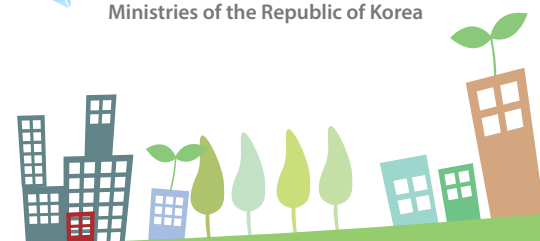# Master Plan for
Building the Internet of Things (IoT)
that leads the hyper-connected, digital revolution

2014. 5. 8

Ministry of Science, ICT and Future Planning
Ministries of the Republic of Korea

CONTENTS

Master Plan for Building the Internet of Things (IoT) that leads the hyper-connected, digital revolution

I Background

- After going through the industrial and information revolutions, our society is currently experiencing a hyper-connected revolution based on the Internet of Things (IoT), in which many objects are connected to the Internet.

  - Though less than 1% of objects are currently connected to the Internet (2.6 billion in number as of 2013), the share will increase (to 26 billion in 2020), bringing diverse innovations and creating business opportunities (Gartner, 2013).

    - Global Market Forecast: USD 200 billion in '13 → USD 1 trillion in '20 (Machina Research, Stracorp 2013)
      Domestic Market Forecast: KRW 2.3 trillion in '13 → KRW 17.1 trillion in '20 (Stracorp 2014)*
    - * Forecasted Global Market Composition: Devices and Parts (38%), SI/ Platform (30%), Service (29%), Network (3%)

- IoT will be used as a means to solve current issues in society in terms of public administration (improving civil services), industry (improving productivity, efficiency, and added-value), and individuals (improving safety, convenience, and other aspects related to quality of life).

  - Small and medium-sized or middle-grade businesses, which will lead to the improvement of industrial competitiveness in the areas of software, sensors, parts, and devices, and creation and innovation of creative IoT services and products, will be fostered; and security functions will be installed in IoT products and services from the early planning stages.

    - 50% of IoT solutions are expected to be developed by venture companies for the next 3 years (Gartner, 2013).

- Though Korea still lags behind major countries globally in terms of IoT competitiveness, it has enough potential* to stand as a leader of the global market with its top-class ICT infrastructure and manufacturing capacities.

  - * Korea is ranked the second in IDC's 'Internet of Things Index' following the United States (IDC, 2013).

‖ <Ref> Policies of Major Countries ‖

US	• US chose the 'Internet of Things' as one of the 'Six Technologies with Potential Impacts on US Interests Out to 2025', and established a technology road map ('08). • It is carrying out the 'Reshoring Initiative' for innovating the manufacturing industry using the IoT ('10)
Europe	• EU chose the Internet of Things as an Action Plan for Europe ('09). • UK announced investment of GBP 45 million into R&D of IoT ('14.3.9) • Germany plans to increase productivity of its manufacturing industry by 30% through Industry 4.0 that uses the IoT.
China	• China announced the '12-5 Plan for Development of the Internet of Things' as part of the 12th 5-year plan (2011~2015) ('11) • It is building IoT pilot complexes (193 including one in Wuhan) targeted toward facilitating use of the IoT and cloud as strategic measures
Japan	• Japan has been implementing IoT industry policies through u-Japan Strategy ('04), I-Japan 2015 Strategy ('09), Active Japan ICT Strategy ('12), etc.

Market Trend and Ecosystem Analysis

◉ **[Market Trend]** Leading businesses of the world are competing to develop a dominating platform and standards in order to take lead in the IoT ecosystem based on their core competencies.

