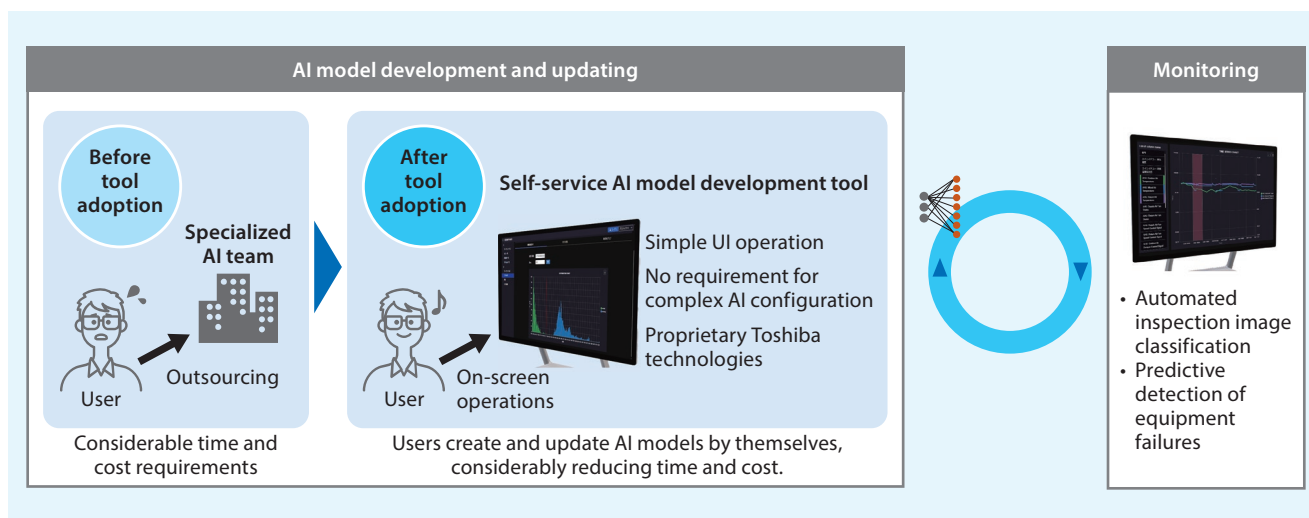# 5. Digital Solutions

5.1 Self-Service AI Model Development Tool Requiring No AI Expertise

Self-service AI model development tool

Developing artificial intelligence (AI) models is insufficient for leveraging AI for automated product inspection at factories and equipment failure prediction. Instead, it is crucial to keep updating AI models over time, for example, retraining them for new objects to be inspected and seasonal trends. However, relying on external experts can be time-consuming and costly, making updating AI models a considerable challenge for continued utilization.

To overcome this issue, Toshiba Digital Solutions Corporation has developed technology that enables even non-expert users to create and update AI models on their own. Utilizing this technology, we have created a self-service AI model development tool specialized for automated image classification and predictive maintenance. Built on Toshiba Group's significant expertise in manufacturing and social infrastructure, this tool offers three key features:

(1) Targeted for two specific applications, the new tool provides an intuitive user interface (UI) that navigates users through the data preprocessing, model creation, and updating steps, streamlining the entire workflow.

(2) The new tool generates AI-related parameters automatically, eliminating the need for manual configuration or technical expertise.

(3) The new tool seamlessly incorporates Toshiba Group's proprietary AI model enhancement technologies, providing users with benefits without the need to understand their underlying mechanisms.

We tested the new tool in real-world scenarios, including image-based non-destructive inspection and predictive maintenance of air-conditioning equipment. The results confirmed that even users without AI expertise could create and update AI models with confidence through simple guided operations requiring less than 30 minutes.

We will further enhance the usability of this tool to make it even more accessible.

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5.2 Standard Platform to Accelerate Utilization of Generative AI to Explore Solutions

The applicability of solutions powered by generative AI has been expanding in recent years. Toshiba Digital Solutions Corporation has developed a standard generative AI platform which includes a set of standard components that facilitate the introduction of generative AI according to the functional requirements of various solutions. Additionally, this standard generative AI platform provides essential security management and information protection functions for user and document management. Using it enables shorter development times for solutions that offer value which aligns with customer needs.

The business use cases of generative AI for digital transformation (DX) can be broadly divided into (1) employee DX to improve the efficiency of document creation and other tasks, (2) customer contact DX to enhance the quality of customer interactions, (3) process DX to improve design and development processes, and (4) manufacturing DX to support stable manufacturing.
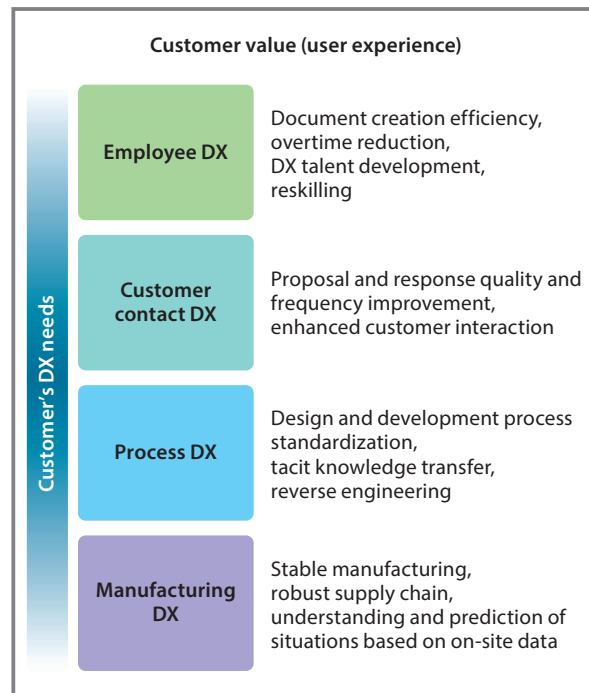
For example, for process DX, we propose solutions for system development and reverse engineering, including that of legacy code, using generative AI. In this context, the standard generative AI platform facilitates the introduction of new solutions via user management, document management, AI-powered code analysis, and application service platform functions. Furthermore, the pre-processing AI and the functional AI available with the standard generative AI platform can be customized as individual modules. This makes it possible to enhance the practicality and value of generative AI by expanding their functionality for description and specification generation according to specific programming language specifications.

As a RAG(∗) solution for customer contact DX, we have started offering a new document utilization service using the standard generative AI platform called Commendry with Generative AI, which supports high-quality automated dialogs.

At present, we are promoting the deployment of generative AI solutions using the standard generative AI platform, including application to our internal operations. By leveraging unique technologies and know-how gained through this process, we will support our customers in achieving business transformation in a wide variety of situations.

(∗) Retrieval-augmented generation: technology to enable generative AI to search for documents and generate answers based on their contents

5. Digital Solutions

Customer value (user experience)

Customer's DX needs

Employee DX	Document creation efficiency, overtime reduction, DX talent development, reskilling
Customer contact DX	Proposal and response quality and frequency improvement, enhanced customer interaction
Process DX	Design and development process standardization, tacit knowledge transfer, reverse engineering
Manufacturing DX	Stable manufacturing, robust supply chain, understanding and prediction of situations based on on-site data

Use cases of and value provided by generative AI

Employee DX
- Dialog AI solutions
- Business process integration
- Business prompts

Customer contact DX
- RAG solutions
- Business process integration
- FAQ utilization

Process DX
- Design and development support solutions
- Custom specification extensions
- Review support

Manufacturing DX
- Data analysis solutions
- BI tool integration
- Domain knowledge

Customization and feature extension

Pre-processing and functional AI
- Chart analysis
- FAQ generation
- Description generation
- Specification generation
- Analysis support
- Failure sign detection

Common functions
- General dialog
- RAG
- Code analysis
- Data analysis
- User management
- Document management
- Service platform

