Technology Strategy to Support Three Growth Drivers

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Generating new value by integrating technology fields around AI and building a differentiated solutions business
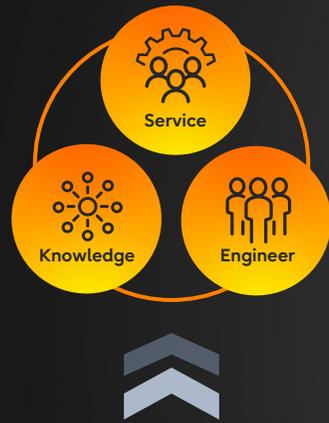
Modernization
Raising business efficiency and productivity by applying generative AI in all phases, from design to testing

Service
Knowledge
Engineer

Uvance
Developing technologies for AI offerings

Data Intelligence
Business Impact
Social Impact

Consulting
Technology consulting e.g. data & AI (technology/integrated know-how)

uvance Wayfinders
Consulting by Fujitsu

5 Key Technology

Enterprise technologies

- Converging technologies
- Computing
- AI
- Data & Security
- Network
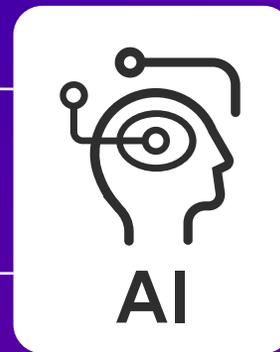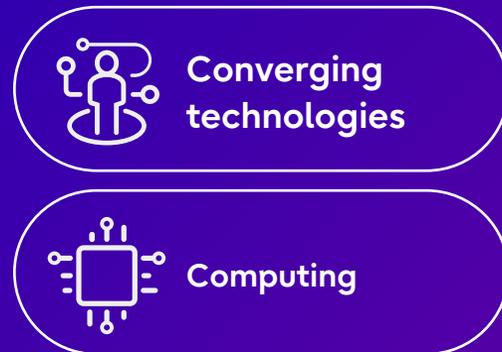
Global leadership in technology capabilities, upfront investments in fields requiring specialized expertise

1

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AI Technologies Supporting Enterprises

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Fujitsu Kozuchi

Generative AI framework for enterprises

Large Language Model Takane

Takane cohere 共同開発 業務特化型 LLM 高嶺

Knowledge graph extended RAG — *Supporting 10 million characters*

Generative AI amalgamation technology — *0 Customization*

Generative AI trust — *Compliance with contracts and internal regulations*

Dealing with large-scale and varied company data

Flexibly dealing with changes in company needs

Measures to eliminate doubts about AI usage

- **Root Casual Analysis**
  Failure occurrence and proposed countermeasures based on past cases
- **Vision Analytics**
  Detection of specific events from video images Creation of reports on hazard countermeasures

- **Software Engineering**
  Assistance in understanding source code/design documentation
- **Question & Answering**
  Highly accurate Q&A over a huge number of manuals

- **Generative AI**
  Generative AI technology
- **Vision AI**
  Vision recognition

- **AI Security**
  Governance, defense, reliability
- **Graph AI**
  Graph analysis

Knowledge Graph

AI Core Engine

AI Computing Platform

Network Platform supporting AI

Fujitsu's AI strategy to compete globally

Differentiation through the fusion of AI and world-leading technologies

Quantum・Computing

Computing technology reaches beyond the realm of human knowledge

Processor
・MONAKA

Server
・Private AI Platform on PRIMERGY
・GPU / Edge servers / CDI

Quantum
・Quantum computer
 (256qbit FY24, 1,000qbit FY26)
・Diamond spin
・STAR architecture

Network

Optimal control of large-scale NW operation by AI /Distributed AI world with advanced NW

