IoT without the barriers

Middleware to connect all

ORiN

ORiN Consortium

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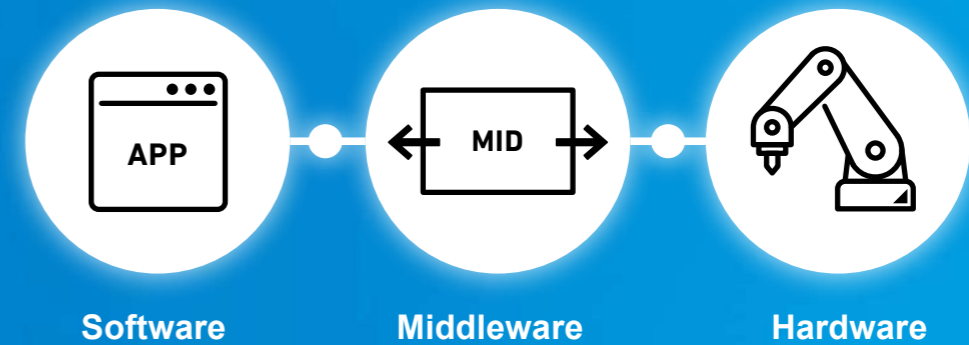
What's hindering the worldwide transition to IoT?
It's the "wall" between data communication standards.

The whole world expands when facilities are connected more easily.

APP	MID	
Software	Middleware	Hardware

If systems can be integrated more easily without concerns about the barriers between data communications standards, the introduction of IoT will be significantly accelerated.
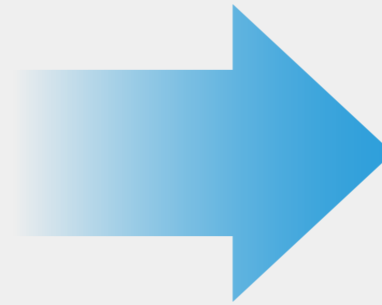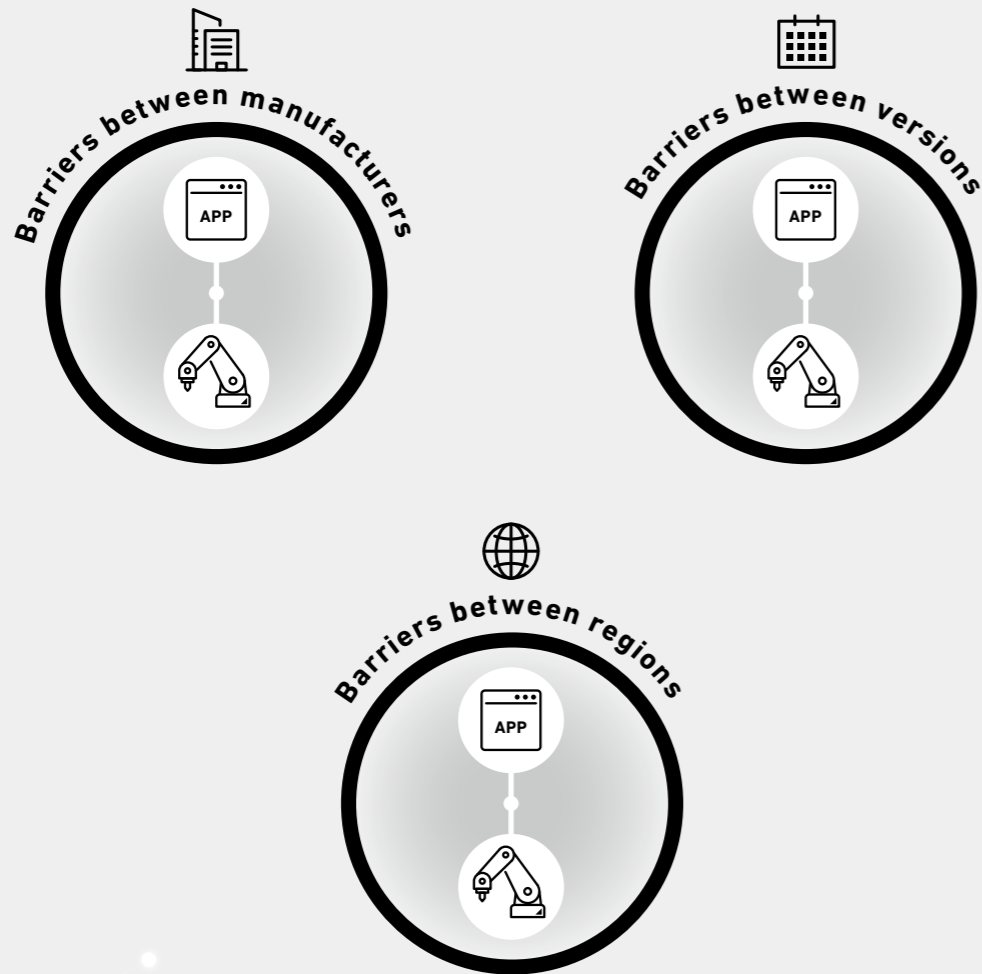
ORiN Consortium is a non-profit organization that aims to promote the widespread use and development of the middleware "ORiN."