Standard generative AI platform

Custom specification extensions
- Dedicated UI

Code
Design documents

Pre-processed code

Description and specification generation
Review results

Code analysis

Document management

Review support

Examples of configurations of design and development solutions
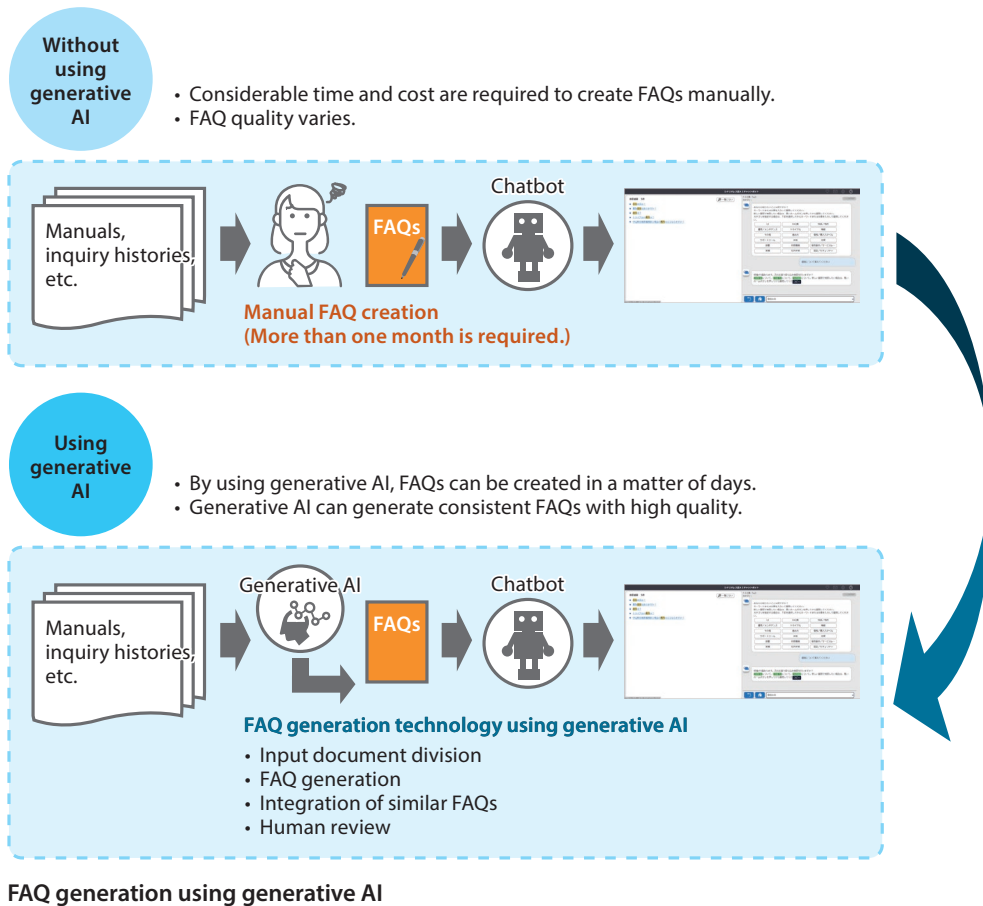
FAQ: frequently asked questions   BI: business intelligence

Examples of solution development using standard generative AI platform

5.3 Generative AI to Produce FAQs from Text Documents

- **Without using generative AI**
  - Considerable time and cost are required to create FAQs manually.
  - FAQ quality varies.

Manuals, inquiry histories, etc.

FAQs

Chatbot

**Manual FAQ creation
(More than one month is required.)**

- **Using generative AI**
  - By using generative AI, FAQs can be created in a matter of days.
  - Generative AI can generate consistent FAQs with high quality.

Manuals, inquiry histories, etc.

Generative AI

FAQs

Chatbot

FAQ generation technology using generative AI
- Input document division
- FAQ generation
- Integration of similar FAQs
- Human review

FAQ generation using generative AI

Chatbot services that use generative AI to answer questions from users based on a document-based database are becoming widespread. It is difficult, however, to eliminate omissions and errors made by generative AI. On the other hand, chatbots that consult existing frequently asked questions (FAQs) can be expected to provide a higher level of accuracy. However, the time and cost required to prepare FAQs have been a barrier to the implementation of such chatbots.

With this in mind, Toshiba Digital Solutions Corporation has developed technology to generate draft FAQs from existing documents such as manuals and inquiry histories. The new FAQ technology divides the input documents into appropriate units and generates FAQs for each unit. It then integrates similar FAQs automatically to produce FAQs with higher quality. The final step is human verification to ensure FAQ quality.

The new FAQ generation technology helps facilitate the implementation of chatbots and reduce costs. We will offer this technology as an option in our scenario-less AI chatbot service.

5.4 Interactive AI Data Analysis Technology Using Generative AI
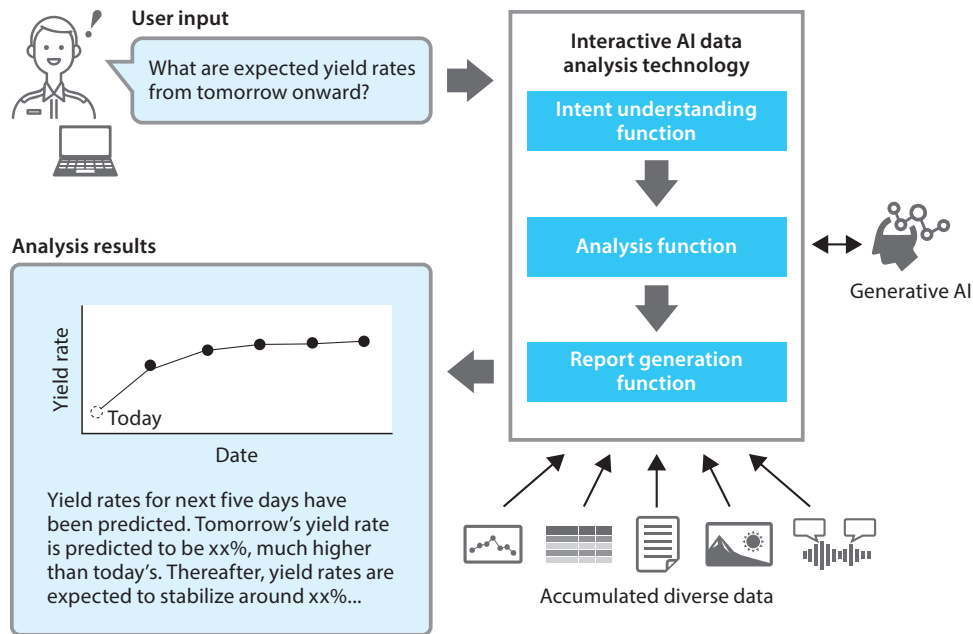
**Overview of interactive AI data analysis technology**

In the manufacturing and social infrastructure sectors, various on-site data are collected every day. However, there is a shortage of personnel who can use business intelligence (BI) tools effectively, resulting in reliance on tacit knowledge.

With this in mind, Toshiba Digital Solutions Corporation has developed interactive AI data analysis technology using generative AI which allows factory line engineers and other users to check production line conditions using natural language to obtain important insights, such as nonstandard conditions, without requiring data analysis knowledge. This technology includes an intent understanding function that infers ambiguous human instructions and missing information and asks appropriate questions to draw out user intent. This makes it possible to perform data analyses as intended by users even when their requests are ambiguous. The new AI data analysis technology also incorporates a function to generate reports that analyze numerical data and graphs and provide helpful information for understanding the analysis results.

In the future, we will utilize this new technology to visualize factory data and contribute to DX in the manufacturing and social infrastructure sectors.

5.5 Generation of Character Images Representing Diverse Handwriting Styles and Variations Using AI
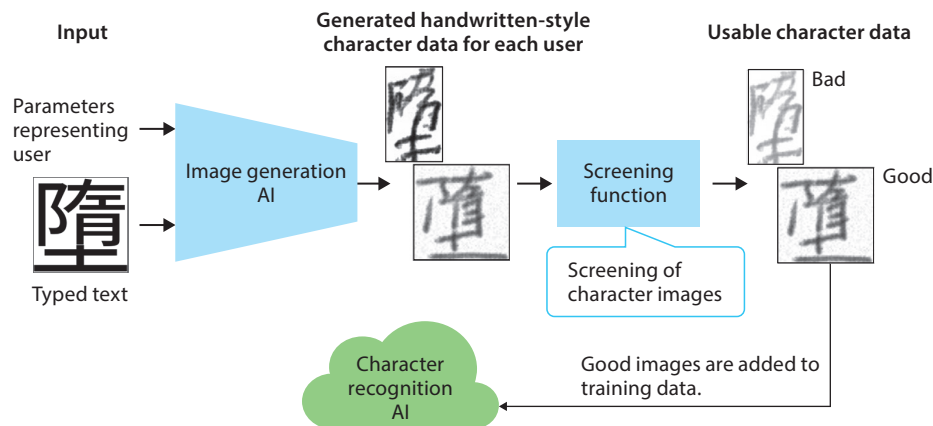
Generation of handwritten-style character images using AI

