ETRI
Open Source
Annual Report
2021

R&D
Innovation with
Open Source

National **AI** Research Institute,
Making a Better Tomorrow

ETRI

CONTENTS

ETRI Open Source
Annual Report 2021

R&D Innovation with
Open Source

ETRI
Electronics and Telecommunications
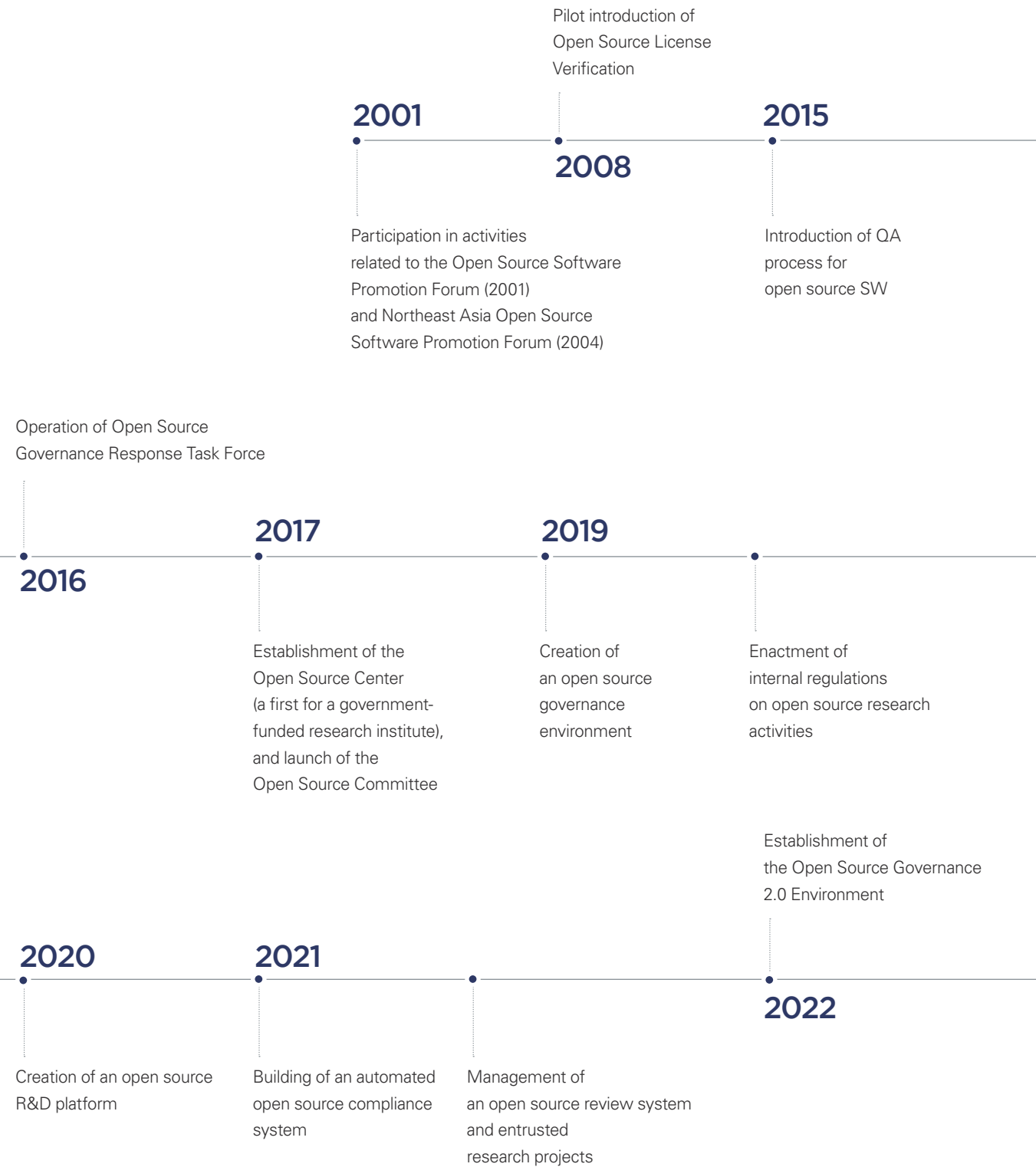Research Institute

President's Message

Intellectualization and digital transformation through the convergence of AI are important topics in the global ICT field, and are recognized as key factors swaying a nation's future competitiveness. The Korean government has set out strategies for digital transformation to gain traction in all fields of industry, in order to enhance Korea's global presence and promote new industries. One of the keys to realize an intelligence-based digital transformation is software (SW) competency, given that SW technologies have facilitated innovations in most ICT fields recently. In particular, SW development through open cooperation using an open source code can also help accelerate technological innovation.

In 2019 the Electronics and Telecommunications Research Institute (ETRI) declared its plan to transform itself into a comprehensive national intelligence research institute. Since then, ETRI has been duly committed to securing national growth engines through AI, by establishing AI implementation strategies, the ETRI Medium and Long-Term Technology Development Roadmap 2035, an AI academy, and so forth, in order to improve the quality of life of the people by carrying out R&D activities. ETRI is also the first government-funded research institute to have established an open source governance system, involving measures such as enacting relevant regulations to support open source-based R&D. ETRI also offers a platform that supports both external and internal cooperation backed by open source in carrying out R&D. Through these initiatives, it aims to ensure that open source activities play an integral role in revamping its existing research culture. Moreover, it plans to contribute to creating an open R&D ecosystem by revitalizing market linkages with the research being carried out by other government-funded research institutes or various community organizations. It duly pledges to pursue innovation through open cooperation, by expanding its open source governance system and cooperation platform into the relevant areas of the private sector, and also to create new business opportunities.
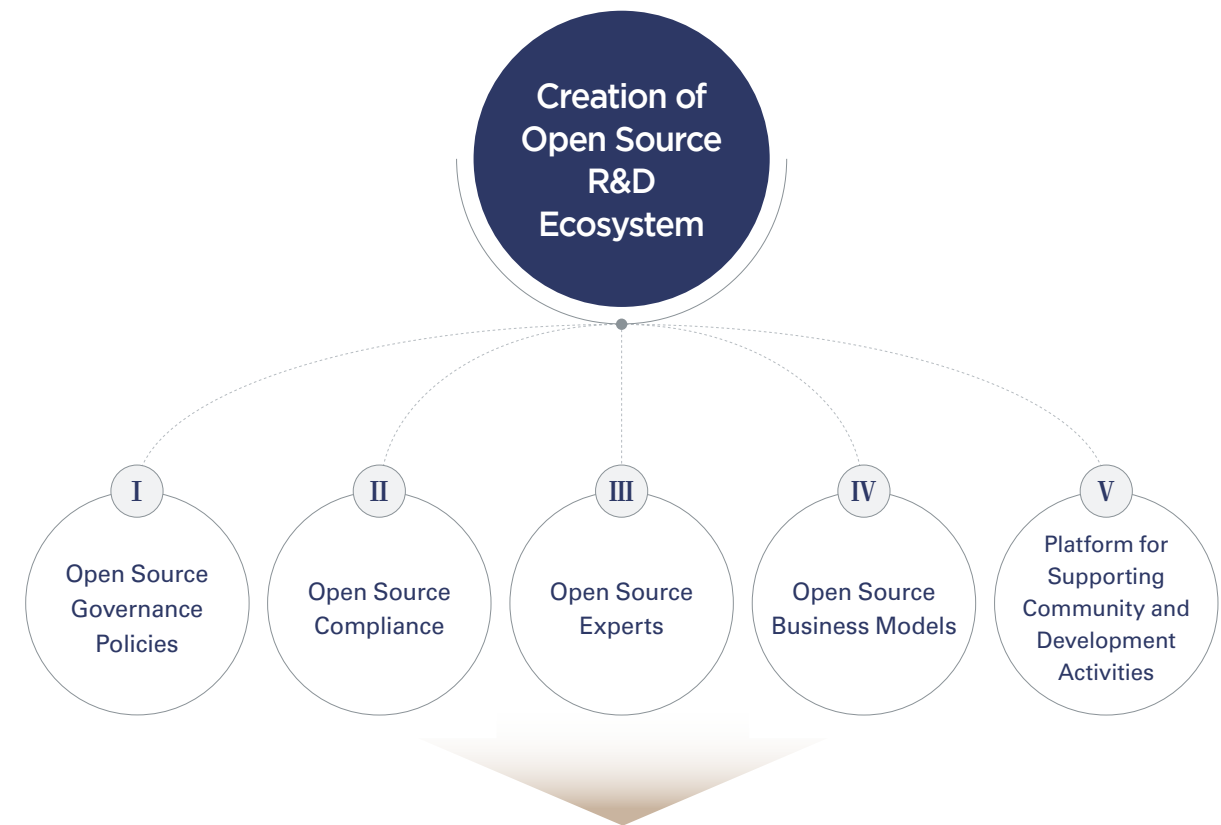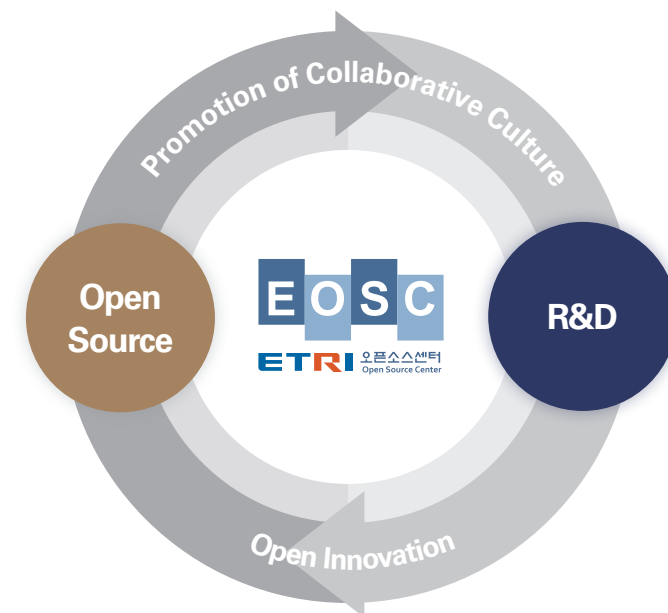
President of ETRI, *Kim, Myung-Joon*