ISO **ORiN is in conformance with the international standard ISO 20242-4**
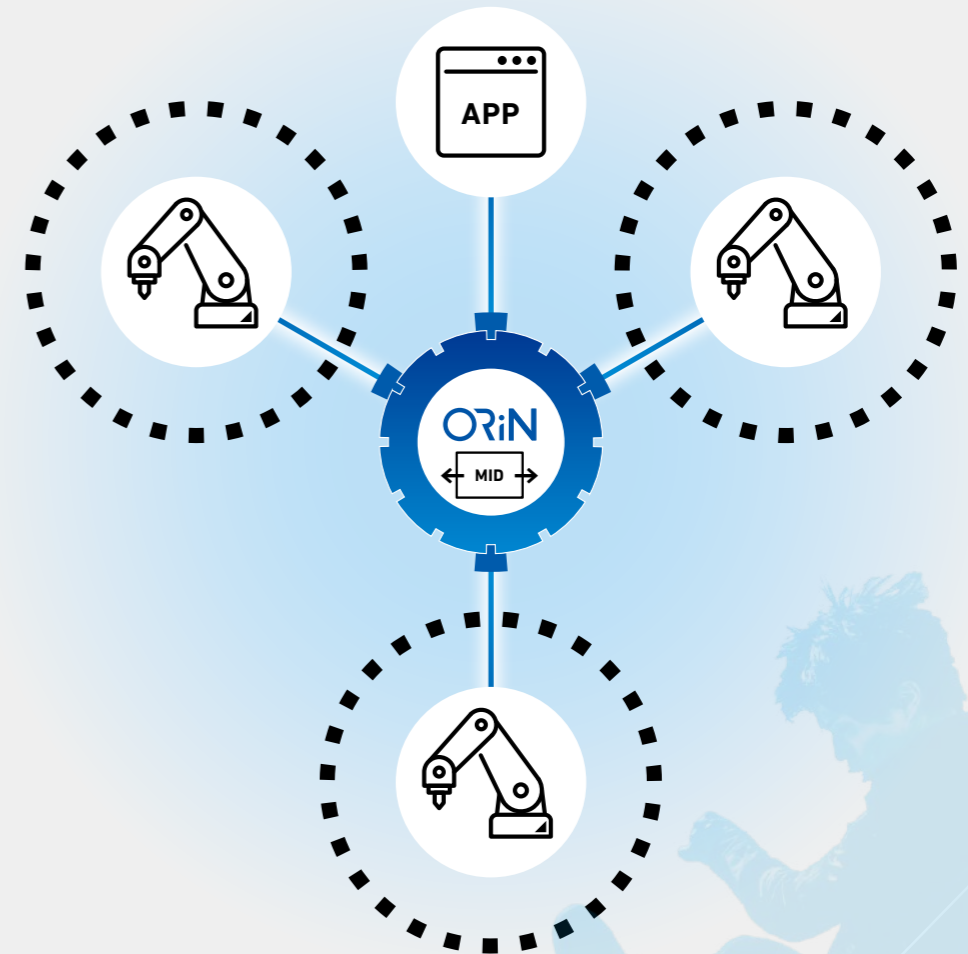
Data communications standards vary between manufacturers, versions and regions.

The differences in the standards form barriers that make it difficult to integrate systems.

Barriers between manufacturers

APP

Barriers between versions

APP

Barriers between regions

APP

Middleware ORiN overcomes the barrier of differences in standards, to connect facilities and integrate systems.

System integration will also enable the extraction and visualization of data on current status.

APP

ORiN
MID

"We want to introduce IoT, but cannot connect our various facilities."
Do you have such a problem?

Introduction of IoT into facilities is an urgent task for all industries nowadays. You may also have the need to connect different existing facilities and integrate and streamline systems for improved productivity. However, a major barrier is differences in data communications standards. Facilities are composed of a wide variety of machines, which are operated according to specific data communications standards. The communications standards adopted differ between manufacturers, versions and regions, which makes it difficult to connect different facilities and obstructs the introduction of IoT.

ORiN allows data to be analyzed using existing applications.
Identifying weak points in the system enables you to launch a rational facility plan that includes the introduction of IoT.

ORiN is middleware that can overcome the differences in communications standards between manufacturers, versions and regions to connect all facilities. The connection of different facilities through ORiN to integrate systems will enable data on the current status to be visualized and analyzed with existing applications. As a result, the points of reinforcement can be identified and you can make rational capital investments and introduce IoT in the most suitable manner for the current situation of your company. Thus, the exceptional compatibility to connect devices beyond differences in the communications standards is the greatest feature of ORiN and can accelerate the introduction of IoT into the world.

Keeping all applications and all devices permanently connected, ORiN encourages innovation in all fields.

Continuously connecting facilities in response to the evolution of data communications standards.

For the future of innovative technology.

| 1980 | 1990 | 2000 | 2010 | 2020 | 2025 | 2030 | 2035 | 2040 |

Sustainable facilities can be established without being influenced by changes in IT trends.