- They are seeking for mutual competition and cooperation, not knowing who will be the winner, as there is no dominate provider as of yet.
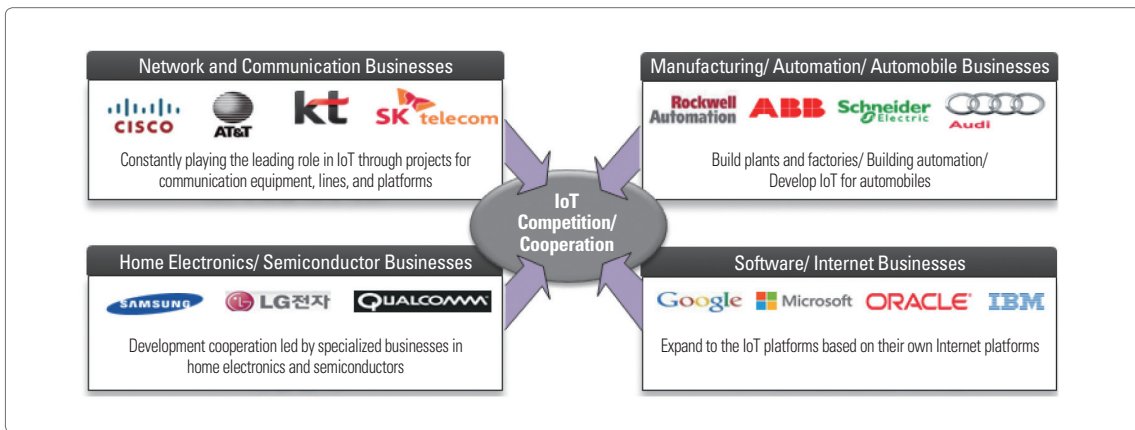
◉ **[Ecosystem]** The market ecosystem is transforming itself into an open one where anyone can easily develop and provide services and access and use of things via smart phones or mobile apps.

- It is a market where small and medium-sized venture companies with creative ideas can take lead in, as there are a variety of applicable areas including the public sector, industries, and consumer products for daily life.

Type	Ecosystem Status
Service (S)	• (Government) Though various pilot projects were implemented, they were not widely applied due to the burden of development and operational costs. • (Industry) It was mostly large businesses that introduced IoT; there was a low rate of IoT introduction by SMEs due to cost constraints. • (Individual) Global businesses are competing with each other in the areas of wearable devices, home electronics, and automobiles. SMEs are making efforts to make their way into the market of diverse areas of consumer product application.
Platform (P)	• Large businesses in Korea are developing the platform, but they lack leadership in the global market. • As SMEs in Korea lack platform, it is difficult for them to enter the market; they are even likely to be dependent on global businesses. • Global standardization is in progress based on oneM2M* (established July '12 and to be completed in August '14)
Network (N)	• Technologies are being developed, which use software to process the rapidly increasing traffic in a flexible manner • There is an increasing demand for non-licensed low-power, long-distance band to interconnect objects of remote areas. • Infrastructures such as 5G, Giga-Internet, and IPv6 are being developed and constructed to facilitate IoT.
Device (D)	• After the widespread take up of smart phones, global companies are now competitively developing augmented, intelligent, and converged devices. • The market is forecasted to expand based on wearable devices and smart sensors.
Security (Se)	• As there are increasing cases of security breaches in IoT services (for home, home electronics, and healthcare), countermeasures are being discussed. • Technologies and services should be developed, where functions for security and privacy protection are installed from the designing stage.

* oneM2M : Standard development institutions around the world – Europe (ETSI), North America (ATIS and TIA), China (CCSA), Japan (ARIB and TTC), and Korea (TTA) - officially launched oneM2M (in July 2012), in which 267 businesses including Cisco, Huawei, 3M, Intel, IBM, and Oracle have joined (there are 13 Korean businesses including Samsung Electronics, LG Electronics, SKT, KT, LGU+, etc.).

III Vision, Goal, and Strategy

[Vision: A Leading Country in Hyper-connected Digital Revolution]

▶ One of the leading countries in the world where citizens, businesses, and the government are actively developing and using IoT services.
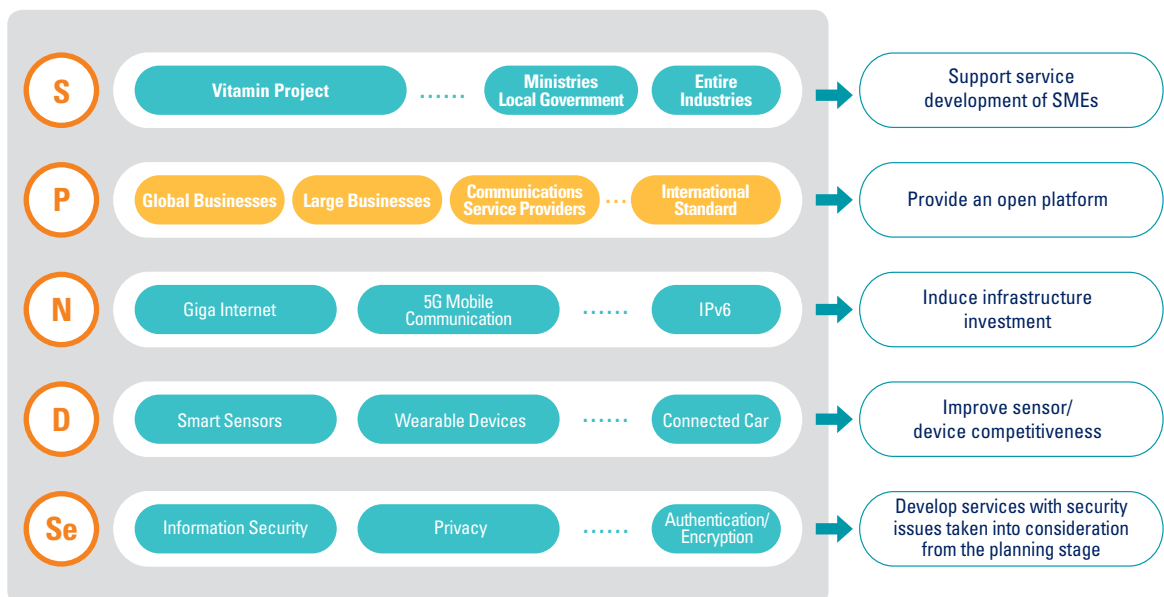
[Goal (2013 → 2020)]