Open source is a core capability required for open innovation of the existing R&D culture, and promises to create the critical value that it aspires to attain with it.

History

2001

Participation in activities related to the Open Source Software Promotion Forum (2001) and Northeast Asia Open Source Software Promotion Forum (2004)

2008

Pilot introduction of Open Source License Verification

2015

Introduction of QA process for open source SW

2016

Operation of Open Source Governance Response Task Force

2017

Establishment of the Open Source Center (a first for a government-funded research institute), and launch of the Open Source Committee

2019

Creation of an open source governance environment

Enactment of internal regulations on open source research activities

Establishment of the Open Source Governance 2.0 Environment

2020

Creation of an open source R&D platform

2021

Building of an automated open source compliance system

Management of an open source review system and entrusted research projects

2022

Vision & Goal

Creation of Open Source R&D Ecosystem

I Open Source Governance Policies

II Open Source Compliance

III Open Source Experts

IV Open Source Business Models

V Platform for Supporting Community and Development Activities

Establishment of Cooperation-based
Open Source R&D Activities as Innovative R&D Culture

Promotion of Collaborative Culture

Open Source

EOSC
ETRI 오픈소스센터 Open Source Center

R&D

Open Innovation

ETRI

OPEN

**ETRI Open Source
Annual Report 2021**

SOURCE

CENTER

EOSC
ETRI 오픈소스센터

I

OPEN SOURCE
GOVERNANCE

I

OPEN SOURCE GOVERNANCE

> Under the vision of "Maximizing research outcomes by creating an open source-based R&D innovation platform," ETRI pursues research culture innovation by enhancing its collaboration-based development environment, cultivating expert personnel, and promoting a community-oriented cooperation culture through open source activities.

1

Key Strategy and Agendas

Recently, the proportion of open source use in the software industry and R&D environment has continued to increase, and ETRI has endeavored to bring about innovations in its research culture through cooperative research, leveraging openness and sharing.

Recognizing this paradigm shift in the software industry, in December 2020, the Korean government amended the "Software Promotion Act," in order to stipulate the promotion of open SW-based research and technology development. Through its announcement of the "Higher Value-Added Software-Oriented Software Ecosystem Innovation Strategies" in June 2021, the Ministry of Science and ICT plans to push innovation in the Korean software industry ecosystem using open source SW.

With its vision of "Maximizing research outcomes by establishing and operating of an open source-based open R&D innovation platform," ETRI seeks to achieve research culture innovation by setting detailed goals, such as strengthening risk management for increased open source use, enhancing its collaboration-based development environment for sustainable community activities, developing experts by conducting open source activities, and promoting a community-based cooperation culture. To this end, ETRI has established internal open source policies, implemented relevant systems, and continuously seeks improvements. It also handles the basic matters related to open source governance through its operation of an the Open Source Committee, open source Special Fellows, and an open source review system. In order to respond to open source governance more systematically and efficiently, ETRI operates the ETRI Open Source Center, a dedicated department, and more recently is also operating an open R&D platform supporting open source R&D activities and an automated open source license compliance system. In addition, ETRI became the first Korean government-funded research institute accredited for compliance with the ISO 5230 OpenChain Project by the International Organization for Standardization (ISO) in 2021. As such, ETRI is an internationally recognized institution with reliable open source SW development capabilities.

ETRI will share its open source governance experiences and achievements with other government-funded research organizations, private research institutes, industry and academia through open source community activities as well as internal and external community support platforms, thereby contributing proactively to creating an open R&D ecosystem.
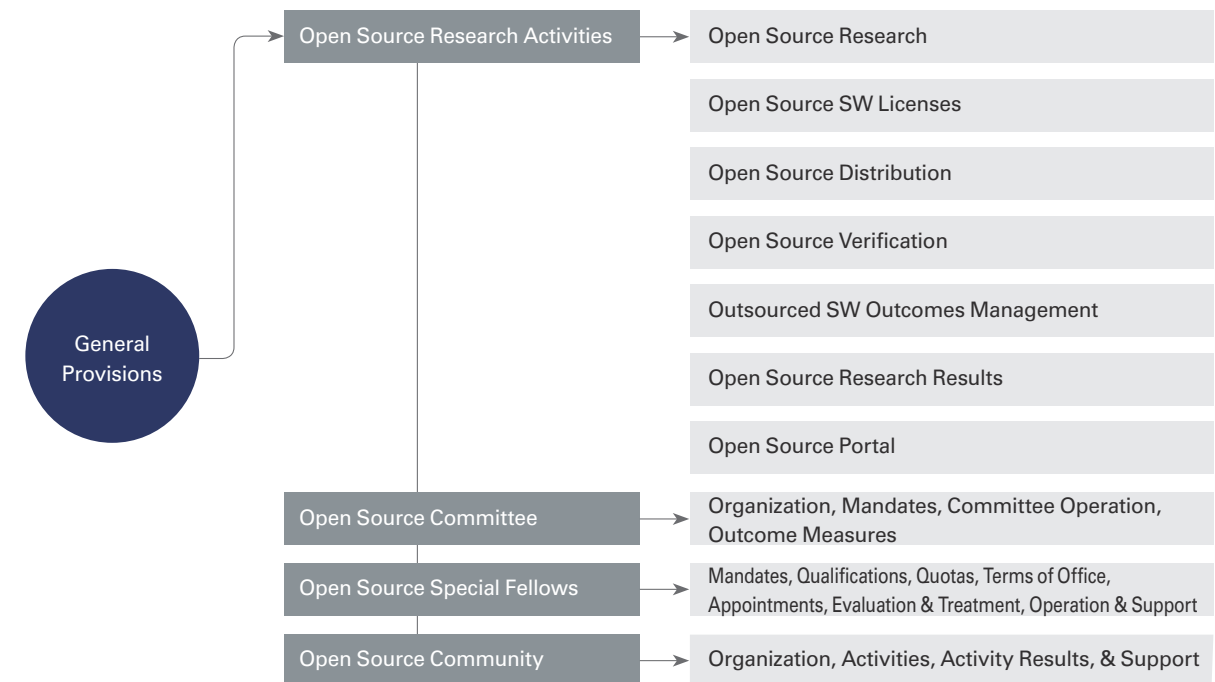
2