Growing expectations for DX and AI evolution are spurring demand for digitalization of a wide variety of paper-based office documents, including invoices, purchase orders, etc. Because many of these documents have been accumulated over a long period of time, it is necessary to use AI-powered optical character recognition (OCR) to improve the recognition accuracy of handwritten characters.
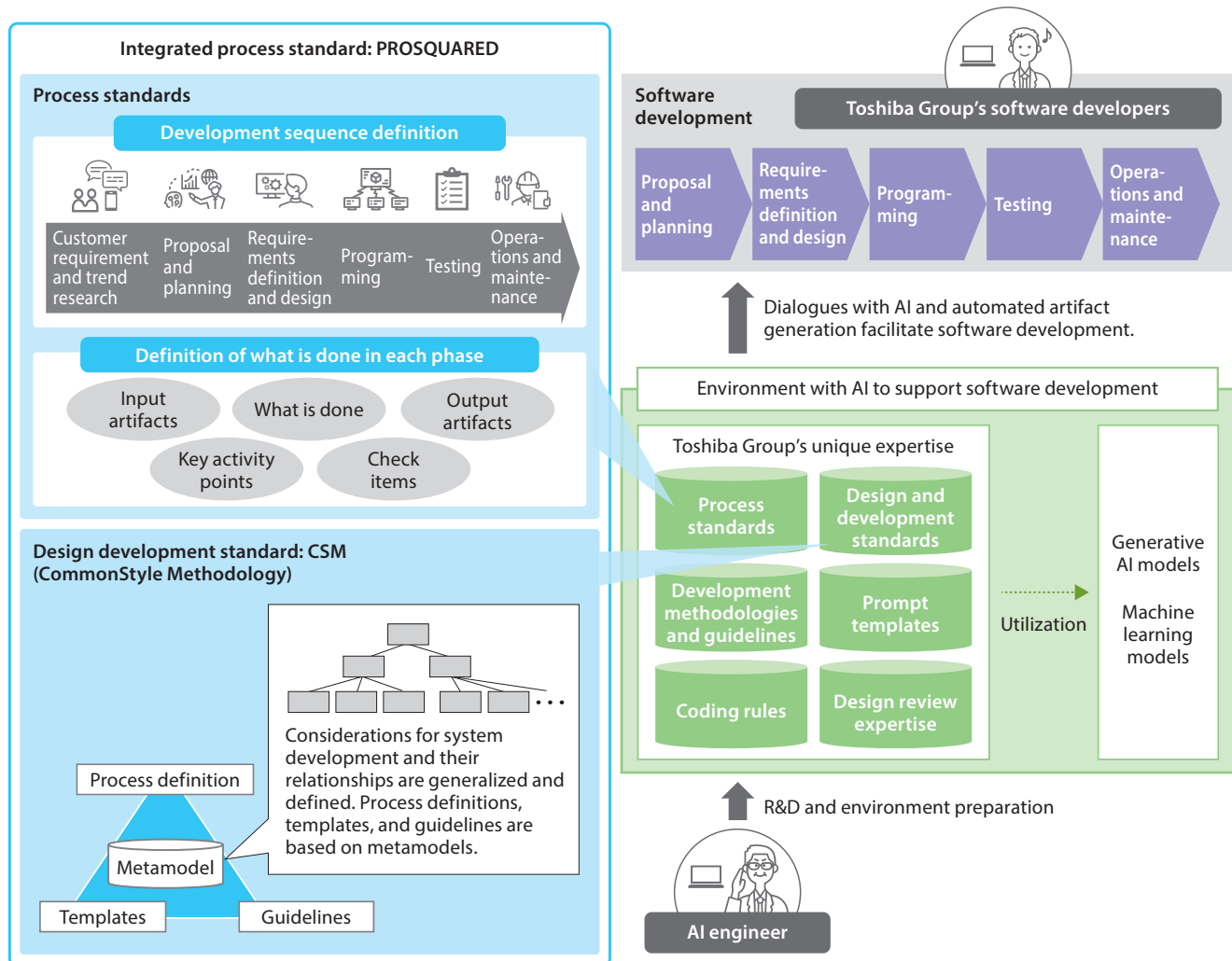
Generating AI training data for a collection of diverse handwritten characters is essential so that the OCR tool can recognize a wide range of handwriting styles and variations. However, it is costly to collect a huge quantity of handwritten characters for AI training, especially for East Asian languages with thousands of characters.

With this in mind, Toshiba Digital Solutions Corporation is developing technology to generate character images with a wide variety of handwriting styles based on typed characters. We have recently developed character image generation technology based on a diffusion model, which incorporates a function to screen out inadequate character images for high-quality character image generation. We have improved character recognition accuracy efficiently by using the generated character image data to train character recognition AI.

We will continue to work to further improve the accuracy of our character recognition services such as the AI OCR Character Recognition Service.

5.6 Software Design and Development Support Technology Combining Process Standards and Generative AI

Integrated process standard: PROSQUARED

Process standards

Development sequence definition

Customer requirement and trend research | Proposal and planning | Requirements definition and design | Programming | Testing | Operations and maintenance

Definition of what is done in each phase

Input artifacts | What is done | Output artifacts

Key activity points | Check items

Design development standard: CSM (CommonStyle Methodology)

Considerations for system development and their relationships are generalized and defined. Process definitions, templates, and guidelines are based on metamodels.

Process definition

Metamodel

Templates | Guidelines

Software development — Toshiba Group's software developers

Proposal and planning | Requirements definition and design | Programming | Testing | Operations and maintenance

Dialogues with AI and automated artifact generation facilitate software development.

Environment with AI to support software development

Toshiba Group's unique expertise

Process standards | Design and development standards

Development methodologies and guidelines | Prompt templates

Coding rules | Design review expertise

Utilization →

Generative AI models

Machine learning models

R&D and environment preparation

AI engineer

∗ Toshiba Digital Solutions systematized system development engineering standards in the form of CommonStyle in 2006 and has been using it since then.

Approach to supporting software development using generative AI

Toshiba Digital Solutions Corporation is developing technology that combines Toshiba Group's software development process standards and expertise with generative AI to provide consistent support for software design and development. In 2024, we produced software development and design review support technologies.

The new software development support technology facilitates step-by-step detailing of software design, starting with functional specifications, up to automatically generating a complete set of web application program code. We confirmed that approximately 80% of the generated program code was executable without modification. Leveraging our process standards, we prepared AI-friendly prompts that are easy to interpret and contain sufficient information, achieving highly accurate and relevant output from AI.
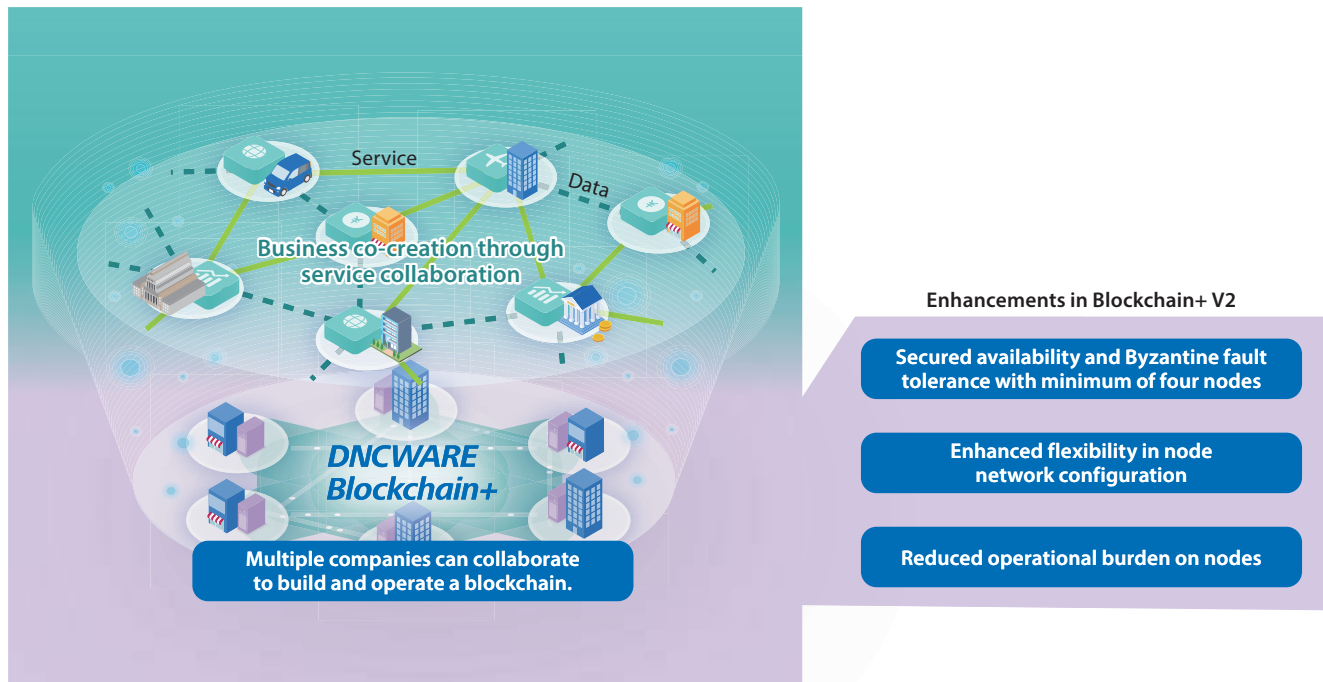
5. Digital Solutions

The new design review support technology incorporates our expertise into AI prompts to automate software design checks, focusing on terminology consistency, document consistency, and other factors.