ORiN features sustainability to update itself and continuously follow changes in IT trends. Once ORiN is introduced, the users do not have to care about which data communications standard will become the next global standard but can continue to use various facilities whether they are old or new. The history o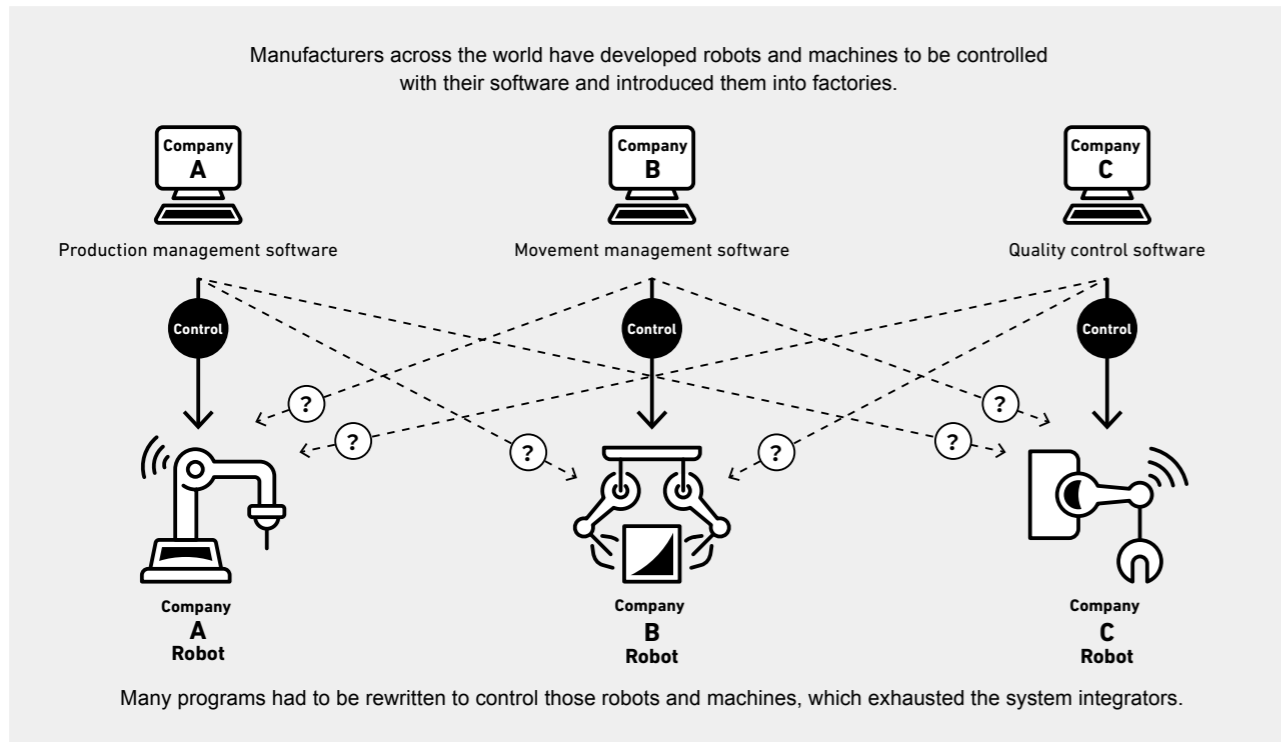f ORiN is the history of continuously connecting facilities all over the world. Its high reliability is endorsed by the achievements over the past 20 years and will also be maintained in the future. ORiN is the only middleware that connects across all standards irrespective of area. It will also bring great development to your business.
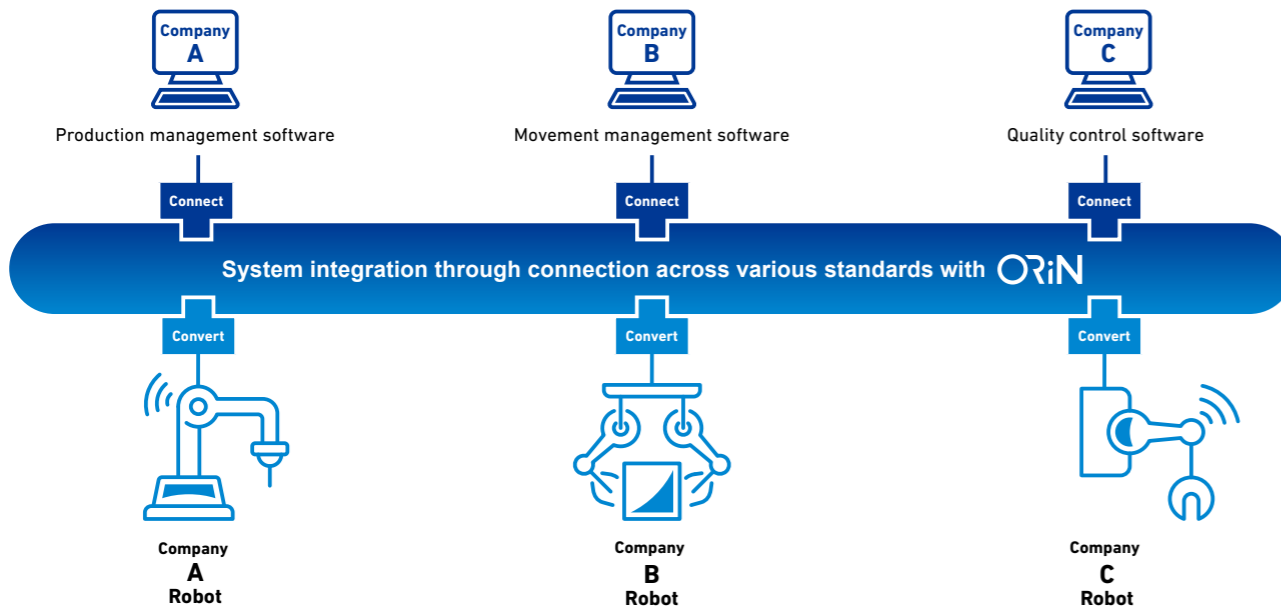
The backstory behind ORiN

As a result of competition of development among manufacturers, there have been too many data communications standards and programming languages since around 1990.

In the world of manufacturing, a large number of manufacturers have taken a long time to develop various machines. Those machines have adopted different data communications standards and programming languages depending on the period when they were developed and other factors, which consequently required software to learn all of the different languages when an attempt was made to integrate systems in different facilities. Such an enormous workload can be reduced with ORiN. As the different languages can be converted into one language with ORiN, the software has to learn the language alone.