Type	2013	2020
Domestic market volume* expansion	KRW 2.3 trillion	KRW 30 trillion
No. of SMEs and mid-grade export businesses	70	350
No. of employees in SMEs and mid-grade businesses	2,700	30,000
Productivity and efficiency increase in user companies	30% increase	

* Market volume does not include the value-added impact of IoT applications to other industries.

[Strategy 1. Increase Collaboration Among Players in the Ecosystem (SPNDSe)]

▶ The government will collaborate with global businesses, large businesses, and communication service providers to develop an open platform, upon which other businesses that make up the entire ecosystem can participate and further cooperate in developing IoT products and services.

▶ Collaboration between the entire government (ministries and local governments) and the private sector (businesses) will be encouraged for IoT services to reach industries and expand throughout the entire country.

‖ IoT Ecosystem Strategy ‖

S — Vitamin Project ······ Ministries Local Government · Entire Industries → Support service development of SMEs

P — Global Businesses · Large Businesses · Communications Service Providers ··· International Standard → Provide an open platform

N — Giga Internet · 5G Mobile Communication ······ IPv6 → Induce infrastructure investment

D — Smart Sensors · Wearable Devices ······ Connected Car → Improve sensor/device competitiveness

Se — Information Security · Privacy ······ Authentication/Encryption → Develop services with security issues taken into consideration from the planning stage

[Strategy 2. Promote Open Innovation]

◉ **[As-Is: Closed Ecosystem]** Each of the user institutions and businesses are developing and building applications software, platforms, or servers on their own in a closed manner, causing a low rate of performance expansion.

→ **[To-Be: Open Ecosystem]** Anyone can develop and provide services using an open platform. In such an open innovation ecosystem, ideas are then developed into services, creating an environment where the potential for each individual can be maximized.

| Category	As-Is	To-Be
Method	Closed Innovation	Open Innovation
Concept	Service A Service B Service Z · · · Platform A Platform B Platform Z · · · Sensor Sensor Sensor Sensor Sensor Sensor	Service A Service B · · · Service Z Open Platform (Open Test-bed) Sensor Sensor Sensor Sensor Sensor Sensor
Stages	• Government: Government selects pilot services to be led by the government (decision-making on requirements, functions, methods, etc.) → Secure budget and order projects • Private sector: Private sector obtains order for each project (SI provider – small and medium-sized subcontractor) → Develop/ construct according to the requirements of government pilot projects • Government: Each government institution builds and uses systems separately	• Government: Government provides an open platform environment for service development and provision (under collaboration with global/large businesses and communication service providers) • Private sector: Private sector transforms ideas into services and provides them (supporting service development of small and medium-sized venture companies) • Government: Government purchases and uses private-sector services
Features	• There is a lack of interoperability between each system as well as redundant system development • There is a burden of expenses for development, construction, and operation • It is difficult to respond to environmental changes	• Interoperability is improved and data can be connected and used • Realization of economies of scale and scope can minimize the cost burden • Flexible responses are ensured when there are environmental changes

[Strategy 3. Develop and Expand Services Targeted Toward the Global Market]

◉ Korea's strengths are in ICT infrastructure, human resources, application technologies, manufacturing capabilities, citizens' experiences and capacities in using ICT, etc.

◉ However, it also has many weaknesses including a small domestic market, lack of source technologies in the areas of sensors, parts, and software, lack of experience in leading international standards, and lack of global marketing capacity.

→ The government will develop products and services under cooperation with global businesses, and step up partnerships and cooperation so that both can enter the global market together.