・Mobile : vRAN software to realize AI-RAN convergence
Photonics: All Photonics Network (APN)
 800G/1.2 T Technology for High Performance and Sustainability,
 Evolved Photonics-Electronics Convergence and 1.6T advanced technologies
・Software : NW orchestration (Virtuora)
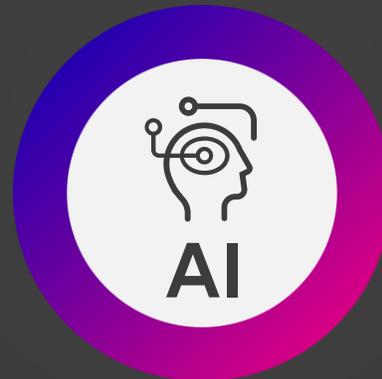
Data & Security

Digital trust to mitigate social/corporate risks from AI-induced false information and misinformation

・Trustable Internet
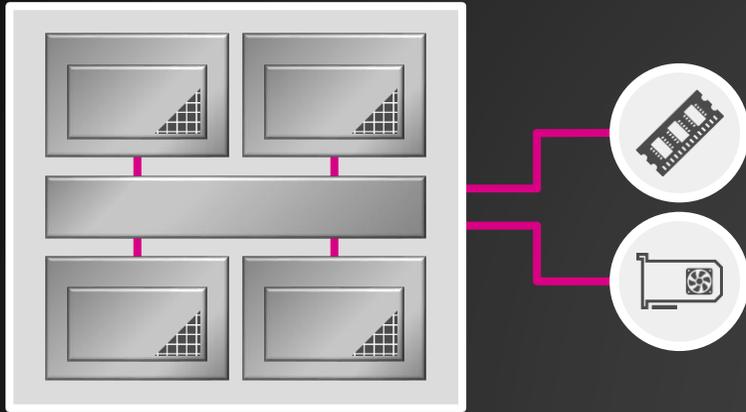・AI Security Framework
・Data Trust
・Ambient Auth.

Converging Technology

Achieve global sustainability transformation by 2030

・Social Digital Twin
・Ocean Digital Twin
・Human behavior change technology

AI

FUJITSU-MONAKA

FUJITSU

Next-generation high-performance, energy-efficient, Japan-made processor for a carbon neutral digital society

- Armv9-A Architecture
- 3D chiplet
  - ·Core die   2nm
  - ·SRAM die/IO die   5nm
- Ultra low voltage for energy-efficiency
- DDR5 12 channels
- Air cooling

- Arm SVE2 for AI and HPC
- 144 cores x 2 sockets (288 cores per node)
- Confidential Computing for security
- PCI Express 6.0 (CXL3.0)

High-speed data processing platform
Achieve high-speed processing of computing workloads, particularly AI workloads (2x faster than competing CPUs)

Balance of energy efficiency and performance
Significantly reduce CO2 emissions and power costs with high energy efficiency (2x more efficient than competing CPUs)

Goal

High security & reliability
Stable operation technology cultivated in mainframes and high security for cloud utilization

Easy to use
Utilize the Arm software ecosystem, and collaborative design across services, software, and hardware
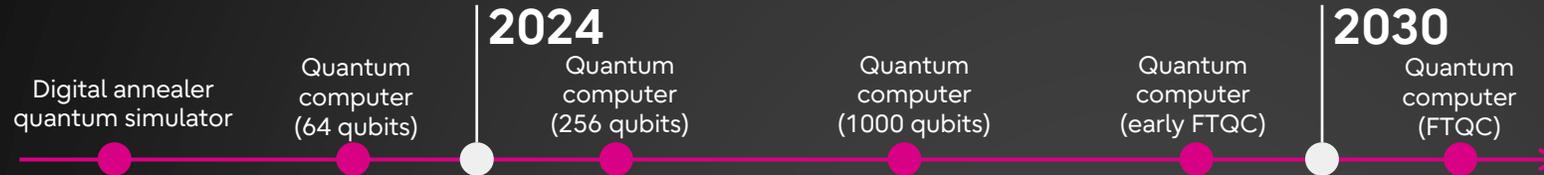
Achieved through our proprietary technologies such as self-designed microarchitecture and Ultra-low-voltage technology