Manufacturers across the world have developed robots and machines to be controlled with their software and introduced them into factories.

Company A — Production management software
Company B — Movement management software
Company C — Quality control software

Company A Robot
Company B Robot
Company C Robot

Many programs had to be rewritten to control those robots and machines, which exhausted the system integrators.

ORiN was created to solve this problem.

Company A — Production management software
Company B — Movement management software
Company C — Quality control software

Connect

System integration through connection across various standards with ORiN

Convert

Company A Robot
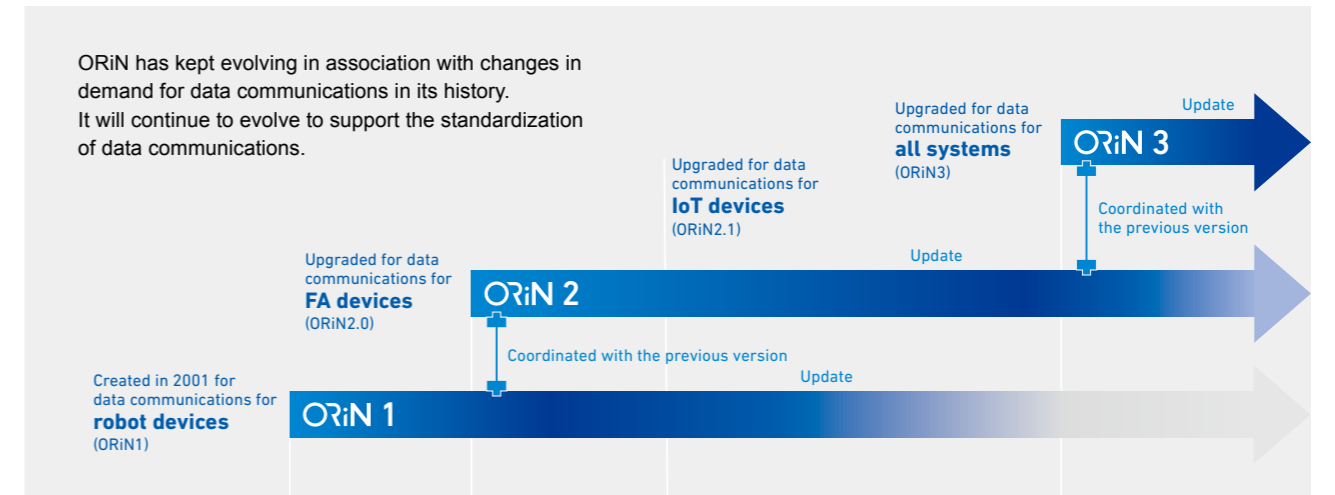Company B Robot
Company C Robot

The creation of ORiN has enabled interface between facilities of different standards with one programming language.
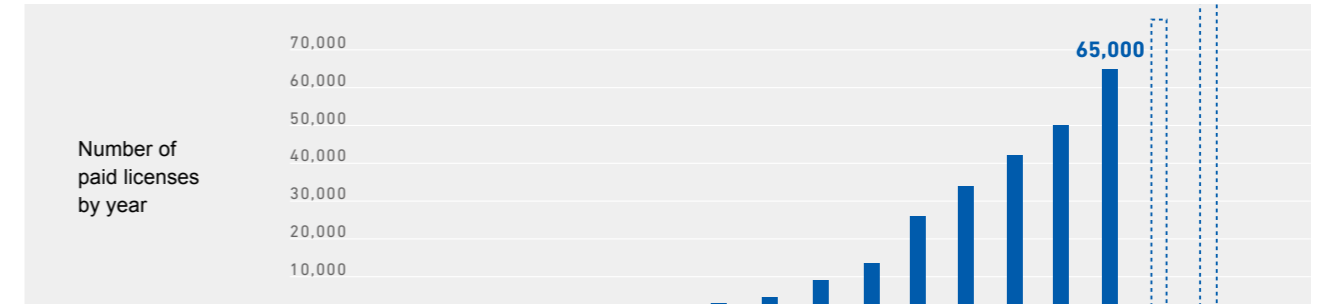
Ever-evolving ORiN

Periodic upgrade and update respond to changes in the IT industry.

Since the start of its development in 1999, ORiN has been continuously upgraded and updated. The version is upgraded in response to major changes in the IT industry. In each version, an update is also repeated to continuously connect emerging data communications standards, which are generated almost year after year. ORiN thus evolves flexibly and increases the compatible standards continuously. Thanks to those features, its technology never becomes obsolescent and ORiN can integrate various old and new applications and devices as well in the future.

ORiN has kept evolving in association with changes in demand for data communications in its history.
It will continue to evolve to support the standardization of data communications.

Created in 2001 for data communications for **robot devices** (ORiN1)

Upgraded for data communications for **FA devices** (ORiN2.0)

Upgraded for data communications for **IoT devices** (ORiN2.1)

Upgraded for data communications for **all systems** (ORiN3)

Coordinated with the previous version

Update

1995 2000 2005 2010 2015 2020 2025

Number of paid licenses by year

70,000
60,000
65,000
50,000
40,000
30,000
20,000
10,000

More than 65,000 paid licenses have been issued worldwide (as of 2022)