Policy

In 2017 ETRI established its Open Source Center, which has operated since then as an organization dedicated to supporting institute-wide, systematic open source R&D activities. ETRI also promotes the following policies to further advance its open source governance:

Establishment of Guidelines on Open Source Research Activities (Internal Regulations)	Open Source R&D Standards Process Development, and Life Cycle Implementation
Building of Open Source Supply Chain System	Operation of Open Source Committee and Open Source Special Fellows
Development of Business Model for Open Source Technology Transfer and Sharing	Establishment of Open Source License and Security Vulnerability Verification System
Support of Repository Environment for Sharing and Development of SW Outcomes	Laws, Education, and Public Relations Concerning Open Source

3

Internal Regulations

As institutional support for research activities has become ever more necessary with the increase in open source utilization in its R&D activities, ETRI has devised its "Guidelines on Open Source R&D Activities," a first ever for a government-funded research institute, and has applied them since January 2019. The Open Source R&D Activity Guidelines deals with general matters as to basic open source research activities, the Open Source Committee, the Open Source Special Fellows, and open source community activities.

Guidelines on Open Source R&D Activities

General Provisions

Open Source Research Activities
- Open Source Research
- Open Source SW Licenses
- Open Source Distribution
- Open Source Verification
- Outsourced SW Outcomes Management
- Open Source Research Results
- Open Source Portal

Open Source Committee → Organization, Mandates, Committee Operation, Outcome Measures

Open Source Special Fellows → Mandates, Qualifications, Quotas, Terms of Office, Appointments, Evaluation & Treatment, Operation & Support

Open Source Community → Organization, Activities, Activity Results, & Support

4

Governance

All departments within ETRI, including the R&D departments and the Planning and Administration cooperate to ensure institute-wide responses to open source governance issues, with the Open Source Center, an organization dedicated to overseeing those responses, having a central role. ETRI provides diverse support to this end, ranging from its community and R&D platforms to training in and consultation on open source-based research activities. In these ways, it promotes open source collaboration externally, and establishes open source-based R&D activities as a culture through Inner Source collaboration internally.

Meanwhile, institutional support is meanwhile also essential to facilitating open source R&D activities. To this end, ETRI provides support through collaboration among various departments, including those responsible for planning, administration, systems, quality management, business management, intellectual property, procurement, public relations, and so on. ETRI has also been collaborating with external organizations, including government agencies and related institutions, on issues such as the policies or institutional improvements needed to revitalize open source R&D and the open source ecosystem. ETRI continuously endeavors to revitalize the open source ecosystem by maintaining close collaboration with industry, government-funded research institutes, national defense agencies, and other groups of the external community.
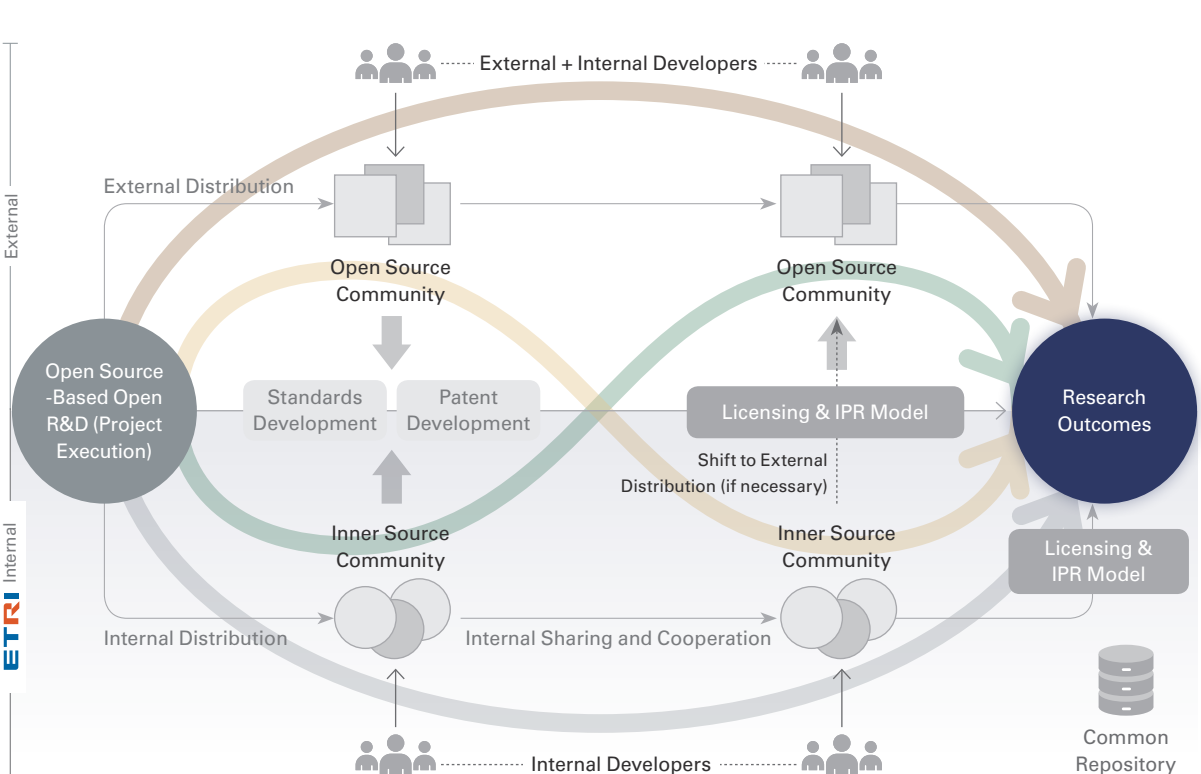
5

R&D Model

ETRI offers support for establishing and carrying out the most optimal R&D implementation strategies, in accordance with the nature of the diverse forms of projects concerned. It proposes different forms of R&D models, depending on the times and methods for development of the SW results that have been developed or are being developed through the R&D process. Notably, these open source R&D execution models all have the common goal of realizing open cooperation as their core value, and promote constant R&D innovation through cooperation with external organizations, let alone internal cooperation.