→ Application of new software services that are based on an advanced manufacturing industrial sector will innovate the added-value of products and increase productivity and efficiency, further enabling mutual growth of both the traditional industries and new software service industries.

[Strategy 4. Develop Customized Strategies for Large Businesses, SMEs, and Startups]

▶ The IoT market can be classified into ① a market for home electronics, automobiles, and wearable devices led by global and large businesses; ② a market for small-scale applications led by SMEs; and ③ a market led by startups with ideas.

IoT Market Volume and Features
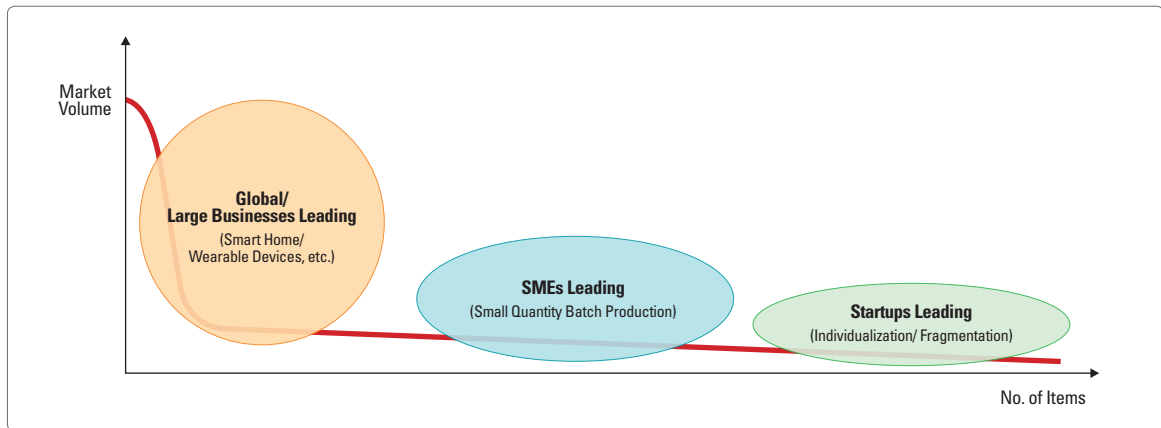
① **For Global and Large Businesses**: Strengthen alliances to secure platform competitiveness and lead open partnerships based on mutual growth and cooperation between large businesses and SMEs

② **For SMEs**: Develop and provide an open platform and test-bed to reduce development costs and time-to-market, and support collaboration among businesses of different areas such as software, sensors, devices, and user businesses

③ **For startups**: Establish an ecosystem for realizing ideas into products and businesses, such as open source hardware or software and D.I.Y. (Do It Yourself, where users can develop products on their own)

Ⅳ Main Tasks

1. Establish and Expand Creative IoT Service Market

[Develop Promising IoT Platform and Expand Services]

① Develop promising IoT services* based on demand from the entire government and the private sector and citizens

   * Healthcare, smart home, smart city, transportation/ logistics, energy, safety, etc.

② Develop an open platform* based on cooperation with platform companies including global, large businesses and communication service providers and also cooperate in verification test-bed construction and standardization

   * A group of development tools and open software (middleware) required for connecting objects onto the Internet and processing data collected from objects

③ Open up the platform to small and medium-sized venture companies and universities with ideas and support their service development

④ Expand the platform and services to all industries and nationwide through pilot services of each ministry, local government, or user business and through the Center for Creative Economy and Innovation

[Develop and Expand New ICBM* Converged Services]

◉ Develop new services that converge data from the public and private sectors with data collected from objects and build a platform for connecting and using ICBM* service development infrastructures**

   * ICBM: Internet of Things (IoT), Cloud, Big Data, and Mobile technologies
   ** Cloud Computing Support Center (NIPA), Korea Big Data Center (NIA), Trans-Eurasia Information Network (TEIN) (NIA), etc.
   ※ Example of ICBM: Smart store management service for analyzing consumption patterns

[Develop User-Oriented Creative Services]

◉ Take steps to establish and expand access to D.I.Y. open labs (IoT Innovation Center and Center for Creative Economy and Innovation) and develop and distribute new products and services through demonstration projects in which users can actively participate and gain hands-on experience

◉ Operate a user-participatory 'Hyperconnected Society Forum (tentative)' to discuss various social issues (regulations and privacy issues), and develop an index measuring users' quality of life

2. Foster Global Businesses Specialized in IoT

[Promote Open Global Partnerships]

⊙ Korea established a 'Global Council of Public and Private Sectors for IoT' and the 'IoT Innovation Center' to improve partnerships between software, device, or user businesses and large businesses/ SMEs (May 2014).