R&D Strategy for Quantum Computing

Investments in technology to achieve the world's fastest and most efficient computational technologies

Timeline:

- Digital annealer quantum simulator
- Quantum computer (64 qubits)
- **2024** — Quantum computer (256 qubits)
- Quantum computer (1000 qubits)
- Quantum computer (early FTQC)
- **2030** — Quantum computer (FTQC)

- **Joint research with world-leading research institutes and companies**

  RIKEN   TUDelft

- **Covering everything from quantum devices to platform software and applications**

- **Development of quantum simulators and actual quantum computers**

  July 2023: Public launch of 40 qubit quantum simulator

  October 2023: Superconducting quantum computer (64 qubits), scheduled for delivery to National Institute of Advanced Industrial Science and Technology (in 2025)

  March 2025: Superconducting quantum computer (256 qubits)

  FY2026: Superconducting quantum computer (1000 qubits)

  FY2026 and beyond: Taking on the challenge of fault-tolerant quantum computation (FTQC)

- **Developing breakthrough technologies**

  - Achieving fault-tolerant quantum computation (FTQC)
    - STAR architecture
  - Diamond spin method

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Strategic Technology Collaboration

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Cohere
(16th July Press Release)

- Development of large-scale language model (LLM) for enterprise business

- Fujitsu is the exclusive provider for global market

Supermicro
(3rd October Press Release)

- Provision of servers for DC equipped with FUJITSU-MONAKA

- Joint development of water-cooling solutions for next-generation green data centers and HPC

AMD
(1st November Press Release)

- Collaboration in three strategic areas: engineering, ecosystem, and business

- Joint development of innovative computing platforms for AI/HPC

AI Technology Vision

Companies can drive innovation by selecting and controlling AI in line with their business strategy.
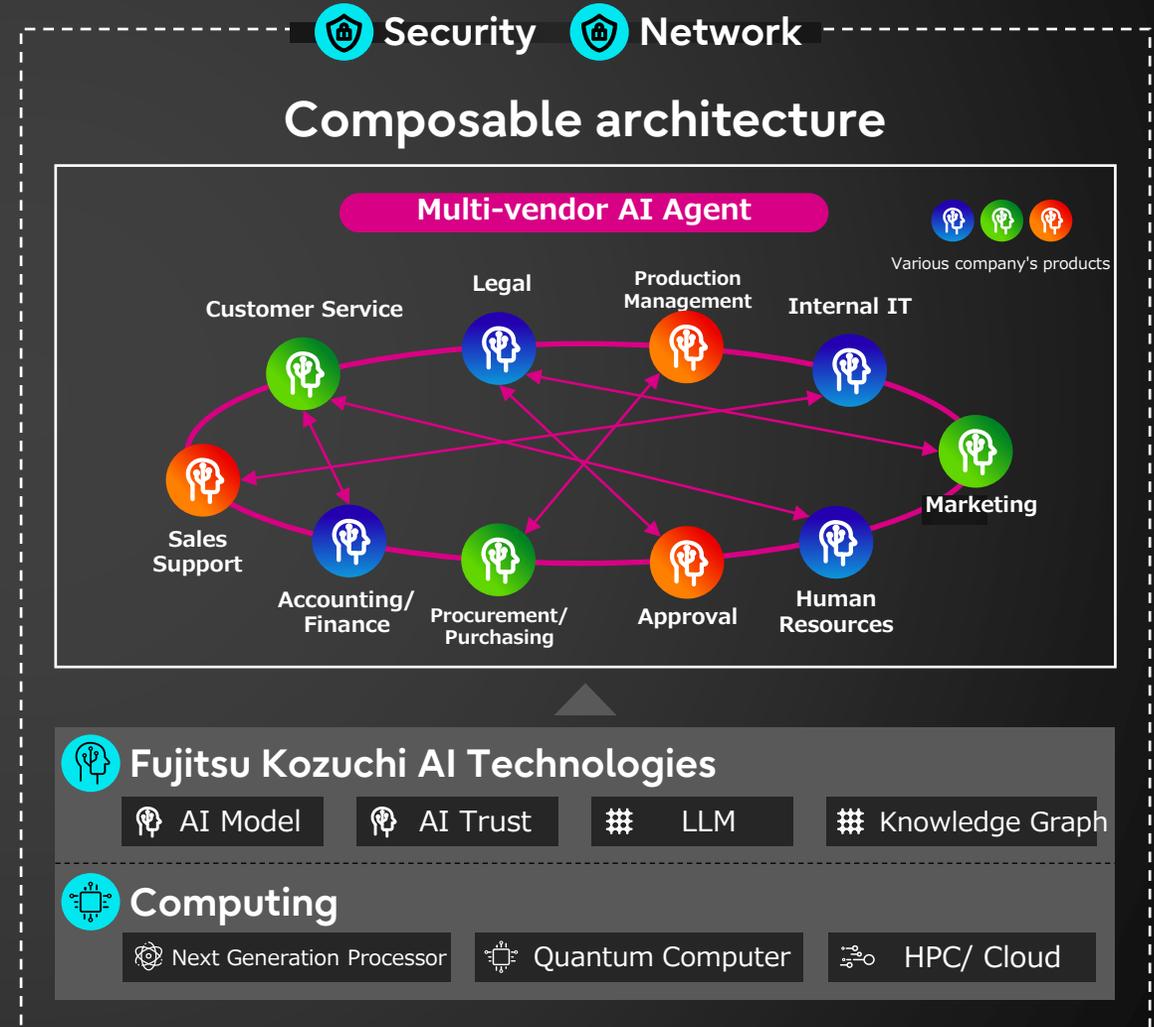
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Composable architecture