ETRI has been encouraging free and continuous community activities by internal and external participants, and this has contributed to revitalizing open source communities and promoting a new cooperative R&D culture led by government-funded research institutes. With this open source community-based cooperative R&D, this culture is has been leading to diverse R&D innovations and changes within the institute by strengthening Inner Source capacities of internal R&D projects and playing a pivotal role in creating an open R&D ecosystem as a critical medium for sharing innovation.

ETRI has established an open source R&D standard process and operates the ETRI Open Source Compliance·Community Platform, through which it seeks to enhance the government-funded open source activities led by research institutes to maximize future ICT R&D research achievements through open R&D innovation.
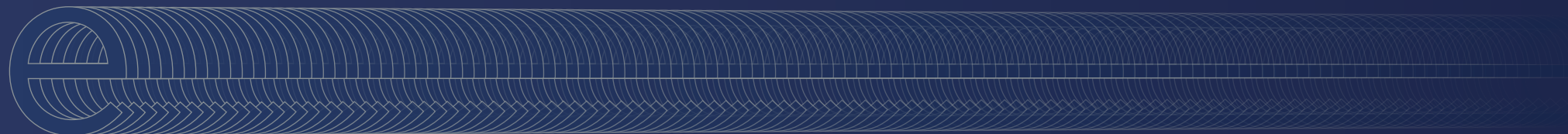
ETRI Open Source Governance Response Structure
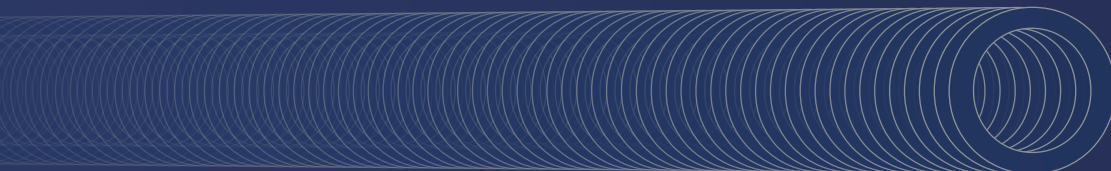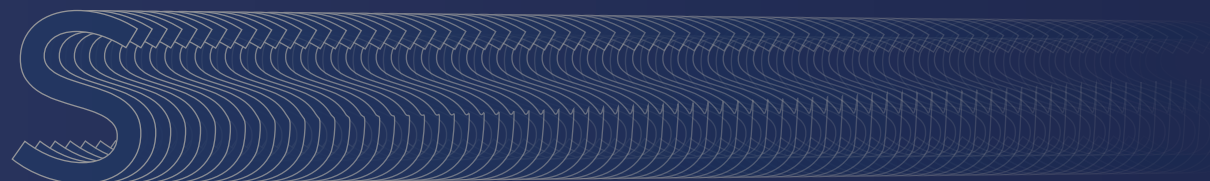

ETRI Open Source R&D Execution Model

ETRI

OPEN

SOURCE

CENTER

EOSC
ETRI

**ETRI Open Source
Annual Report 2021**

II

OPEN SOURCE
R&D ACTIVITIES

II   OPEN SOURCE R&D ACTIVITIES

> ETRI has diverse sets of policies and support systems in place, including its standard process for open source governance, open source compliance process, open source review system, education & training programs, among others.

1
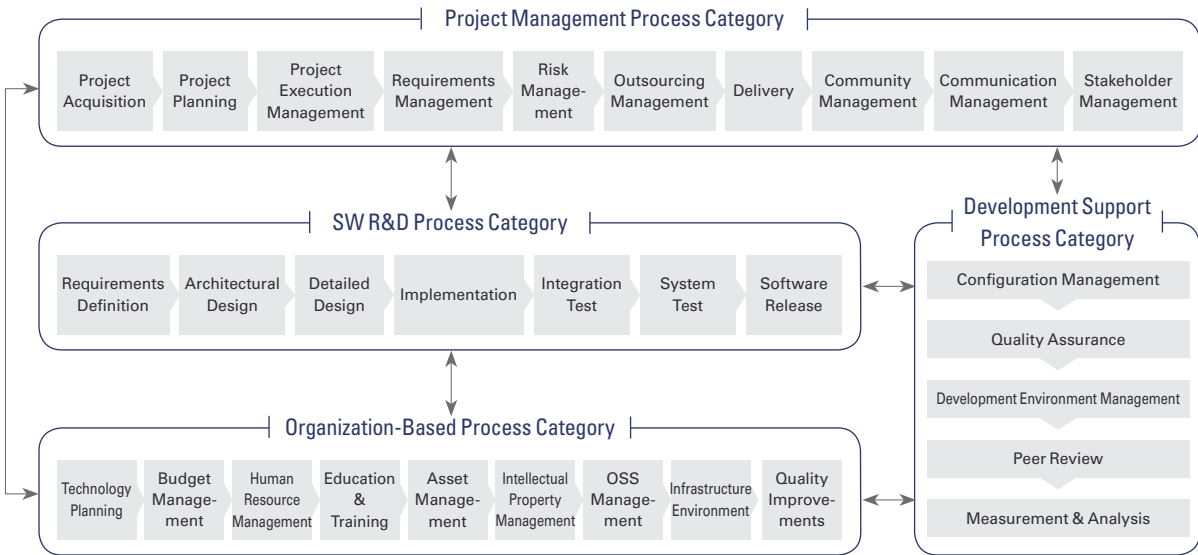## Open Source R&D Standard Process

ETRI has established a systematic "ETRI R&D Standard Process," so as to ensure implementing more effective and efficient R&D work. It employs this process in all R&D projects.

The ETRI R&D Standard Process comprises several categories of processes – the project management process category, required for R&D project implementation; the SW R&D process category, employed in implementing diverse projects; the development support process category; and the organization-based process category. For each project, its scale, characteristics and customer demands are all taken into account in order to adjust and utilize the process optimally geared to project execution.

The existing standard process was extended for carrying out open source R&D tasks, by adding the following processes:

- Community Management Process
- Software Release Process
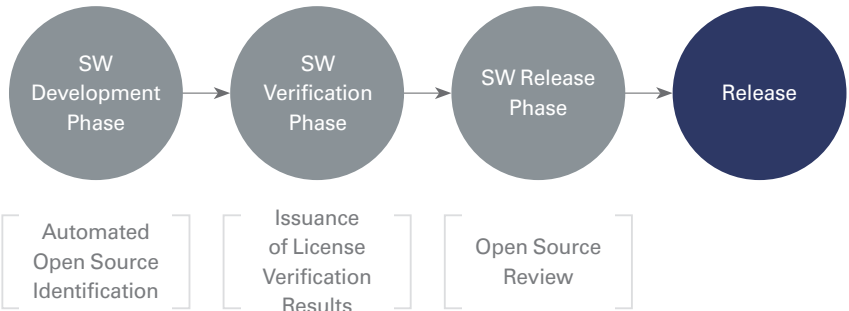- OSS Management Process

Standard Process for Open SW R&D

2
Open Source Compliance

ETRI has established a management system for addressing potential risk factors[1] that might arise when open source is used in its R&D processes. With open sources being increasingly used around the globe, open source compliance[2] has gotten recognized as more than merely responding to inspections, but as a core element in a researcher's R&D process.

To minimize the risks arising due to open source utilization, ETRI has prepared individual response systems suitable for the SW development phase, SW development completion phase, and SW release phase. For the SW development phase, it provides an automated open source identification function by integrating the repository and compliance system. For the development completion and SW release phases it has mandatory processes in place. To this end, ETRI operates an open source license verification procedure to check for any open source license violations. The open source SW license verification results obtained through this verification process include information such as conformity with license obligations for open sources used, the existence of patent retaliation clauses, and security vulnerability and dependency assessment results.