⊙ They aim to foster small yet strong IoT businesses and cooperate for global expansion by providing education for creative entrepreneurship and conducting projects in teams of large businesses and SMEs

Aim	Description	Method
Develop creative IoT entrepreneurs	Develop the finest group of IoT entrepreneurs through team-based education and training	Government-led
Foster specialized SMEs	Organize project teams consisting of global/ large businesses and promising IoT businesses to support product and service development	Government and private sector-led
Cooperate for global expansion	Organize voluntary partnership between businesses at home and abroad → Joint development and investment to technologies and services → Global expansion together	Private sector-led
Build a global cooperative network	Improve global cooperation through online and offline cooperative networks with major countries	Global cooperation

[Promote the Smart Device Industry]

⊙ Enable entry into the device market at a lower cost through open source hardware* development, and lead shared growth by making device/parts-producing businesses cooperate in the process of new IoT service development

* Open source hardware: Circuit diagrams, board plans, and specifications required for hardware development are open and shared, improving access to the device/parts market.

⊙ Promote technology development of next generation smart devices and parts, such as wearable objects, healthcare, subminiature, and ultra low-power devices, and foster businesses specialized in IoT devices and parts

　※ Support systematic test certification and field-tests for new IoT technologies and products

⊙ Install a lab for creative devices to conduct research on an ecosystem specialized for devices and support creative ideas from development to production, commercialization, and global marketing

[Promote Smart Sensor Industry]

⊙ Develop core generic technologies for smart sensor development and commercialization by linking smart sensor R&D to demonstration or pilot projects (under collaboration between Ministry of Science, ICT and Future Planning (MSIP) and Ministry of Trade, Industry and Energy (MOTIE))

- Based on the Plan for Sensor Industry Development (established in December 2012), MOTIE plans to develop technologies for high-tech sensor application and commercialization, which will be applied in major industries from 2015.

- MSIP is promoting development, production, pilot project development, and commercialization of technologies related to smart sensors that are applied to IoT.

[Support Shared Growth of the Traditional Industry and New Software Industry]

◉ Carry out a project aimed to improve productivity and efficiency of traditional industries by 30% through IoT technology application, ultimately to enhance the overall global competitiveness of traditional industries

MSIP	Each Ministry and Local Governments	Private Sector Businesses
• Provide professional consulting • Support IoT businesses	• Support user companies	• Participate in pilot projects

◉ Apply IoT technologies to promising products manufactured by SMEs through locally specialized projects and make the products both smarter and better*

　* Examples: smart medicine bottles managing dosage, smart helmets providing navigation features, etc.

[Comprehensive Life Cycle Support]

◉ Improve 'Support for IoT Commercialization' (R&D → verification → demonstration and expansion), in which the result of R&D conducted in Korea is used in projects for demonstration and expansion for further commercialization

◉ Promote comprehensive support for the entire life cycle of industries from developing ideas of SMEs and venture companies → prototype production → commercialization → global market entry and test certification

　※ Increase synergies by establishing an online and offline cooperative framework with diverse supporting bodies domestically and abroad

3. Establish an Infrastructure for the Safe and Dynamic Development of IoT

[Improve Information Security Infrastructure]

◉ Develop an 'Information Security Roadmap for the Internet of Things' (within 2014) and establish a cooperative framework with other countries (US, Japan, EU, etc.) for prompt responses to and analysis of incidents based on information sharing

◉ Establish a test-bed environment for testing security functions and capacities within the IoT Innovation Center and promote the embedding of security measures within IoT products and services as early as in the planning stage

　- Promote pilot projects in the areas of IoT security such as healthcare and home electronics

◉ Expand development of IoT security technologies such as the security embedded OS installed in IoT products and nurture IoT information security coordinators, who are information security experts

◉ Apply the concept of 'Privacy by Design' from the planning stage and develop privacy enhancement technologies (PET)

[Expand Wired and Wireless Infrastructure]

▶ Expand the wired and wireless infrastructure, such as the 5th generation (5G) mobile communications and giga-Internet, for wider-spread use of IoT (5G to be commercialized by 2020 and giga-Internet to achieve national coverage of 90% by 2017)

▶ Secure additional frequency of 1GHz or wider (by 2023) and expand the IPv6 infrastructure (major subscriber network to be completed by 2017) in response to the exponential rise in traffic due to IoT

▶ Promote the development of low-power, long-distance, and non-licensed band communication technologies for connecting objects of remote areas (V2V/V2I, low-power wifi, TVWS, digital radio sets, etc.)