To apply these technologies to our software development process, we are working on prototype support tools and applying them to the actual software development process. We will continue to improve these support technologies and tools.

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5.7 DNCWARE Blockchain+ V2 for Enterprise with Features to Support Joint Operations

Blockchain+ V2 features

Toshiba Digital Solutions Corporation offers DNCWARE Blockchain+, a highly reliable blockchain for enterprises. We released DNCWARE Blockchain+ V2 (hereafter "Blockchain+ V2") in December 2024, which provides enhanced operability and availability, simplifying consortium blockchain management on which multiple organizations can build and operate nodes jointly.

In recent years, companies have faced an increasing number of issues that cannot be solved by one organization alone. Secure data sharing is essential for multiple organizations to collaborate on solving such issues. Consortium blockchains provide highly reliable data-sharing infrastructure that does not rely on any specific organization. However, consortium blockchains tend to provide fewer operating nodes than public blockchains, which means that the failure of a single node could have a greater impact on an entire system.

Blockchain+ V2 incorporates an improved consensus algorithm to secure availability and Byzantine fault tolerance (BFT)[*] with a minimum of four nodes. Blockchain+ V2 also provides enhanced flexibility in blockchain network configuration for node installation, allowing nodes to be set up in networks isolated by firewalls. Servers in private networks can also be used as nodes.

Furthermore, to reduce the operational burden on nodes, we have prepared a node liveness monitoring tool (i.e., a tool to check if nodes are functioning properly), a status verification tool, and an environment to support communication among participating organizations.

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Blockchain+ V2 is suitable as a platform for secure data sharing among multiple organizations. It can contribute to various scenarios, such as tracking carbon dioxide emissions throughout a product lifecycle, improving delivery transparency and reliability in the logistics industry, and facilitating public services between municipalities and private companies.

(＊) In a distributed system, Byzantine fault tolerance ensures that a system as a whole can reach a correct consensus even when some nodes fail or maliciously send incorrect information.

5.8 GridDB 5.6EE Database Enabling Inter-Site Database Replication

Inter-site and intra-site database replication using differential transaction logs
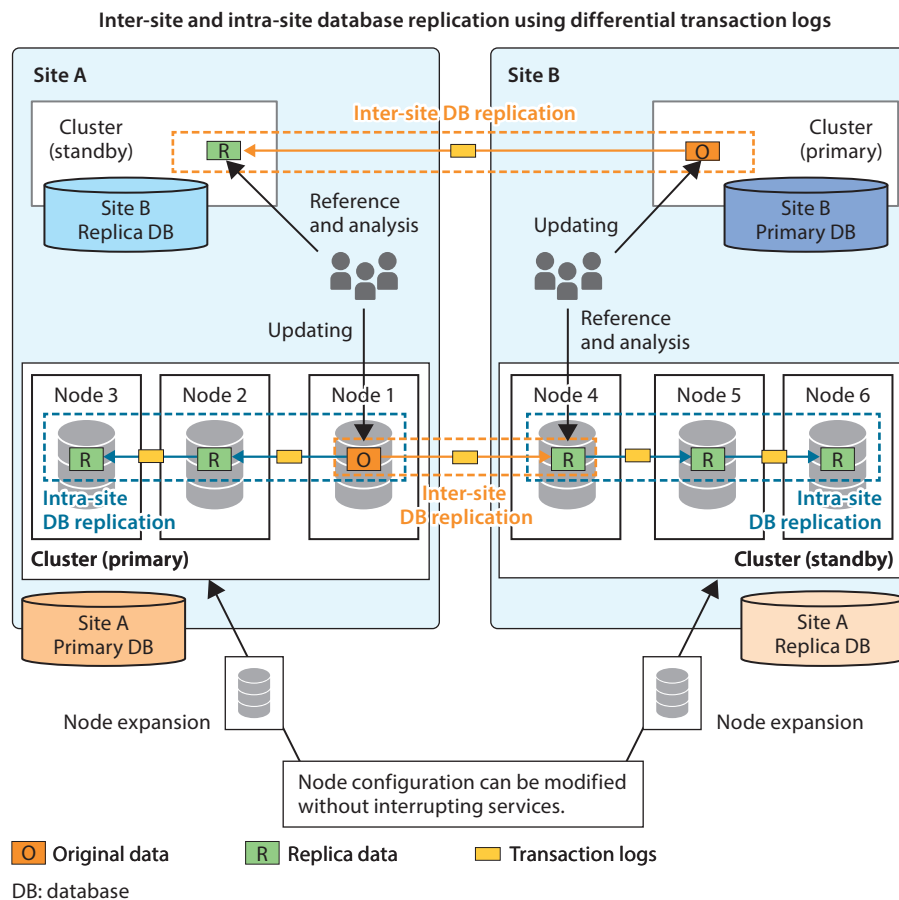
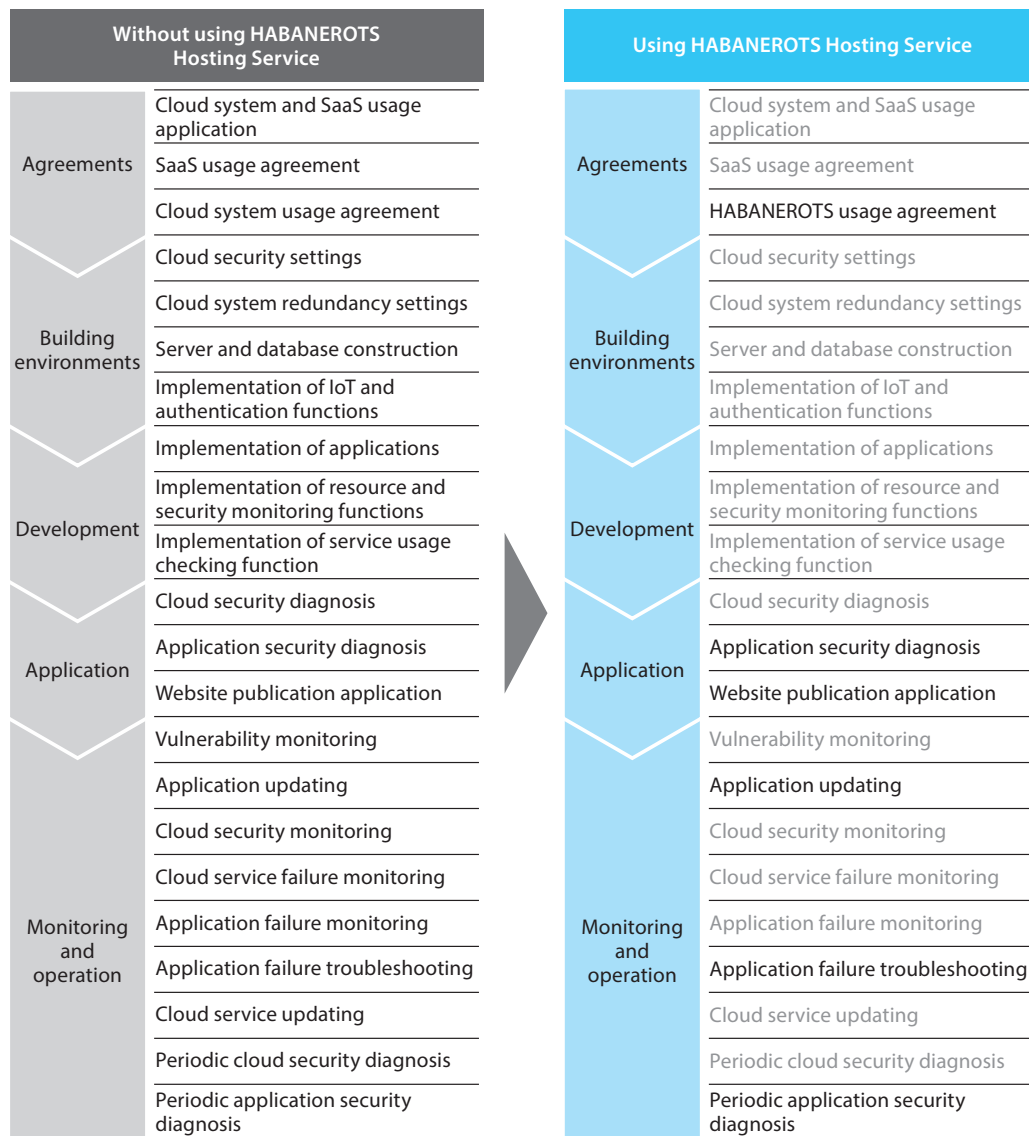**Overview of inter-site database replication using GridDB**

Enterprises that provide services over a wide area need to replicate Internet-of-Things (IoT) data from a source site to one or more target sites. This must be done to prepare for large-scale disasters while preserving the capability to perform data analysis across multiple sites. However, inter-site replication of a large-scale and frequently updated IoT database poses difficult issues such as reducing performance degradation and maintaining consistency between replicas.