Multi-vendor AI Agent which can interact and collaborate will be provided

Fujitsu's Vertical Integration Technology

Supports architecture

- Security technology to realize secure interlocking/cooperation of AI Agents

- Fujitsu Kozuchi AI technologies supporting enterprise business such as LLM, AI models and knowledge graphs

- Cutting-edge processors and quantum computers to maximize the potential of AI and solve the looming power crunch

Security   Network

Composable architecture

Multi-vendor AI Agent

Various company's products

Customer Service · Legal · Production Management · Internal IT · Marketing · Human Resources · Approval · Procurement/Purchasing · Accounting/Finance · Sales Support

Fujitsu Kozuchi AI Technologies

AI Model · AI Trust · LLM · Knowledge Graph

Computing

Next Generation Processor · Quantum Computer · HPC/ Cloud

Thank you

Fujitsu's Research Strategy

Seishi Okamoto

Corporate Executive Officer, EVP
Head of Fujitsu Research

Fujitsu Limited

December 12, 2024

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AI Evolution at Fujitsu

Accelerating AI development from "Generative AI that transforms enterprise business," to "AI agents that proactively facilitate problem-solving," for creating a "future where multiple AI agents collaborate"

Generative AI
Creating content
suitable for your needs
through interaction

→

Today's Press Release

AI agent
Planning/executing tasks
to achieve purposes
by understanding the intention
and environment

Specific environment — Understanding — Executing tasks ← Result

→

Today's Press Release

Multi-AI agent
Solving complex issues
through collaboration of multiple AI agents
in distributed environments

Distributed environment — Under-standing — AI agent
Mutual learning Collaboration
Solving issues ← Solving — AI agent

Takane announcement on Sep. 30

Fujitsu Kozuchi AI Agent announcement on Oct. 23

Fujitsu's AI agents

Accelerating AI development from "conversational generative AI" to "AI agents that proactively promote problem-solving" by updating AI technologies for necessary information selection, self-learning and behavior control according to rules

Context memory
Efficiently stores only necessary parts

Self-learning
Automatically improves the abilities required for jobs/tasks

Behavior control
Conform AI agent activities to corporate rules

Logistics warehouse
Autonomously judges dangerous behavior to ensure worker their safety

Stores
Analyzes purchasing behavior, suggests the best customer service and promotional materials