[Develop Core Technologies and Foster Manpower]

▶ Establish the "Mid- and Long-term R&D Plan for IoT" that links existing R&D projects classified into units with the entire IoT ecosystem (SPNDSe) (2014)

▶ Promote R&D cooperation between the private sector and the military, which will contribute to advancement of the military*, and improve leadership in international standards through joint research with major countries including EU

  * Ministry of National Defence and Ministry of Science, ICT and Future Planning are currently cooperating to develop a converged IT platform and service infra in the area of national defense (MOU signed in April 2012)

  ※ Promote joint research and demonstration projects using Trans-Eurasia Information Network (TEIN) connecting 34 European countries and 19 Asian countries

▶ Develop specialized curricula on IoT after a status survey and manpower supply analysis (2014) → Operate a variety of manpower/HR fostering programs such as ITRC and connecting workers and job seekers

[Establish an Liberal and Competitive Industrial Environment]

▶ As creative IoT products and services are emerging in various IoT application areas, it is forecasted that there will also be areas that conflict with the existing regulations or a need for new ones.

  - For areas that conflict with the existing regulations, the 'Telecommunications Strategy Council'*, which was established based on the Special Act on ICT, will take the initiative in improving laws and regulations.

  * The Telecommunications Strategy Council can find regulations that hinder facilitation of ICT convergence and request related ministries for improvement of these regulations (Article 10 of Special Act on ICT).

  - For new products and services, prompt commercialization of new converged services can be supported through prompt processing and interim licensing* (Articles 36 and 37 of Special Act on ICT).

  * Supportive procedures as specified in the principle of negative regulation (Article 3) of Special Act on ICT

▶ Establish an IoT 'Test-bed' as a regulation-free zone and improve the legal system

REF Examples of IoT Services

[Overview]

◉ Many objects are embedded with sensors, software, and communication functions and connected to the Internet, and can be used as cloud-based services (Everything as a Service).

[Convenient and Comfortable Life Oriented Toward (Individual IoT) Users]

Car as a Service	Healthcare as a Service	Home as a Service
Cars are connected to the Internet → safe and convenient driving	IoT data such as heartbeat and amount of exercise are provided → improved personal health	Living environment is controlled via IoT in an integrated manner → improved convenience and safety
※(Ex) Automatic transmission for emergency rescue, unmanned autonomous navigation, etc.	※(Ex) Heartbeat care service, healthcare bracelets, etc.	※(Ex) Remote control of home electronics and devices, home CCTV service, etc.

[(Industrial IoT) Enhanced Productivity and Efficiency and Creation of New Added-Values]

Factory as a Service	Farm (& Food) as a Service	Product as a Service
Process analysis and facility monitoring → Improved work efficiency and safety	Application of IoT to production, processing, and distribution → Enhanced productivity and safe distribution system	Application of IoT to consumer products → Commercialization of highly value added services
※(Ex) Real-time monitoring of manufacturing facilities, risk detection and alert warning service	※(Ex) Smart farms, food production and distribution traceability service, etc.	※(Ex) Forks that manage eating habits, pillows that send sound of heartbeats, shoes that analyze behavior patterns, etc.

[(Public IoT) Better and Safe Society]

Public Safety as a Service	Environment as a Service	Energy as a Service
Provision of IoT data of CCTV, GPS for the elderly, etc. → Disasters or accidents prevented	Provision of IoT data on air quality, amount of waste, etc. → Minimized environmental pollution	Provision of energy-related IoT data → Improved efficiency of energy management
※(Ex) Safety service for children and elderly, disaster forecast service, etc.	※(Ex) Provision of smart environment information, smart trash can service, etc.	※(Ex) Smart building energy management, smart meter, smart plug service, etc.

REF Worldwide Cases of IoT Application

- **Smart Water System of Doha and Sao Paulo**
  - Large cities like Doha, Qatar; Sao Paulo, Brazil, and Beijing, China install sensors in pumps and water supply and drainage systems, preventing 40~50% less in possible leakage.

- **Intelligent Operation Center of Rio de Janeiro**
  - Possibility of heavy rain can be predicted 40 hours in advance with up to 90% of accuracy based on weather data analysis, allowing early preparation for flooded roads.
  - Response time to emergencies improved by about 30%, and the death toll decreased by 10%.

- **UK's Intelligent Transport System that Reduces Traffic Congestion**
  - UK built an intelligent transport system on the M42 motorway and reduced travel time by 25% and traffic accidents by 50%.