History of ORiN

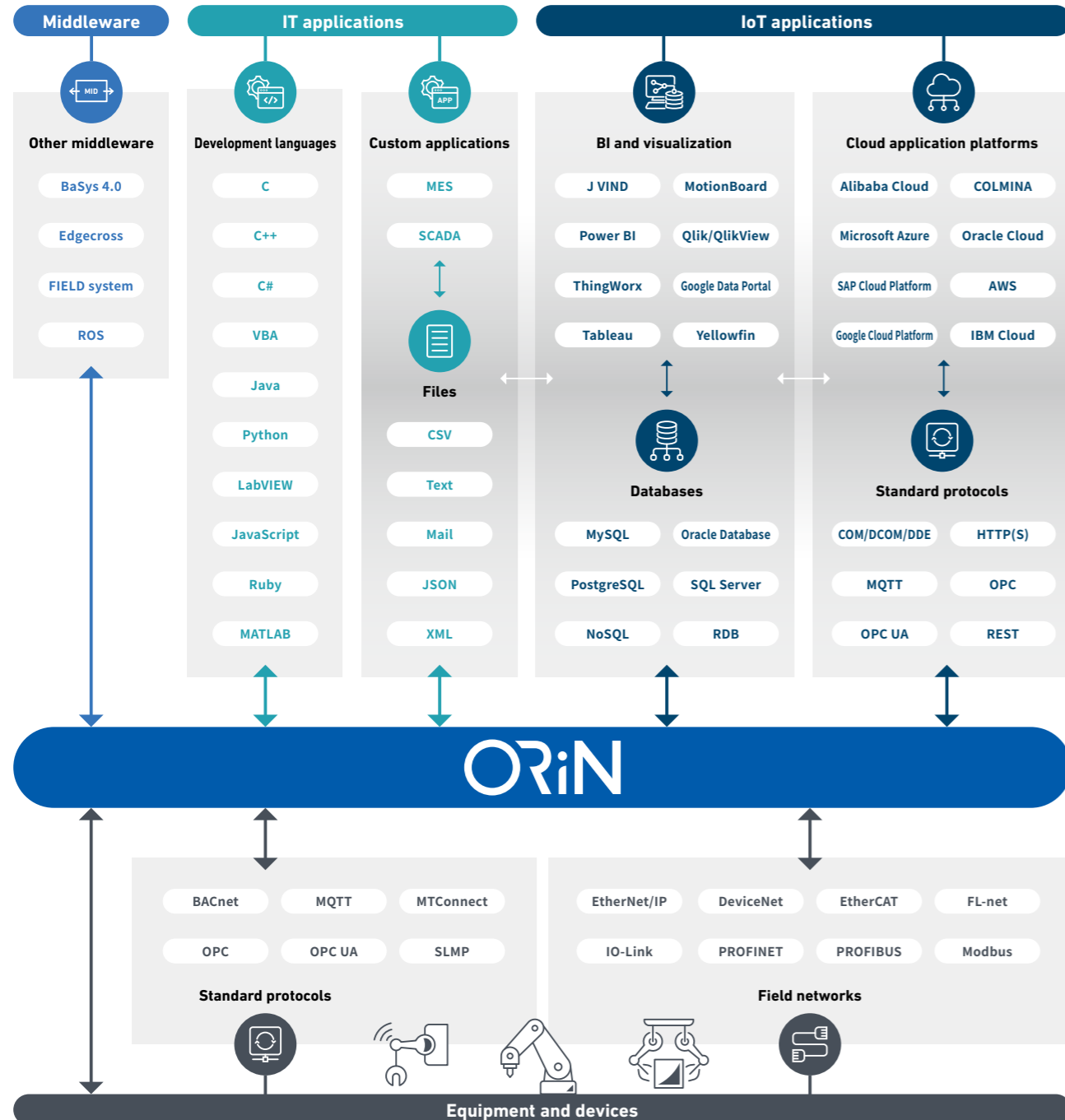| Year	Event
1999	• Launched by the Japan Robot Association as part of its activities toward standardization. 　* The project started in full swing with three-year support from NEDO (New Energy and Industrial Technology Development Organization). • Participator in the International Robot Exhibition. 　* Tests to verify its connection with the exhibitors' robots were conducted in 2001.
2001	• Specifications completed for ORiN Version 1.0.
2002	• ORiN Consortium was set up to promote activities for widespread use and functional improvement.
2005	• Specifications completed for ORiN Version 2.0.
2006	• Commercialized as ORiN2 SDK by DENSO.
2007	• ORiN2 SDK received First Prize in the Robot Award of the Year 2007.
2011	• Part of the specifications for ORiN Version 2.0 was issued as an international standard "ISO 20242-4".
2016	• The ORiN3 project was launched with support from NEDO.
2020	• Specifications completed for ORiN Version 3.0.

The history of evolution and the track record of operation over more than 20 years

ORiN's connectivity expansion

Development philosophy,
"Connecting data beyond the standards barriers to harmonize IT and IoT"