While the ETRI open source compliance verification functions, such as license verification and vulnerability and dependency assessments, are being strengthened, they are also getting more modernized and advanced through process automation so that verification efficiency during the development process can be maximized.

Open Source Compliance Response System

SW Development Phase → SW Verification Phase → SW Release Phase → Release

Automated Open Source Identification | Issuance of License Verification Results | Open Source Review

1 Open source risk factors: Legal risks that could be introduced if the SW development outcomes are achieved while violating obligations specified in the license for open sources used;

2 Open source compliance: A process for minimizing open source risks by meeting open source license obligations

3

Supply Chain Management

The scope of supply chain management in government-funded research institutes covers both SW developed externally, through entrusted research projects, commissioned research projects, and joint R&D projects, as well as SW developed internally that is provided to external users through technology transfers. From 2021, ETRI has officially institutionalized open source management for external research projects.

For management of open sources for SW developed through entrusted research projects, it is required that the following items be submitted when contracting for the projects:

- Open Source Management Plan, Verification Results, Verification Schedule
- Open Source License & Intellectual Property (Patent) Management Plans
- Open Source SW License Verification Results

In addition, when the SW outcomes of an entrusted research projects are inspected, it is required that the "Open Source SW License Verification Results" be submitted, to check whether the SW outcomes were managed in step with the open source management plan.

ETRI is also constantly providing training and guidelines on open source management plans when it contracts research projects, and up-and-coming plans to also promote open source management for commissioned research projects or joint research projects. In addition, the Institute is considering management of SW versions and vulnerabilities through adoption of SBOM (Software Bill of Material) system, which has gained greater traction in supply chain SW management.

4

Open Source Review System

Since an open source management system is required for the distribution of its own SW development outcomes, including releases of SW or technology transfers, ETRI has introduced its "Open Source Review System" in order to comprehensively inspect the use and development of open source codes, open source licenses, and intellectual property rights (patents, copyrights) prior to releasing its SW outcomes to the public or making technology transfers.

The Open Source Review System is a system by which the institute inspects potential risks related to the release of its SW outcomes in advance, with the key matters for deliberation denoted as follows:

- Propriety of use of open source & intellectual property information
- License definition & adequacy of obligation fulfillment
- Appropriateness of license verification information

5

Open Source Community

For the success of open source activities, it is essential that a system be established that enables free open source community activities by internal and external participants, so that the released open source projects can be continuously expanded and advanced.

ETRI undertakes varied initiatives for operating an open community for open sources and creating an ecosystem for cooperation with external actors, let alone between internal departments. Focusing on open SW projects, it has developed the relevant regulations to foster efficient implementation of internal open source research activities, and provided community activity guidelines along with online and offline spaces for collaboration, including a collaborator's repository for open source project activities. To establish a collaboration-based open source R&D culture, the institute strives to achieve open source-based R&D innovation through openness and collaboration, by enhancing the quality of its research outcomes, and maximizing productivity right from the R&D phase. With such an open source-based collaborative R&D, this culture will lead to strengthened Inner Source capacities of internal R&D projects using confidential technology to the outside, thereby facilitating internal R&D innovation and change as well as playing a central role in sharing innovation.

ETRI plans to prepare a framework for carrying out joint research through mutual exchanges with other government-funded research institutes engaging in open source-based research activities, and also to share its experiences with other such institutes that are preparing to establish open source governance systems. ETRI plans further to engage in open source activities in diverse fields, by forging an open source alliance together with government-funded research institutes engaged in open source activities, and encouraging exchanges and cooperation among them.

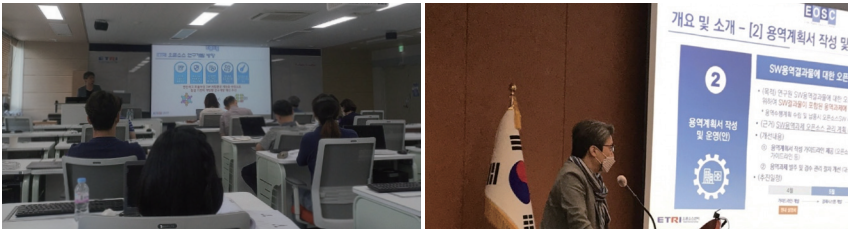Presentation by Korea Institute of Energy Research (KIER)

Government-Funded Research Institutes Open Source Community Cooperation Meeting (June 2021)

6

Education & Training Program

ETRI devotes itself to enhancing its researchers' awareness of open source and consolidate its open source development capacities through provision of diverse education & training programs supporting open source R&D activities. Notably, it has adopted a variety of media in online and offline to ensure efficiency in its provision of education & training in this contactless environment.

The scope of those participating in ETRI's open source education & training programs has now been gradually expanded from new employees to project managers, while the educational purposes have grown more diversified as well. Educational & training materials for open source developers are also being developed, to facilitate regular promotion and education as to open source R&D activities.

ETRI also provides education & training programs customized for open source R&D innovation, and strives to enhance an understanding of the overall processes involved in open source governance and facilitate open source activities. Through its provision of training on the relevant systems and open source tools for creating an open source R&D environment, ETRI continuously endeavors to establish open source governance.

Education Programs

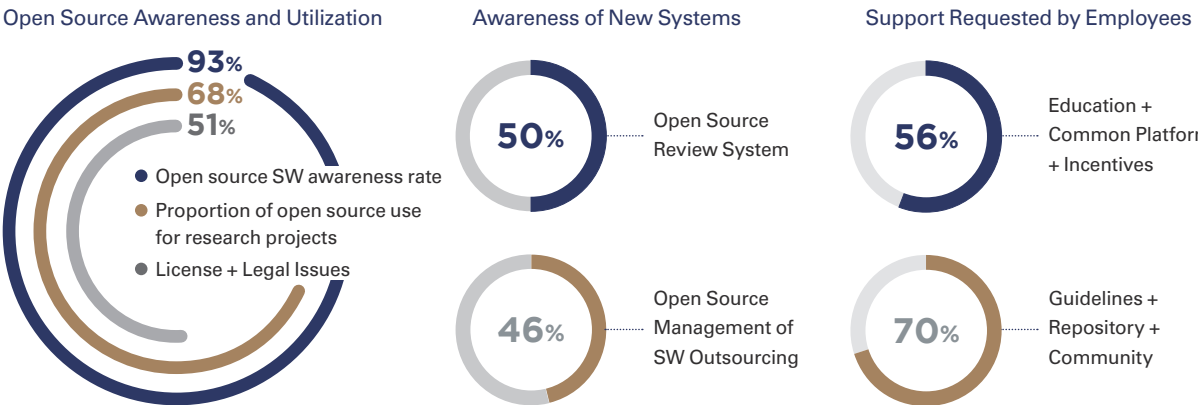| Type	Title	Description
Management-Level Employees Group	Education for management of the Research Department (for executives and directors)	Education for understanding of open source and the importance of open source management
	Education for management of the Administration Department (for directors, department managers, & senior managers)	Education for the understanding & utilization of open source
	Education for open source managers (for senior managers of the Research Department)	Education for understanding of open source, ETRI's open source response status, and introduction of strategies
General Staff Group	Education on open source license verification tools	Education on use of license verification tools, including the importance of license compliance & open source verification methods
	Internal on-the-Job Training	Training as to legal support of issues that can arise during use of open source for research projects, such as potential license violations, patent retaliation clauses, & training on license selection procedures
	ETRI AI Academy Education & Training	Training as to understanding of open source R&D activities for AI SW development and their importance, as well as for understanding & practicing use of GitHub for utilization & release of open source code
	Training on open source repository	Training on use of the repository (GitHub/GitLab) required for developing & using open sources
	Open source training for new employees	Training to raise awareness of open source SW R&D processes & open source R&D activities, and training for understanding of open source governance
Provision of Guidelines	Development & provision of various guidelines required for research activities	Have developed & released on open source R&D portal with about 10 types of posted guidelines related to license verification, public disclosure, community operations, and so forth
Joint Activities	Seminars by guest experts	Sharing recent trends & issues related to open source

7

Awareness

Since the establishment of Open Source Center as a dedicated organization in 2017, ETRI has begun dealing with open source management in full-scale, and devoted diverse efforts to support open source-based R&D activities. In particular, with open source being a tool for R&D process innovation and transformation to a new research culture, ETRI has also devoted efforts to improve the awareness of internal staff in order to boost its cooperation-based R&D activities.