- **IoT Application on Waste Management System in Cincinnati**
  - IoT is applied to the volume-based waste disposal program, in which the volume of waste from each household is monitored and charged.
  - The amount of waste in the city has seen a decrease of 17%, while the recycling rate has seen an increase of 49%.

- **Barcelona's Energy-Saving Smart Streetlights**
  - Sensors are installed in streetlights, enabling automatic control of brightness by analyzing the levels of noise, air pollution, and population density.
  - At least 30% energy savings per year.

- **GE Improving Efficiency of Production Factories with the Industrial Internet**
  - Prompt monitoring of the production line can find the causes for quality deterioration, further reducing the defect rate.
  - Just 1% of efficiency increase in major industries will save USD 270 billion for the next 15 years.

- **Great River Medical Center Connecting Center's Medical Devices via Network**
  - IoT is applied to monitoring the dosages of controlled medicine in anesthesia workstation, tracing medicine dosages in healthcare units, automated secure cabinets, pharmacy conveyors for stock management, etc.
  - Time required for medicine delivery was reduced by 67% from an average of 90 minutes to just 30 minutes, as well as a decrease in stockpiling expenses by USD 400,000.

- **Making Agricultural and Livestock Industries Efficient Using Topcon Tractors, GPS, and Sensors**
  - Controlling tractors not to go over sowed lines again using GPS increases work efficiency by 20% as well as the amount of production.

- **Vitality GlowCaps – Intelligent Pill Caps**
  - Sensors attached on the pill caps inform users by light, sound, SMS, or phone to take their medication on time.
  - GlowCap use increased the adherence rate to more than 98%.

- Wireless Blood Pressure Monitor – Real-time Blood Pressure Monitoring
  - Manufacturer: iHealth Lab, US
  - The monitor is linked to the smart phone app via Bluetooth and monitors blood pressure on a real-time basis.

- HAPIfork – Measuring Eating Speed and Number of Fork Servings
  - Manufacturer: HapiLabs, Hong Kong
  - HAPIfork measures users' eating speed and amount of fork servings to advise on the right eating habits for a healthy diet.
  - Measured records can be synchronized immediately with a smart phone or computer through Bluetooth.

- UrinCare – Smart Phone-based Urine and Feces Management System
  - Manufacturer: IT Health, Korea
  - As a smart phone-based urine and feces management system, UrinCare consists of a diaper embedded with a ZigBee sensor and a detection system.
  - For the elderly or patients who have difficulties in disposing of their urine or feces, the system automatically sends data to healthcare givers or nurses


- Connected Bike – Measuring Speed, Mileage, and Amount of Exercise
  - Manufacturer: Samsung Electronics, Korea
  - Together with the US bike manufacturer Trek, Samsung Electronics developed the 'Connected Bike' that is linked to Galaxy Note 3.
  - The sensor installed in the bike measures speed and miles on a real-time basis, and the rider can check the amount of exercise or distance on the smart phone mounted in the middle of the bicycle handlebars.
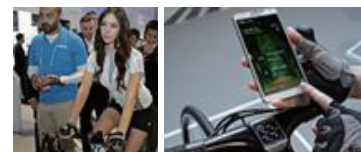
- Lifeband Touch – A Wristband Measuring the Amount of Physical Activity
  - Manufacturer: LG Electronics, Korea
  - Lifeband Touch is a wearable device in form of a wristband that measures the amount of physical activities such as calorie consumption, step counts, and distance traveled by tracing the user's movement.
  - Only by a touch on the OLED screen, the user can check the time and received calls on the smart phone and even play music on the smart phone that may be placed in his/her bag.
 - The band can be linked to both iOS and Android-based smart devices and supports Bluetooth 4.0.
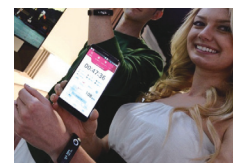
• Smart Band – Providing Health and Exercise Data Through a Mobile Smart Phone

  - Manufacturer: Sony, Japan
  - Smart Band provides data on health and exercise via a smart phone.
  - It shows the data of a certain date or time, such as how many hours the user walked or slept, through the 'Life Log' app.