To seek harmony rather than competition is the philosophy underlying the development of ORiN. A variety of standards have competed for market share in the IT industry. ORiN accepts any standards flexibly and thereby connects facilities that have not previously been interchangeable, to bring new harmony to IT and IoT. The connection is merely a means, not in itself a goal. In the field of connection of facilities, ORiN aims not to introduce the principle of competition, but to realize a world where manufacturers compete on a friendly basis with each other and seek technological innovations in the future, with connected facilities.
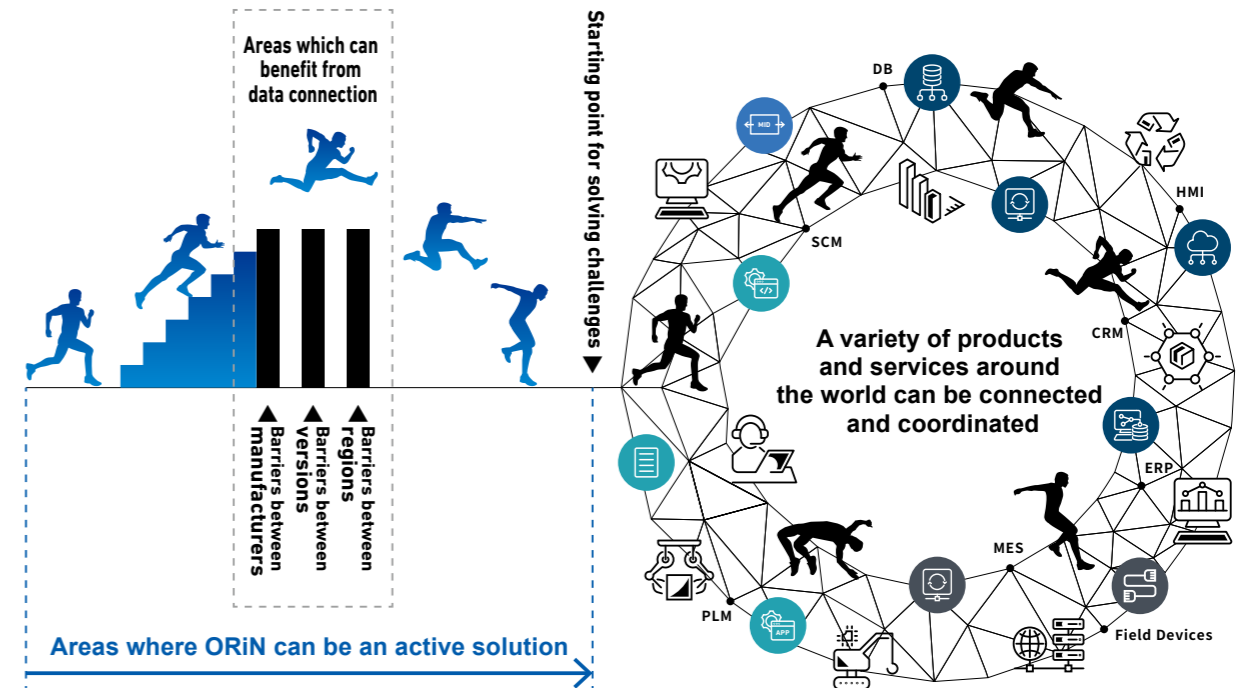

Middleware

Other middleware
- BaSys 4.0
- Edgecross
- FIELD system
- ROS

IT applications

Development languages
- C
- C++
- C#
- VBA
- Java
- Python
- LabVIEW
- JavaScript
- Ruby
- MATLAB

Custom applications
- MES
- SCADA

Files
- CSV
- Text
- Mail
- JSON
- XML

IoT applications

BI and visualization

J VIND	MotionBoard
Power BI	Qlik/QlikView
ThingWorx	Google Data Portal
Tableau	Yellowfin

Databases

MySQL	Oracle Database
PostgreSQL	SQL Server
NoSQL	RDB

Cloud application platforms

Alibaba Cloud	COLMINA
Microsoft Azure	Oracle Cloud
SAP Cloud Platform	AWS
Google Cloud Platform	IBM Cloud

Standard protocols

COM/DCOM/DDE	HTTP(S)
MQTT	OPC
OPC UA	REST

ORiN

Standard protocols
- BACnet
- MQTT
- MTConnect
- OPC
- OPC UA
- SLMP

Field networks
- EtherNet/IP
- DeviceNet
- EtherCAT
- FL-net
- IO-Link
- PROFINET
- PROFIBUS
- Modbus

Equipment and devices

* Those shown above are only some of the existing communication protocols ORiN has coped with, numbering more than 200 types.

ORiN is in conformance with the international standard ISO 20242-4

In December 2011, part of the specifications of ORiN Version 2.0 was issued as ISO 20242-4 and recognized as an international standard. This is one of the reasons why ORiN is used with a sense of security in Europe and other parts of the world.

ORiN's applicability

"Areas which can benefit from data connection" form a starting point for the solution of any challenge

Connecting facilities with different standards is very difficult, and any attempt to facilitate their conversion into IoT often ends up failing before it is even fully planned. The introduction of ORiN can **substantially reduce the burden of connection**. ORiN lets you get on with the identification of challenges based on the extracted data, and **the introduction of IoT to increase productivity**. ORiN can also help solve other challenges involving connecting data, such as improving productivity through **the coordination of systems in different factories, overseas transfer of facilities** and **continued use of older facilities**.

Areas which can benefit from data connection

Starting point for solving challenges ▼

Barriers between manufacturers ▲
Barriers between versions ▲
Barriers between regions ▲

Areas where ORiN can be an active solution

A variety of products and services around the world can be connected and coordinated

As well as in the manufacturing industry,
ORiN can be used in various other areas such as primary industries and medicine

The range of areas where ORiN can become an active solution is infinite. FA facilities apart, it is used for smart agriculture and smart medical care, for example. In the future, ORiN will continue to expand its role in the world while augmenting its compatibility standards.

Factory
ORiN supports the introduction of IoT and factory automation into manufacturing plants and connects a wide variety of machines used in various processes efficiently to increase productivity.

Medicine
Various medical devices in an operation room are connected via a network. Information is collected from the devices and displayed on large screens in an integrated manner to assist the operators.

Farming
Cultivation management systems are developed through collaboration between agriculture and industry. Cloud management is adopted not only for production but also for marketing activities to contribute to the exploration of new markets and the development of agriculture.

Development
Applications can be developed more efficiently. ORiN makes it easier to establish systems, which helps shorten the development period and improve quality. It also supports the analysis of operation status and failure.