ETRI has conducted surveys on open source use of all employees annually since 2019. The survey results from 2021 show that employees' open source activities and experiences have gradually increased. In addition, along with their open source activities employees' awareness of Inner Source activities to encourage internal cooperation has also been rising steadily. As diverse demands for successful open source activities are identified, ETRI will harness them in its efforts to improve its open source R&D activities.

Survey on the status of open source use in ETRI

Open Source Awareness and Utilization

- 93% ● Open source SW awareness rate
- 68% ● Proportion of open source use for research projects
- 51% ● License + Legal Issues

Awareness of New Systems

- 50% Open Source Review System
- 46% Open Source Management of SW Outsourcing

Support Requested by Employees

- 56% Education + Common Platforms + Incentives
- 70% Guidelines + Repository + Community

8

Open Source Business Models

Aligned with the increasing proportion in use of open source in R&D projects, ETRI proposes a business model using open source R&D outcomes in tandem with guidelines on how to leverage them into a real business at a government-funded research institute level.

The open source-based business models can be sub-categorized as three phases of (▲the open Source R&D phase; ▲transfer (transfer/utilization) phase; and ▲diffusion phase), while different forms of business scenarios are offered depending on the types of R&D concerned. Open source R&D business models include not only profit-making models associated with the specific industries involved, but also models aimed at further disseminating technologies and boosting SW ecosystems in the fields concerned.

ETRI will continue to promote research and disseminate its results, in order to deliver its open source R&D outcomes to the community and market in a more effective manner.

ETRI

OPEN

SOURCE

CENTER

**ETRI Open Source
Annual Report 2021**

III

OPEN SOURCE R&D SUPPORT
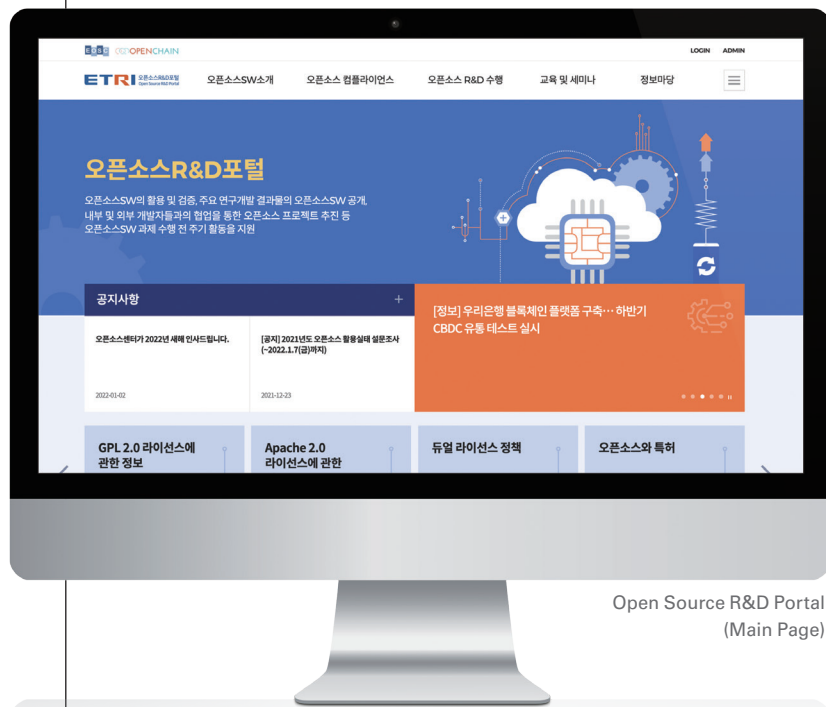## INFRASTRUCTURE

III

OPEN SOURCE R&D SUPPORT INFRASTRUCTURE

"
In order to support open source R&D activities and implement
public disclosure, ETRI is operating its open source R&D portal,
open source compliance system,
open source R&D platform, and ETRI open source public website.

1. Open Source R&D Portal

The "open source R&D portal" operated by ETRI is an integrated information system
to support ETRI employees' open source R&D activities and
provide comprehensive information on ETRI open source governance.
open source R&D portal provides information on the latest open source developments,
licenses, existing security vulnerabilities, standard processes, education/training
and seminars, news, and industry trends, in addition to an archive, variety of guidelines
for conducting open source R&D activities and other up-to-date open source-related
information.

Open Source R&D Portal
(Main Page)

Open Source SW Introduction

Introduces concepts and trends of
open source & open source licenses

Open Source Compliance

Offers the latest information needed
for open source compliance & links
to the open source compliance system

Open Source R&D Execution

Provides essential guidelines for open source
R&D activities, & links to the open source
R&D platforms & public websites

Education/Training and Seminars

Provides information on the Open Source Center's
education/training programs & seminars,
with the related materials

Information Courtyard

Offers information on the latest open source trends,
a reference archive, announcements, & a bulletin board

2. Open Source Compliance System

ETRI has independently constructed and operates its own open source compliance system, OLA[3],
so as to minimize the open source risks of the R&D software used.
The OLA provides support on a variety of open source compliance issues, such as license conflicts,
responses to patent source codes, and usage of code with security vulnerabilities.
The system carries out the basic process of validating the licenses, running security checks on and
evaluating the dependency of all SW downloaded to ETRI or distributed externally,
after which it issues the license validation certificates.
Automated processes ranging from source code scanning and
open source analysis to validation certificate creation serve to enhance user convenience,
and assorted information is also provided related to matters
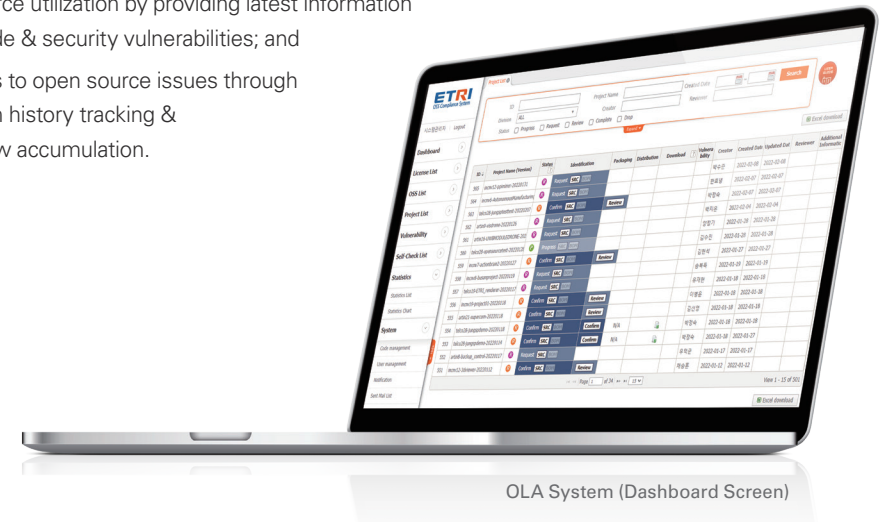such as version licenses and security vulnerabilities.
ETRI plans to share its OLA's source code and its experiences in operating it with other institutions,
to help to create a sound open source ecosystem in Korea through organic collaboration.