Public sector
Detects suspicious behavior at an early stage to realize a safe and secure society

Healthcare
Accompanies the patient's rehabilitation and provides personalized support

Transportation
Identifies near-miss driving habits, and suggests preventive measures

Sports
Analyzes the athlete's characteristics and supports personalized improvement in technology

AI agent that refers to documentation to analyze camera images of worksites and makes proposals for site improvement and work reports

DEMO

Context memory

High-accuracy analysis function to process the long-duration video content

Achieved the world's top record in the benchmark for long-duration video analysis with the smallest video memory capacity

Self-learning

Learns to recognize the worksite, tasks, etc.

Warehouse safety management

AI agent adds the spatial understanding capability needed for safety management, and executes tasks from event detection, cause analysis and to report submission

Detecting a dangerous event in the live video
A person approaches a forklift in operation within 3 m

I prepared a draft incident report. Please confirm.

レポートシステム

インシデント管理

| 案件番号	INC20492
発生日時	2024/12/12 10:06
事象	運行中のフォークリフトの3.0m以内に人が接近。
分析	インシデント発生の前に集団で会話しながら歩行する事象を確認

Fujitsu's multi-AI agents' world view

Secure collaboration between different AI agents to proactively solve challenges

Co-creative learning

Agent Learning

Technology to address unknown problems through co-creative/adversarial learning among agents with different skills
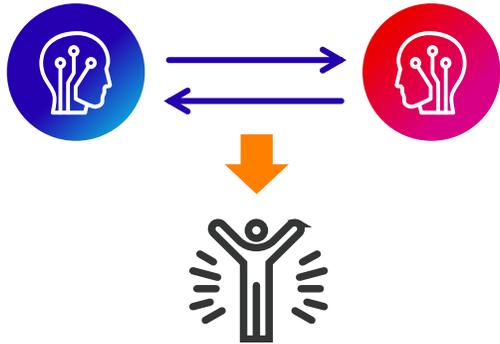
Solving complex issues proactively

Secure agent gateway

Agent Communication

Technology to apply interoperability policy among agents to workplaces for addressing security and privacy risks

Information Security

Contract/Terms

Privacy

Laws and regulations Guidelines
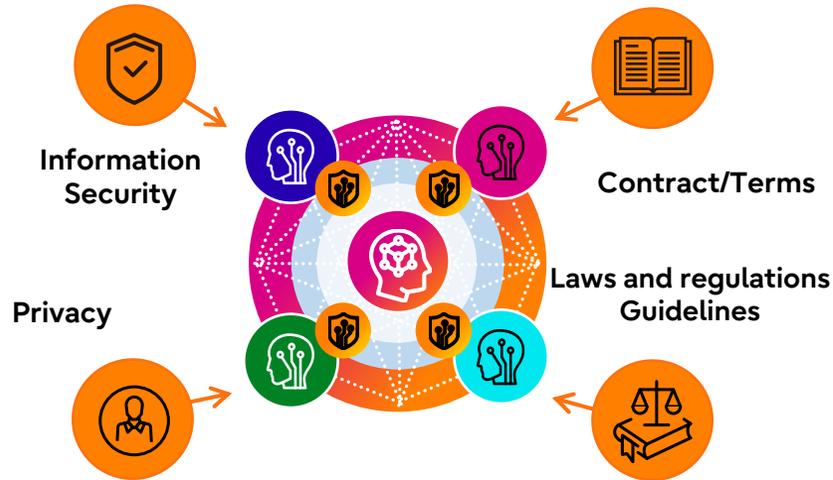
Ensuring reliable information exchange and actions

AI Workflow Control

Agent Coordination

Technology to control consistency in task sharing and execution among AI agents

Optimal task sharing through automatic understanding of environments and issues

DEMO

Realizing proactive security measures through multi-AI agents

- New technology in Co-creative learning to enhance robustness through knowledge sharing among AI agents with different expertise

Test Agent

Impact analysis Test

Protection scenario

Defense agent

Security Cyber Twin

Attack scenario

Attack agent

Solving problems caused by misjudgment of a single AI agent due to its latent bias