To solve these issues, GridDB 5.6EE, a database oriented for big data and IoT data from Toshiba Digital Solutions Corporation, supports inter-site database replication, extending the conventional intra-site replication function. GridDB 5.6EE synchronizes only differential transaction logs with original data both within a given cluster and between sites to improve processing performance and ensure data consistency.

Additionally, we have developed a function that allows the node cluster configuration to be modified without interrupting services, making it possible to reduce operational costs. We aim to apply GridDB 5.6EE to projects that handle a large volume of data.

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5.9 HABANEROTS Hosting Service for Easy and Secure Realization of Cloud Services

Without using HABANEROTS Hosting Service		Using HABANEROTS Hosting Service	
Agreements	Cloud system and SaaS usage application	Agreements	Cloud system and SaaS usage application
	SaaS usage agreement		SaaS usage agreement
	Cloud system usage agreement		HABANEROTS usage agreement
Building environments	Cloud security settings	Building environments	Cloud security settings
	Cloud system redundancy settings		Cloud system redundancy settings
	Server and database construction		Server and database construction
	Implementation of IoT and authentication functions		Implementation of IoT and authentication functions
Development	Implementation of applications	Development	Implementation of applications
	Implementation of resource and security monitoring functions		Implementation of resource and security monitoring functions
	Implementation of service usage checking function		Implementation of service usage checking function
Application	Cloud security diagnosis	Application	Cloud security diagnosis
	Application security diagnosis		Application security diagnosis
	Website publication application		Website publication application
Monitoring and operation	Vulnerability monitoring	Monitoring and operation	Vulnerability monitoring
	Application updating		Application updating
	Cloud security monitoring		Cloud security monitoring
	Cloud service failure monitoring		Cloud service failure monitoring
	Application failure monitoring		Application failure monitoring
	Application failure troubleshooting		Application failure troubleshooting
	Cloud service updating		Cloud service updating
	Periodic cloud security diagnosis		Periodic cloud security diagnosis
	Periodic application security diagnosis		Periodic application security diagnosis

SaaS: software as a service
Gray text: Items that are no longer needed

Differences between cloud services that use and do not use HABANEROTS Hosting Service

HABANEROTS, an IoT platform service from the Toshiba Group, is the foundation that supports our business units in the development and provision of IoT systems. It is designed to reduce development and operating costs and facilitate easy and secure cloud services.

HABANEROTS provides the Web application programming interface (API) necessary to build IoT systems and the following hosting services:

- A mechanism for running applications in a secure and redundant cloud environment
- Tools for checking and monitoring application access and operating status

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- Storage such as databases and caches that can be selected according to the application requirements

HABANEROTS helps to reduce the costs of building and operating a cloud environment, allowing customers to concentrate on application development and operation and has been used in several dozens of projects. We will continue to contribute to the realization of IoT systems that demand rapid development cycles and releases.

5.10 Application of SQBM+ Quantum-Inspired Optimization Solution to Large-Scale Combinatorial Optimization Problems

SQBM+ is a quantum-inspired optimization solution from Toshiba Digital Solutions Corporation designed to solve large-scale combinatorial optimization problems. We have developed a new methodology to effectively apply SQBM+ to real-world problems, as demonstrated by the following two examples:

(1) Drug discovery

Drug discovery involves identifying allosteric sites on proteins responsible for diseases. Allosteric sites are a set of specific amino acid residues on a protein that have the highest impact on the activity of the active site. Targeting allosteric sites in drug discovery is expected to offer a promising avenue for drug development that was previously difficult with conventional methods.

Proteins are composed of a chain of amino acid residues that interact with one another. We modeled a protein structure as a graph in which nodes denote amino acid residues and then used SQBM+ to solve a graph theory problem called a weighted maximum independent set problem.

We have confirmed that the new method is capable of estimating known allosteric sites accurately. At present, we are working to estimate new allosteric sites and identify chemicals that bind to these sites to control protein activity, yielding promising results.

(2) Logistics

Logistics involves optimizing item placement on shelves at a warehouse to minimize pick-up travel distance. Traditional simulation techniques were time-consuming and only yielded solutions with high pick-up costs.

We have developed a new method to optimize item placement on shelves gradually by repeating the following tasks: (1) changing part of the item placement, (2) searching for the shortest pick-up route using an existing solver, and (3) evaluating the pick-up travel distance. We employed SQBM+ to calculate the initial solution for the existing solver to stabilize and accelerate the search process, enabling iterative calculations for shelf placement optimization.

The new method resulted in a 15% reduction in pick-up costs, compared to traditional shelf placement.

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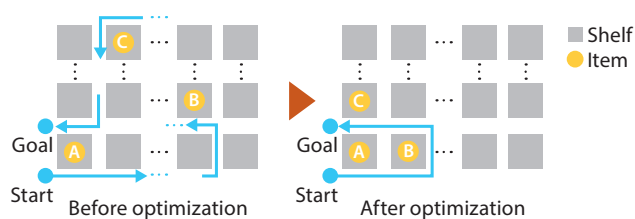
Proteins on human genome: Approx. 20 000 types

Allosteric drug discovery

Target proteins: Approx. 5 000 types

Reactant

Active site

Activity control

Allosteric regulatory molecule

Allosteric site

Target in allosteric drug discovery

Allosteric drug discovery

Proteins not related to diseases: Approx. 15 000 types

Conventional drug discovery

Target proteins: Approx. 1 800 types

Conventional drug discovery targets

Active site

Reactant

Expansion of drug discovery targets by estimating the allosteric sites

Drug discovery targets

× : Active site

Prediction result

High

Low
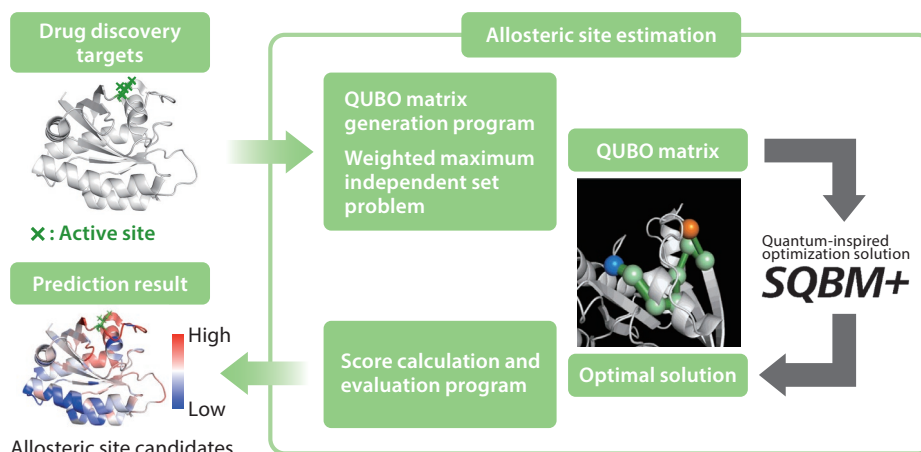
Allosteric site candidates

QUBO: quadratic unconstrained binary optimization

Allosteric site estimation

QUBO matrix generation program

Weighted maximum independent set problem

QUBO matrix

Quantum-inspired optimization solution
SQBM+

Score calculation and evaluation program

Optimal solution

Allosteric site estimation using SQBM+

C

B

Goal

A

Start

Before optimization

C

Goal

A B

Start

After optimization

■ Shelf
● Item

Shelf allocation optimization to shorten item picking route

5.11 Trial Demonstrations of QKD Network for Global Business Expansion

Leveraging the principles of quantum mechanics, quantum key distribution (QKD) enables secure encryption key delivery that is immune to eavesdropping. To support the global expansion of encryption key services, the Toshiba Group is conducting demonstrations in collaboration with partners across multiple countries and regions with the aim of extending the reach of our QKD network.