Guidance for adopting ORiN

Free membership is available on initial registration

How about becoming a member of ORiN Consortium to learn more about ORiN?

ORiN Consortium is a non-profit organization established as part of the Japan Robot Association to support the widespread use and development of ORiN. There are different categories of membership, with benefits varying in accordance with the annual fee, ranging from free members who receive the latest information to executive members who are invited to participate in research and development.

If you are interested in ORiN, we recommend that you register as a free online member through our official website. Please check the latest information and examples of use on the website, and consider introducing ORiN to your own workplace.

Categories of membership

➡ Potential customers interested in information on ORiN

Online membership

Annual fee: **Free**
(registration on the website of ORiN Consortium is required)
Benefits:
① Regular updates from ORiN Consortium
② Information on recent applications of ORiN on the website

Online members receive

Regular email updates | Information on recent applications of ORiN

➡ Companies and organizations that are considering using ORiN

Associate membership

Annual fee: **50,000 JPY**
Benefits:
① Free use of ORiN provider development license and ORiN kernel license
② Use of the ORiN logo on products
③ Discounted fee for participation in events organized by ORiN Consortium
④ Discounted price for publications issued by ORiN Consortium
⑤ Free ORiN provider certification service from ORiN Consortium

Associate members receive

Regular email updates | Information on recent applications of ORiN | Free development and kernel licenses | Use of the logo on products | Discounts on the purchase of event tickets | Discounts on the purchase of publications
Free provider certification

➡ Companies and organizations that are considering selling machines incorporated with ORiN

Regular membership

Annual fee: **100,000 JPY**
Benefits: (in addition to the benefits for associate members)
① Attendance at Technical Committee and Public Relations Committee meetings
② Rights to sell mass-produced machines incorporated with the ORiN kernel license

Regular members receive

Regular email updates | Information on recent applications of ORiN | Free development and kernel licenses | Use of the logo on products | Discounts on the purchase of event tickets | Discounts on the purchase of publications
Free provider certification | Attendance at the Technical and Public Relations Committee meetings | Rights to sell machines incorporated with ORiN

➡ Companies and organizations that would like to participate in the operation of ORiN Consortium

Executive membership

Annual fee: **250,000 JPY**
Benefits: (in addition to the benefits for regular members)
① Attendance at the Steering Committee meeting
② Participation in the specification setting and research and development of ORiN

Executive members receive

Regular email updates | Information on recent applications of ORiN | Free development and kernel licenses | Use of the logo on products | Discounts on the purchase of event tickets | Discounts on the purchase of publications
Free provider certification | Attendance at the Technical and Public Relations Committee meetings | Rights to sell machines incorporated with ORiN | Participation in the operation of the Consortium | Participation in R&D

➡ Organizations that are considering using ORiN for education and research
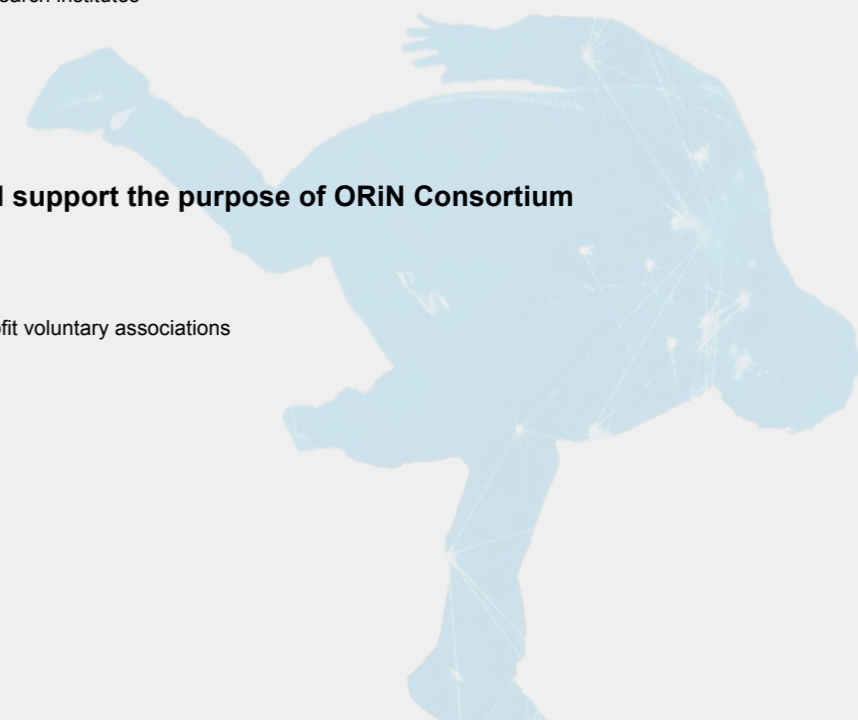
Research membership

Qualification: Educational institutes and non-profit research institutes
Annual fee:
① Educational institutes: **Free**
② Non-profit research institutes: **50,000 JPY**

➡ Organizations that agree with and support the purpose of ORiN Consortium

Supporting membership

Qualification: Public interest corporations and non-profit voluntary associations
Annual fee: **Free**

How to apply for membership

Please contact by email.