3 OLA(OSS License Automation):
ETRI's automated open source compliance system based on FOSSLight™ open source project led by LG Electronics
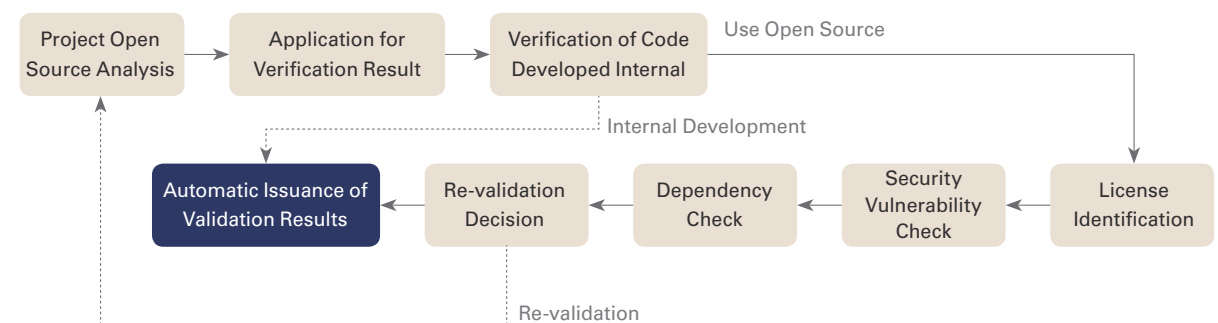
**Key features
of OLA**

• Provision of a one-stop service for open source license validations;

• Integrated management of SW development outputs, including their license information, patent
management, security vulnerability information, & dependency information;

• Supports open source utilization by providing latest information
on open source code & security vulnerabilities; and

• Effective responses to open source issues through
in-system validation history tracking &
validation know-how accumulation.

OLA System (Dashboard Screen)

OLA System Validation Process
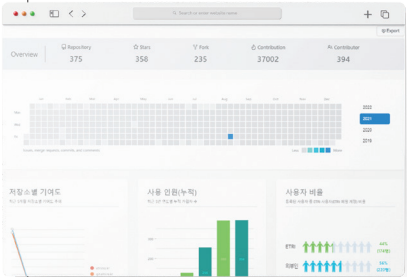
ETRI CONNECT (Home Screen)

4. ETRI Open Source Public Website
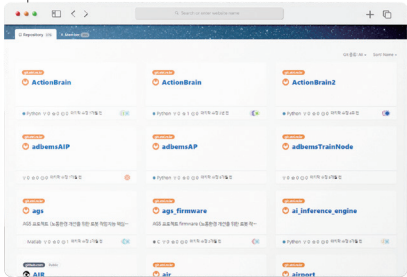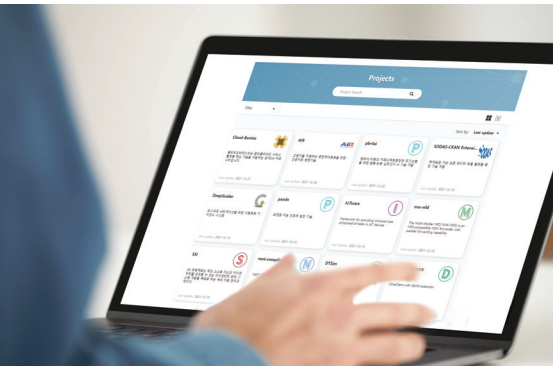
With its core belief in and value placed on technical progress and innovation
through openness and sharing, ETRI discloses its R&D results through various channels.
It has recently created and been operating an integrated information channel to introduce
and systematically disclose the open source projects it has developed.
This channel serves to consolidate and provide open source projects
that have been made public in a variety of channels, such as on GitHub or other websites.
Through its open source sharing website,
ETRI plans to expedite external distribution of its open source SW and R&D results,
and provide related support, so that its R&D results can be openly utilized by anyone.

ETRI Official GitHub
https://github.com/etri

ETRI Open Source Public Website
https://opensource.etri.re.kr

Open Source Project Page

Usage Statistics

Searching page

3. Open Source R&D Platform

ETRI strives in earnest to create an open source-based cooperative research culture,
through which it maximizes R&D innovation, research performance and productivity.
Its open source R&D platform (CONNECT) is
a user-oriented development platform based on shared storage,
which offers various types of R&D environments for ETRI projects.
The integrated infrastructure for R&D culture innovation
and enhancement of open/Inner Source capacities
enables efficient ETRI open source project management.
Through CONNECT, ETRI aims to build an R&D ecosystem
in which innovative and sustainable R&D outcomes can be created in diverse fields,
via strengthening of R&D competencies and engaging in cooperative R&D projects.

**Key
Features of
Open Source
R&D Platform**

• Git-based repositories (GitHub, GitLab)

• DevOps, MLOps DevOps, MLOps

• Automated checking for licenses & security vulnerabilities

• Diverse educational contents

• Statistics

ETRI Open Source Public Website (Home Screen)

EOSC
ETRI 오픈소스센터

ETRI

OPEN

ETRI Open Source
Annual Report 2021

SOURCE

CENTER

IV

OUTREACH ACTIVITIES AND INTERNATIONALIZATION

IV

OUTREACH ACTIVITIES AND INTERNATIONALIZATION

"

Internationally recognized as a reliable open source SW management institution with international standard ISO/IEC 5230 certification, ETRI strives to duly build a sound open source ecosystem through organic collaboration with government-funded research institutes, private industry, academia, and various communities.

1

ETRI Open Source Tech Day

EOST Day Official Website
https://eostday.kr

EOST GitHub Website
https://github.com/eostday

ETRI YouTube Channel
https://www.youtube.com/
user/etri9401

ETRI has paved the way in creating an open source-based R&D ecosystem through its holding of "ETRI Open Source Tech Day" since 2020. This event was the first event held by a government-funded research institute in Korea.

The "ETRI Open Source Tech Day" event has been held with the aim of sharing externally open source R&D activities of government-funded research institutes, thereby contributing to building a new R&D culture of sharing and collaboration, as well as creating an open R&D ecosystem.