The QKD network facilitates secure encryption key sharing. Our QKD service platform combines a QKD network with a quantum key management layer to provide and manage encryption keys for end users, serving as the foundation for secure cryptographic communication infrastructure.

The demonstration projects involved constructing a QKD network in partnership with telecommunications carriers and end-user companies from participating countries. The trial demonstrations aimed to validate technical feasibility and identify operational challenges to be solved to scale the QKD network for commercial services.

In France, we established a dedicated laboratory test environment with Orange S.A., a telecommunications operator, to simulate the architecture and multiplexed transmission models used in current telecommunication networks. The verification process included testing QKD network operations in real-world conditions. We built a 184 km QKD network with three QKD links, successfully demonstrating multiplexing a 100 Gbps encrypted data transmission within a 400 Gbps communication channel, taking into account both commercial environments and the QKD channel.

In the United Kingdom, we partnered with BT Group plc and Equinix, Inc. to launch an initiative for connecting data centers located in the heart of London's financial district. This connection, facilitated by a QKD network, offers multiple users an opportunity to try quantum-secure communication services.

In South Korea, we have demonstrated a long-distance QKD network in collaboration with KT Corporation. Our most recent test involved verifying a hybrid environment combining a QKD network and post-quantum cryptography (PQC) in collaboration with Shinhan Bank, an end user.

In the United States, Wells Fargo & Company, a major financial institution, conducted interoperability tests involving Ciena Corporation's optical communication equipment and our QKD system.

Our next step is to expand these projects to include more countries, explore the deployment of large-scale QKD networks, and launch QKD network services worldwide.
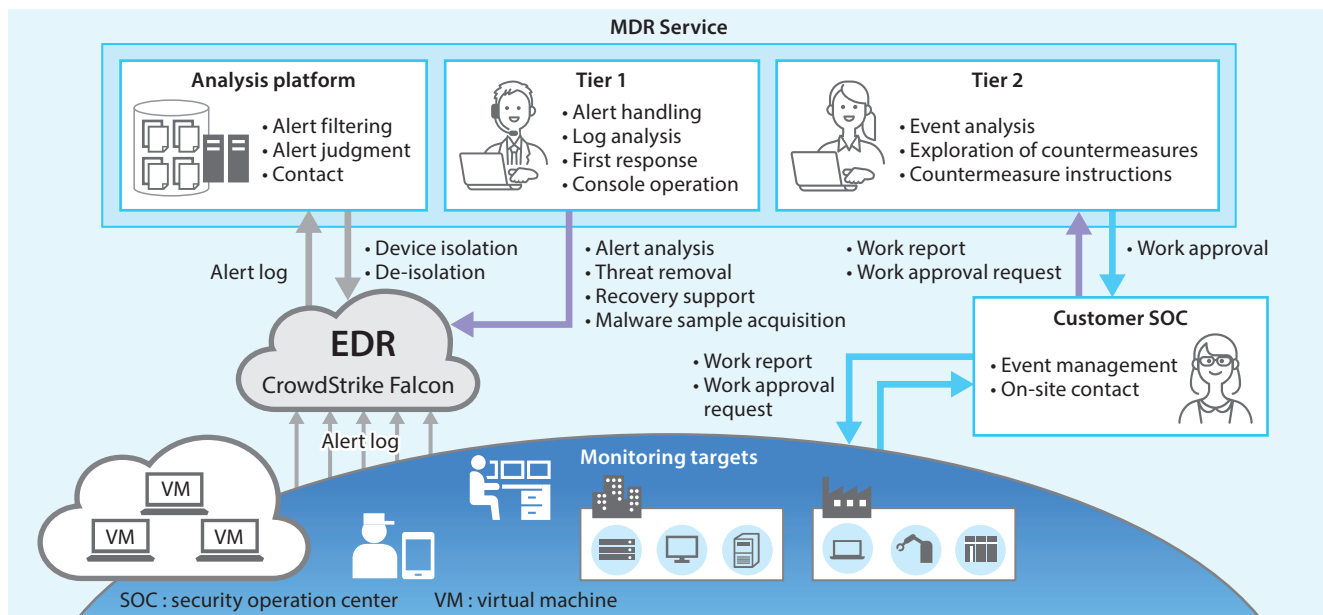
5. Digital Solutions
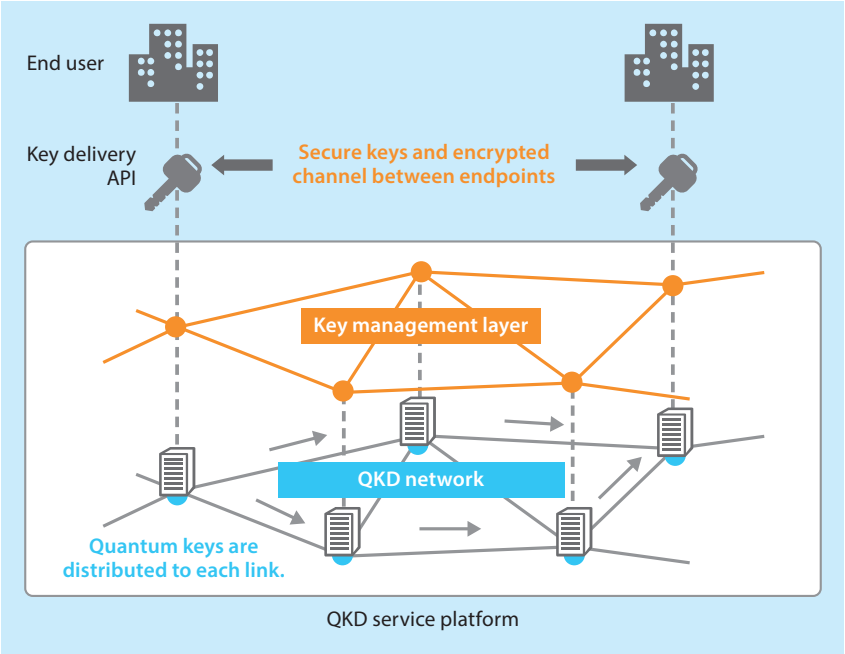
Encryption key service on QKD service platform
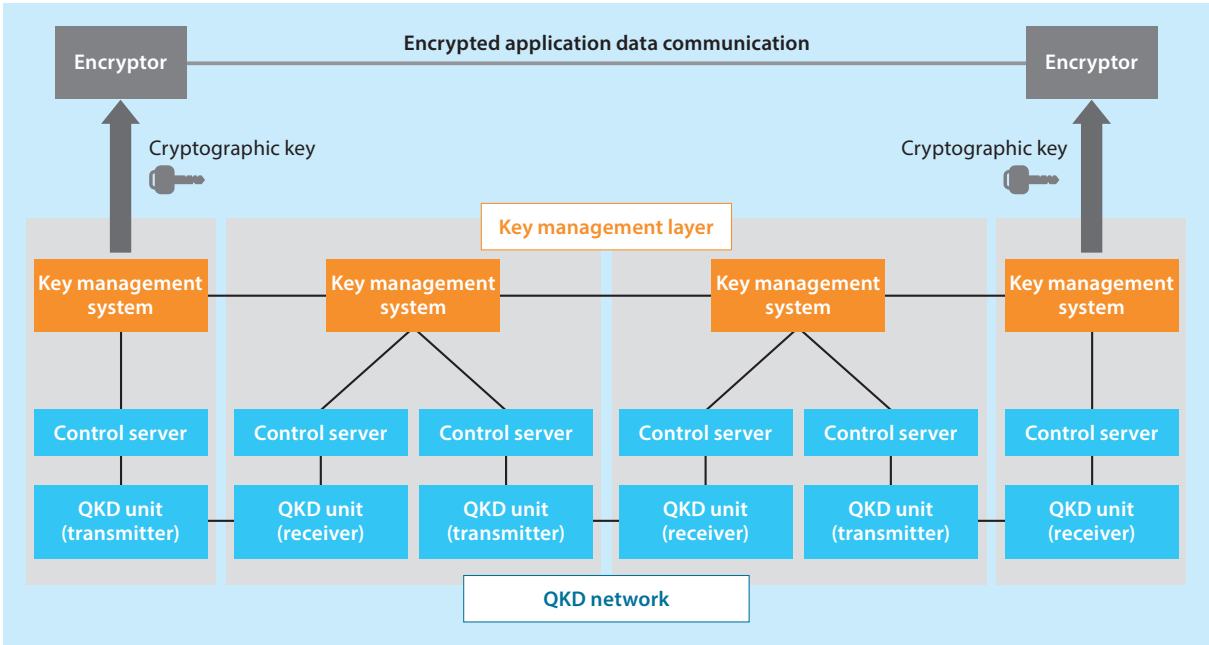
QKD network testbed system with multiple QKD links (example with three QKD links)

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5.12 Launch of EDR-Based Security Operation Service Using CrowdStrike Falcon

EDR tool CrowdStrike Falcon and MDR security operation service

In recent years, cyberattacks have become increasingly sophisticated and malicious, making it more difficult to protect PCs and other endpoints from ransomware and other malware with antivirus software only. On the other hand, work styles have become more varied, including working from home and remote working. This has driven a shift from the conventional concept of a secure internal network to that of a zero-trust network that does not rely on perimeter defenses like firewalls and intrusion detection systems.