ORiN Consortium Secretarist

Email: office@orin.jp

About ORiN Consortium

Operational organization

Chairman — Secretariat

Vice-chairman

Steering Committee

① Approval for the business plan and business report
② Approval for the budget and settlement of accounts
③ Coordination of Technical and Public Relations Committees

Technical Committee

① Consideration of the technical content of ORiN
② Organization and management of deliverables
③ Preparation of technical materials

Public Relations Committee

① Consideration of dissemination and awareness-raising activities
② Operation of the website
③ Organization of seminars, workshops, etc.
④ Exchange of information with relevant agencies

Purpose of the organization

ORiN Consortium works to disseminate and raise awareness of ORiN, which is technology to connect industrial machines using different architectures, to establish the common infrastructure technology necessary for the realization of an open data exchange environment for robots and other production systems in the manufacturing industry. Through these activities, we aim to contribute to the healthy development of the manufacturing industry.

Activities

Our activities support the widespread use, maintenance and development of ORiN.

Widespread use of ORiN

We promote the widespread use of ORiN through disclosure of specifications, software and related information on our website. We also organize ORiN seminars and offer consultancy on the use of ORiN in business.

Maintenance and development of ORiN specifications

We continuously improve and revise the specifications of ORiN and update them regularly to ensure that ORiN continues to be a solution for the needs of the moment.

Management of ORiN software

We manage (store, distribute and upgrade) standard software that conforms to ORiN specifications.

Contact for inquiries

For inquiries on ORiN and ORiN Consortium, contact ORiN Consortium Secretariat, Department of Technology, Japan Robot Association.
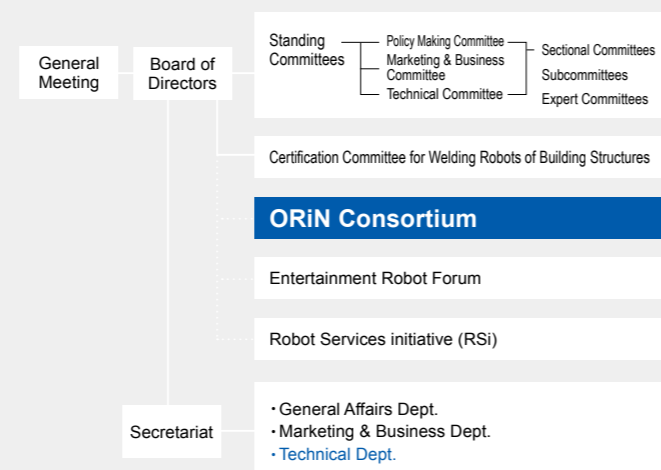
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Tel: +81-3-3434-2919
Fax: +81-3-3578-1404
URL: https://www.orin.jp/en/

Organizational chart of the Japan Robot Association

General Meeting — Board of Directors

Standing Committees — Policy Making Committee / Marketing & Business Committee / Technical Committee — Sectional Committees / Subcommittees / Expert Committees

Certification Committee for Welding Robots of Building Structures

ORiN Consortium

Entertainment Robot Forum

Robot Services initiative (RSi)

Secretariat — ・General Affairs Dept. / ・Marketing & Business Dept. / ・Technical Dept.

Frequently Asked Questions

Why has ORiN been developed?

While industrial robots and machines play key roles in the automation of factories, they are now commonly compatible with networks, making it possible to perform their production management, equipment diagnosis, etc., on PCs with access to the data managed by devices. However, the specifications of the networks connecting PCs and devices (such as media and protocols), as well as mechanisms for using them (such as API specifications to check and connect communication types), were specific to manufacturers and the establishment of systems to combine different communications specifications involved enormous cost and labor.

In this context, ORiN (Open Resource Interface for the Network) was created to serve as an open interface that enables integrated access to devices in a network environment, irrespective of manufacturer or model.

What technology is used in ORiN?

ORiN provides an interface to access industrial robots and machines, involving two modules, namely an interface for applications (engine) and an interface for devices (provider). The engine has the same functions as a standard program interface and provides an application development environment with no need to consider differences between devices. The provider has a communications interface to connect various industrial machines with PCs and absorbs differences between communications specifications, which are different between machines, to offer an integrated access means to high-level applications.

With this technology, application vendors can develop client applications without dependence on industrial machines, and manufacturers can disclose the functions of devices without dependence on client applications.

What applications can potentially use ORiN?

The following applications may use ORiN:
1. Production management system (display of the operation status of equipment)
   Display data on the productivity of equipment (e.g. production number, operation time).
2. Equipment operation monitor (simple simulation function)
   Visualize equipment operation (3D graphics) and I/O operation on PCs.
3. Facility maintenance and diagnosis system
   Collect and analyze data on the control of equipment (present values, current values) in case of abnormality.
4. Analysis of processing and assembly data
   Measure and analyze external sensor data (accuracy, variations between products, etc.).
5. Switching of equipment operation
   Activate programs and change variables and I/O via PCs.
6. Transmission of operation commands
   Directly send operation commands from PCs.
7. Automatic program update
   Automatically download programs from PCs when necessary.

What effects can be expected from the introduction of ORiN?

The following economic effects can be expected:
1. Improvement of manufacturing competitiveness
   Conversion of know-how into data helps improve production technology. You can also achieve higher product quality and productivity through automation, which will enhance your international manufacturing competitiveness.
2. Expansion of the robot market
   It is anticipated that the introduction will expand the processes to which robots can be applied and also promote the growth of the robot market.
3. Software industry entry into the robot market
   Applications to be shared between robots of different companies can be created on PCs, which can allow the software industry to enter the field of applications for robots. As a result, the software resources that have been developed in various areas can be effectively used in the field of robotics as well.
4. Creation of the robot engineering industry
   A common communications environment on PCs means that new robotics service sectors, including robotic engineering and consultation services for introducing robots, can be created independently of robot manufacturers. Those sectors also have the potential to interact and produce synergetic economic effects.

APPLICATION

ORiN

DEVICE