• A-Scan – Measuring Alcohol Density with a Breathalyzer Device

  - Manufacturer: ACEN, Korea
  - A-Scan is a product that measures and manages the alcohol density of a user.
    · The user can receive useful information on drinking and health through the app, and consistent delivery of messages containing the risk of drunk-driving which in turn, helps prevent drunk-driving.
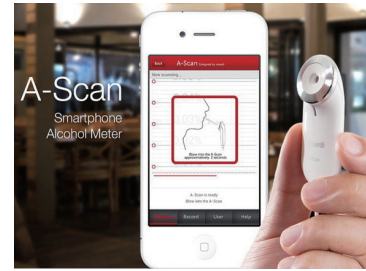
• i-Limb – World's First Prosthetic Hand

  - Manufacturer: Touch Bionics, UK
  - As the world's first prosthetic hand developed for commercial use, i-Limb was recognized as one of the best inventions by TIME in 2008.
  - I-Limb was introduced in CeBIT 2014 (Hanover, Germany), where UK Prime Minister Cameron and Germany Chancellor Merkel together visited and observed the product demostration.


• Tennis Sensor – Analyzing Movements When Playing Tennis

  - Manufacturer: Sony, Japan
  - A sensor attached to the end of a tennis racket analyzes swing speed and ball movement.

• Babble - Baby Care Communicator for Hearing-Impaired Children

  - Manufacturer: Moneual, Korea
  - Babble is a system consisting of a station, or the main body, and a bangle, or a wearable watch.
  - The sensor attached to the station detects baby crying, temperature, and humidity, and informs the parents of the baby's condition with vibrations and lights through the bangle and smart phone using the Bluetooth network.
  - Sensor virtual machine (SVM) technology is applied, which was developed by ETRI for sensor search, connection, and sensing data processing.
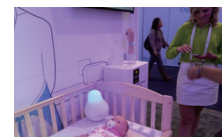
• I-Remote Application – Remote Control of Vehicle

  - Manufacturer: BMW, Germany
  - The amount of charged electricity, condition of vehicle management, locking of the sunroof, doors, and windows of BMW i3 can be checked at a glance via Galaxy Gear.
  - In addition, the S voice function is also embedded, allowing voice input of destination address to the navigation system as well as vehicle control.

- **Pebble – Informing Location, Door Lock Status, and Fuel Level**
  - Manufacturer: Mercedes-Benz, Germany
  - Pebble is a wearable device in form of a wrist watch that delivers data on the location, door lock status, and fuel level of cars.
  - The driver can receive almost all data required for driving without having to look at the dashboard.

- **Planty – Smart Flowerpot**
  - Manufacturer: nThing, Korea (to be released to the market)
  - Planty is a smart flowerpot which provides water, light, and other things required for plant growth based on the user's control through smart phone.
  - An open platform technology, Mobius 1.0, which was developed by KETI, is applied in the Planty-smart flowerpot.


- **RGB Lamp – Controlling Colors and Light Output**
  - Manufacturer: NXP, Europe
  - RGB lamps use NXP JN5168 micro-processors and SSL5001 SSL drivers, and communicates through ZigBee and JenNet-IP.

- **Alljoyn – Open Source Networking Platform for Direct Communication Between Devices**
  - Manufacturer: Qualcomm, US
  - The Alljoyn open source platform pursues connection of objects so that all products, devices, and services can communicate regardless of the producers or operation systems.
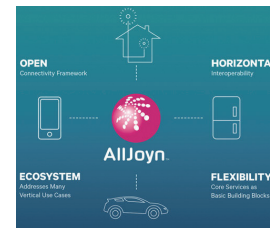
- **TRACK.r – Product Registration and Management Through Smart Phone**
  - Manufacturer: IT-1, Korea
  - Products are easily registered using the app specially developed for smart phones.
    · If a product registered to the smart phone gets out of a certain distance, the smart phone and the product send the first warning; if it gets out of the second limit, they send the second warning along with the location data to other contact points that have been additionally registered.

- **Epi – Measuring Skin Moisture and Exchanging Data via SNS**
  - Manufacturer: Ahrong Eltech, Korea
  - Epi is a tripolar sensor that measures the skin moisture level. Comparison with other users is possible through the app.
    · Users can exchange opinions via SNS, and obtain customized information and feedback for each age group, skin condition or part.

- **Bag2Go – A Bag that can Detect Theft or Damage**
  - Manufacturer: T-Mobile, Airbus, Rimowa
  - Bag2Go is a carrier with wireless network and GPS features that immediately alerts the user when it is stolen or damaged by anyone other than the owner.
  - It was introduced in CeBIT 2014 (Hanover, Germany), where UK Prime Minister Cameron and Germany Chancellor Merkel together visited and observed the product demostration.

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Master Plan for
Building the Internet of Things (IoT)
that leads the hyper-connected, digital revolution