In the face of changing circumstances and environments, endpoint security measures are becoming ever more crucial to prevent information leakage and business interruptions due to malware infections. To detect cyberattacks and malicious intrusions into endpoints, it is effective to implement endpoint detection and response (EDR), which is designed to monitor PCs and other endpoints in real time, issue an alert, and isolate potentially compromised endpoints when suspicious activity is detected.

Toshiba Digital Solutions Corporation has become an authorized reseller of CrowdStrike Falcon[*] and launched the Managed Detection and Response (MDR) Service for CrowdStrike, a security operation service that supports the use of CrowdStrike Falcon. This service is based on technology that filters out false positives and unnecessary alerts from a large volume of daily alerts detected by CrowdStrike Falcon, extracting only those that require action. It also includes technology for handling extracted alerts based on the latest attack methods and trends. The combination of CrowdStrike Falcon and the MDR Service for CrowdStrike provides customers with advanced expertise and information necessary to operate efficiently.
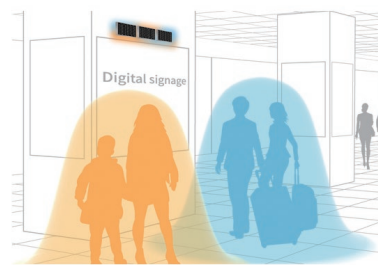
(*) Products and services from CrowdStrike, Inc. We are a certified reseller partner of CrowdStrike, Inc.

5.13 New Sound Field Control Software with Expanded Controllable Sound Field Area, Increasing Use Cases

Conventional method

New method

Comparison of areas where sound pressure distribution is controllable
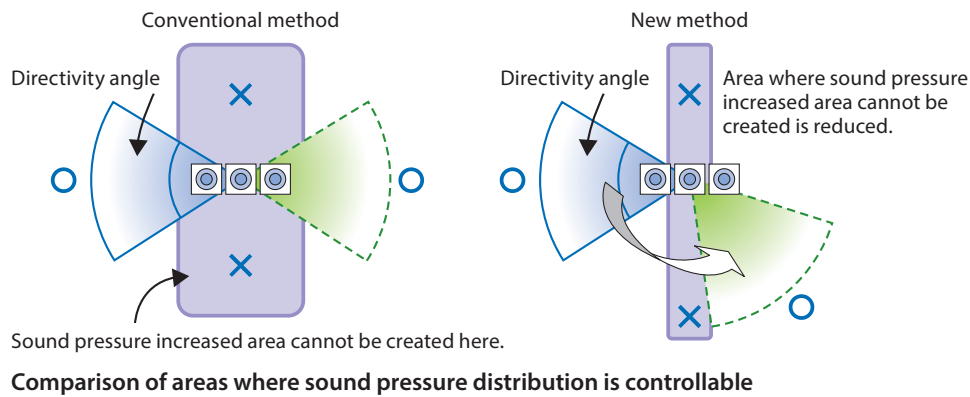
Online meeting conversation conducted in open area

Digital signage

Sound field control use cases

Toshiba Digital Solutions Corporation produces sound field control software to create a directional sound field. However, the sound produced by the initial version (V1.0) of this software released in 2023 had limited directionality. To dynamically reposition the clearly audible area according to the movement of listeners and other surrounding conditions, it is necessary to be able to create such an audible area in arbitrary directions.
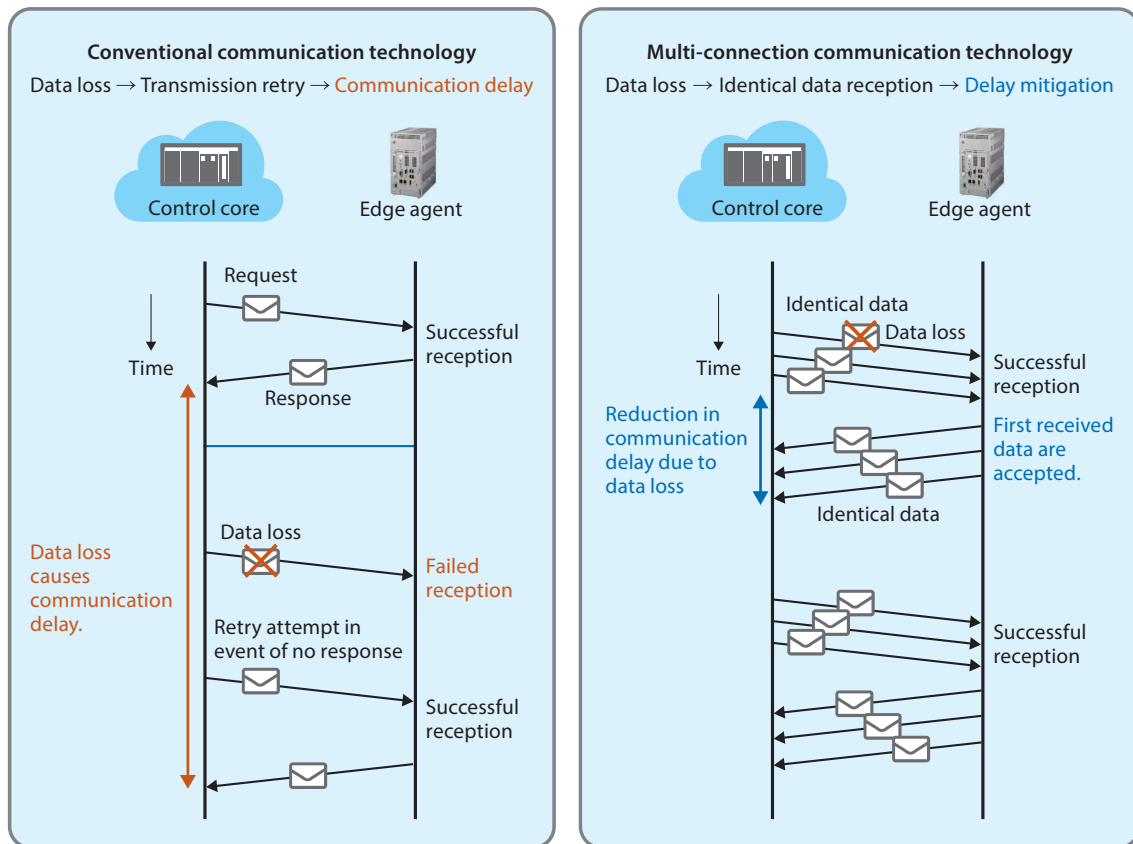
With this in mind, we released a new version (V1.1) of sound field control software applying a new sound distribution method.

The conventional method uses sound nodes for sound field control, which limits sound directionality. The new method has eliminated the need for sound nodes to considerably increase the selectable sound direction range. Free from sound nodes that affect the controllable sound frequency band, the new method can maintain performance even if the distance between each speaker is reduced. This means that software V1.1 allows the use of smaller speaker sets, so it is expected to support expanded use cases.

We will continue to work to increase sound pressure differences and directivity angle options to offer sound control solutions suitable for diverse use cases.

5.14 Release of typeN1 Instrumentation Component Virtualization Platform for Cloud-Based PLC Package

Conventional communication technology
Data loss → Transmission retry → Communication delay

Control core
Edge agent

Request
Successful reception
Time
Response

Data loss causes communication delay.

Data loss
Failed reception

Retry attempt in event of no response
Successful reception

Successful reception

Multi-connection communication technology
Data loss → Identical data reception → Delay mitigation

Control core
Edge agent

Identical data
Data loss
Time
Successful reception

Reduction in communication delay due to data loss
First received data are accepted.