In 2021, five of these institutes (KICT, KIER, KAERI, KARI and ETRI) held the event jointly, under the theme of " An open R&D ecosystem created with open source communities," to promote the full-scale collaboration of communities. ETRI will continue to hold the EOST Day event regularly, and expand its collaboration with various open source communities and industries, let alone government-funded research institutes.
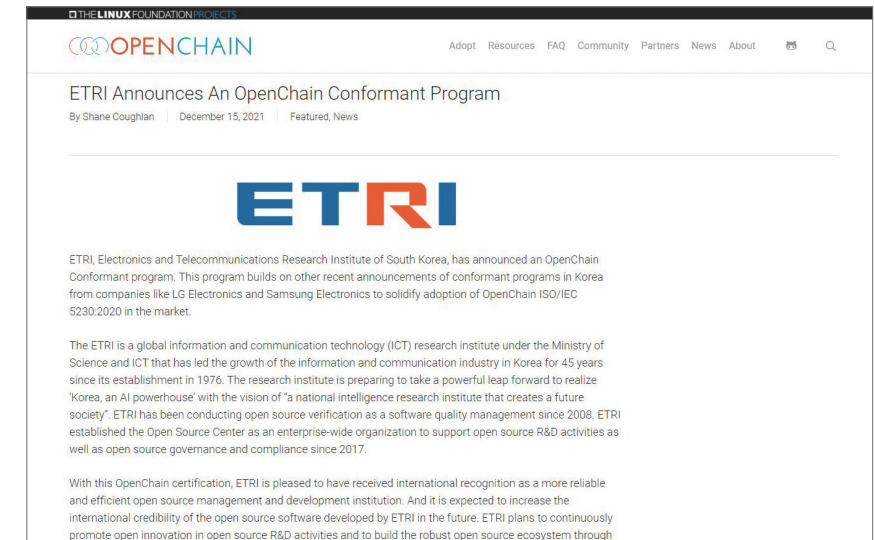
ETRI releases video clips of the annual EOST Day to the public on the ETRI YouTube channel, and makes the presentation materials available on its website and GitHub.

2

International Standards Compliance

On December 10, 2021 ETRI became the first-ever government-funded research institute in Korea to achieve a certification for fulfilling the international standards for open source compliance (OpenChain, ISO/IEC 5230:2020).

As a result, it is highly regarded for its core competencies in ▲constructing an open source SW development process and open source license management system, ▲operating a regular training program through the utilization of open source license and development tools, and ▲providing an efficient R&D environment on its open source R&D platform. This certification solidifies ETRI's global status as a reliable and qualified institute for open source management and development, and serves to heighten public confidence in ETRI's open source SW going forward.

ETRI established its Open Source Center in 2017 as a dedicated department, and from 2019, began transitioning the center into a full-scale open source governance and compliance response system dealing with all the R&D activities of ETRI. It has devoted itself to completing construction of a compliance system operating in accordance with international open source standards.

OpenChain, begun in 2016, is a project led by the Linux Foundation to identify the core components and processes of open source compliance. It assesses an institution's compliance response competency and issues an international certification if the assessment is favorable. Since OpenChain was recognized as an international standard ((ISO/IEC 5230:2020) in 2020, it has been widely recognized and well-respected.
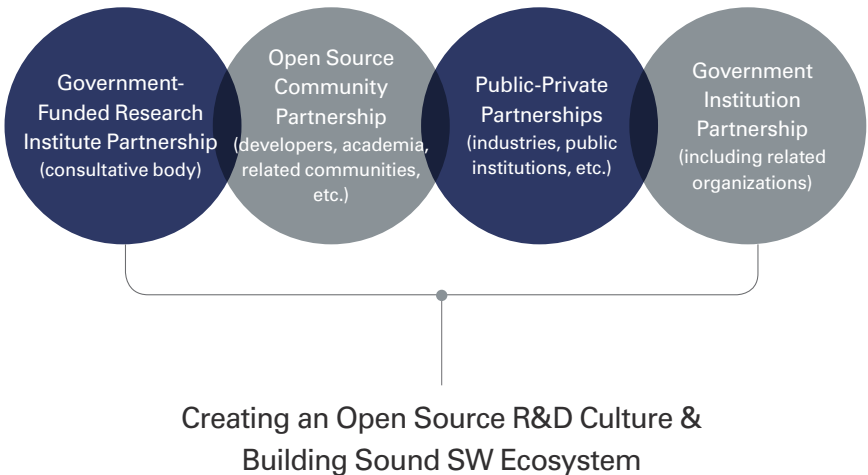
3

External Collaboration

ETRI has made various efforts into bringing about open R&D innovations utilizing open source software. To this end the institute operates a consultative body comprising government-funded research institutes, and promotes cooperation with various academic communities including open source developer groups. In addition , ETRI continuously seeks collaboration with industry, to heighten open source R&D utilization in the market and build a sound SW ecosystem and stable market environment.

ETRI has also cooperated with Samsung Electronics in open source R&D since 2019. In November 2021, it finalized an MOU with LG Electronics on disseminating an open source compliance system and service. Its pursuit of cooperation with industry is aimed at realizing the following: ▲Open source-related R&D technology exchanges; ▲disseminating open source compliance systems and services; ▲cooperating with open source communities at home and abroad; ▲domestic/overseas standardization activities in open source compliance; and ▲partnerships to support open source joint project developments.

Through these forms of cooperation, it is expected that the institutions concerned will pursue open innovations of their open source R&D activities, which will contribute to increasing domestic corporations' profitability with their leveraging reliable open sources.

Government-Funded Research Institute Partnership (consultative body)

Open Source Community Partnership (developers, academia, related communities, etc.)

Public-Private Partnerships (industries, public institutions, etc.)

Government Institution Partnership (including related organizations)

Creating an Open Source R&D Culture &
Building Sound SW Ecosystem

APPENDIX

ETRI Public Open Source Projects

NO	PROJECT	FIELD	ARCHIVE
1	AIR	AI	https://github.com/ai4r
2	Cloud-Barista	Cloud	https://github.com/cloud-barista
3	CICN-NRS	Network	https://github.com/etri/cicn-nrs
4	DFaaSCloud	Cloud	https://github.com/etri/DFaaSCloud
5	dotaclientQMIX	AI	https://github.com/etri/dotaclientQMIX
6	DTSim	Computing	https://github.com/etri/dtsim
7	GymProxy	AI	https://github.com/etri/GymProxy
8	IoTware	IoT	https://github.com/etri/IoTware
9	mw-nfd	Network	https://github.com/etri/mw-nfd
10	nest-compiler	AI	https://github.com/etri/nest-compiler
11	pbr4ai	AI	https://github.com/etri/pbr4ai
12	psdcn	Network	https://github.com/etri/psdcn
13	SSI	Blockchain	https://github.com/etri/SSI
14	DeepGuider	AI	https://github.com/deepguider
15	GEdge-platform	Cloud	https://github.com/gedge-platform
16	SODAS-CKAN Extension	Data	https://github.com/etri-odp
17	moca-etri	Computing	https://github.com/moca-etri
18	lge-robot-navi	Robots	https://github.com/lge-robot-navi
19	memos	Computing	https://github.com/ememos
20	edgeAI	AI	https://github.com/etri-edgeai/
21	TrainDB	AI	https://github.com/traindb-project/
22	BeeAI: KSB AI Framework	AI	https://etrioss.kr/thkimetri/ksb19.03-manual
23	azalea	OS	https://github.com/oslab-swrc/Azalea
24	aliusM	OS	https://github.com/oslab-swrc/aliusM
25	Hydrangea	OS	https://github.com/oslab-swrc/Hydrangea
26	mkpac	OS	https://github.com/oslab-swrc/mkpac
27	RECIPE-with-Tonic	System	https://github.com/oslab-swrc/RECIPE-with-Tonic
28	pmperf	Tools	https://github.com/oslab-swrc/pmperf

Websites for ETRI Open Source

ETRI Official GitHub
https://github.com/etri

ETRI Open Source Sharing Website
https://opensource.etri.re.kr

EOST Day Official Website
https://eostday.kr

EOST GitHub Website
https://github.com/eostday

ETRI YouTube Channel
https://www.youtube.com/user/etri9401

ETRI Open Source
Annual Report 2021

—

R&D
Innovation with
Open Source

ETRI
Electronics and Telecommunications
Research Institute