Identical data

Successful reception

Comparison of conventional and multi-connection technologies

Toshiba Digital Solutions Corporation offers digital manufacturing solutions integrating operational technology (OT) and information technology (IT).

To enhance control functions, we launched an instrumentation cloud service of digital manufacturing solutions. Additionally, in May 2024, we released a cloud-based programmable logic controller (PLC) package of the typeN1 instrumentation component virtualization platform from Toshiba Corporation.

The typeN1 facilitates remote operations and maintenance as well as data visualization and utilization. We have developed multi-connection communication technology where the control core of the typeN1 transmits identical data multiple times via multiplexed Internet routes and the edge agent accepts the data that arrives first. If any data is missing, the edge agent receives data from another route, thereby reducing transmission retries and ensuring communication stability.

5.15 Enhancement of WAOT Asset Investment Optimization Solution
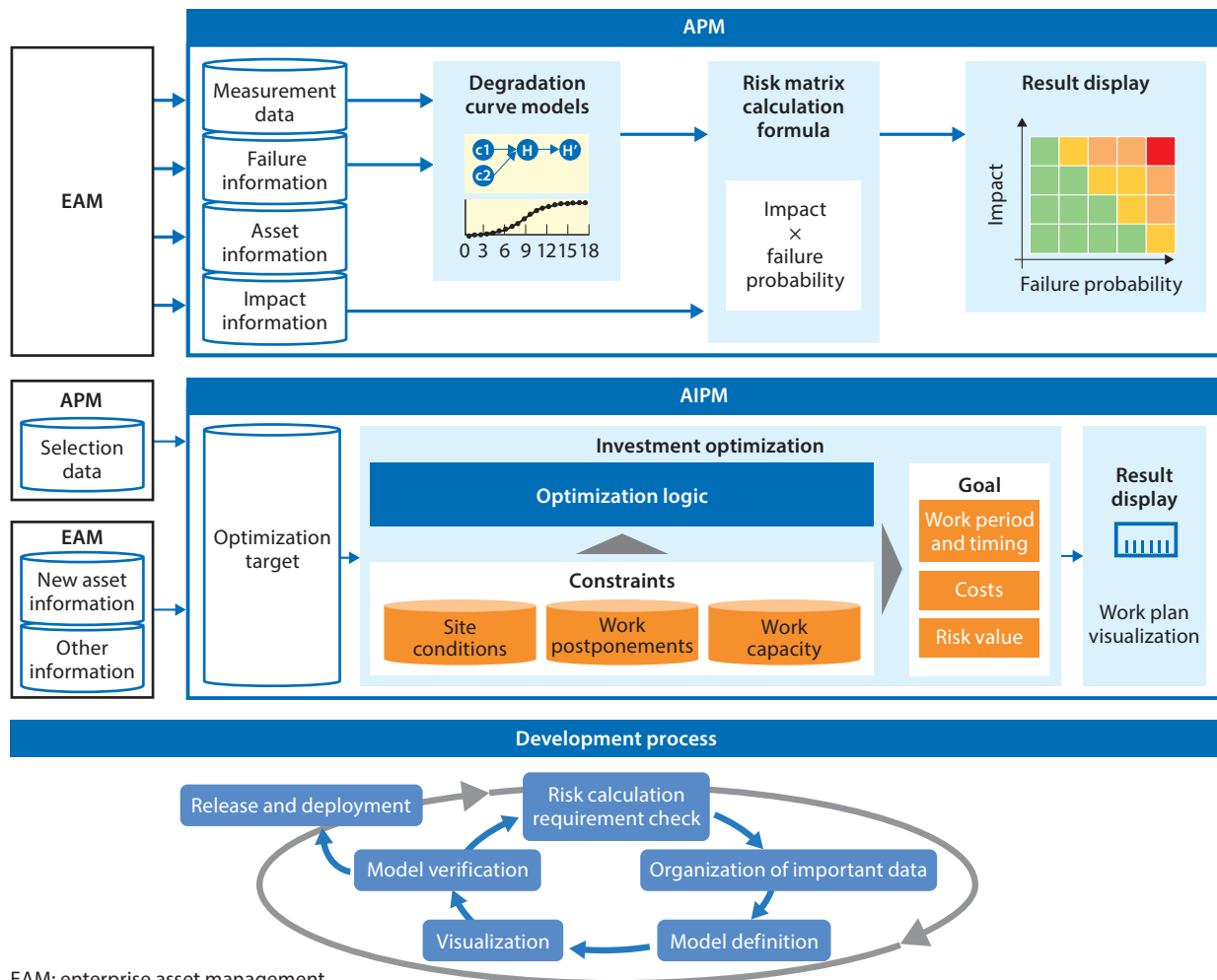
EAM: enterprise asset management

Configuration of WAOT APM and AIPM optimization model template

Toshiba Digital Solutions Corporation offers WAOT, an asset investment optimization solution template for risk-based maintenance (i.e., maintenance based on the evaluation of asset failure risks) using asset performance management (APM) and asset investment planning and management (AIPM). WAOT includes templates for risk calculation formulas and optimization models recommended by the power industry as well as development process standards for applying them to actual business operations. WAOT provides the following benefits:

(1) Ability to calculate and visualize risk quantities (social and business impacts of asset failure risks and asset failure probabilities), enabling rational decision-making on asset replacement

(2) Optimization of asset replacement plans to meet constraints such as risk quantities, budget, and work capacity, ensuring sustainable asset management while minimizing risks

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(3) Flexible customization of risk calculation formulas and optimization models to formulate the optimal plans according to customers' specific business issues

Additionally, WAOT Version 1.2, which we developed in 2024 and released in February 2025, incorporates a new feature to quantify the investment value of each asset and calculate the best year for investment.

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5.16 Process Improvement Assist Package for SMT Lines: Enhancing Productivity through Utilization of Manufacturing Equipment Data
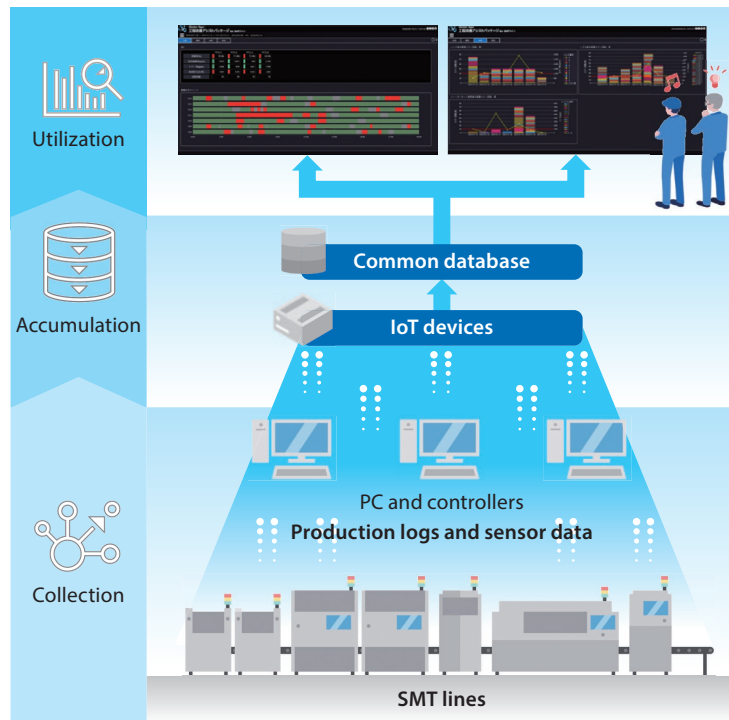
Overview of Process Improvement Assist Package for SMT Lines

Process improvement is required to enhance the productivity of assembly lines used to mount electronic components on printed circuit boards using surface-mount technology (SMT). However, under the current circumstances, it is difficult to improve this process because of the need to collect manufacturing equipment data manually and a shortage of technicians versed in data analysis.

Leveraging the manufacturing expertise gained at the Toshiba Group, Toshiba Digital Solutions Corporation developed the Process Improvement Assist Package for SMT Lines, which collects, accumulates, and utilizes equipment data automatically, releasing it in October 2024. Because data formats differ from manufacturer to manufacturer, we designed a data collection interface and a unified data management model to enable consistent collection of equipment data. Additionally, through trials at Toshiba Group's manufacturing sites, we developed screen designs to display useful indicators for process improvement such as operating and error rates. The Process Improvement Assist Package for SMT Lines allows quick visualization of process conditions and facilitates process improvement.

We will continue to develop improvement recommendations, predictive detection, and other functions to prevent equipment failures and contribute to further process improvement.