AI agents with different expertise/stances discuss the countermeasures in the same environment to address security problems appropriately and reliably

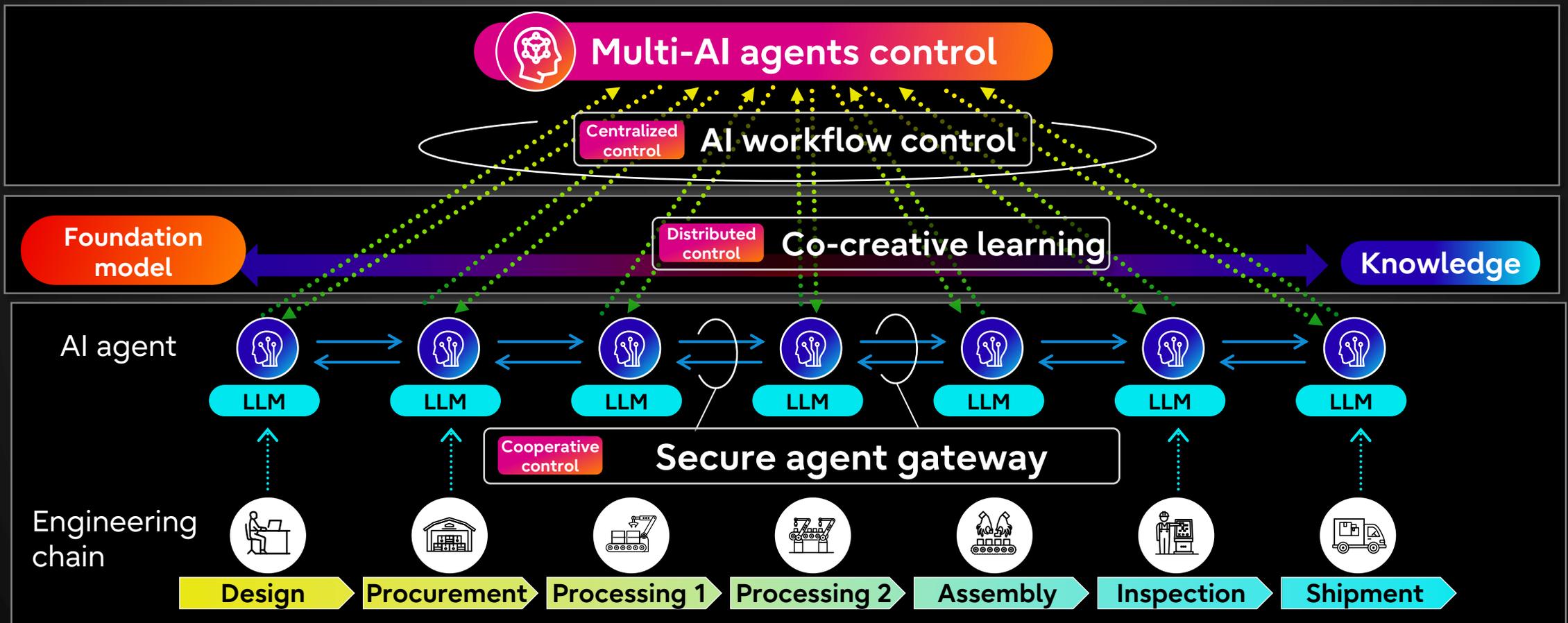- Simulate the effects of attack and protection scenarios in the virtual environment and create the optimal measure

Automatically detecting and preventing new threats

AI agents collaboratively find and address system vulnerabilities on the same day, which took several weeks for experts before

Theme adopted by COCN (Council on Competitiveness-Nippon

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AI agents in the supply chain autonomously optimize/adjust/judge across industries

Multi-AI agents control

Centralized control **AI workflow control**

Foundation model

Distributed control **Co-creative learning**

Knowledge

AI agent

LLM LLM LLM LLM LLM LLM LLM

Cooperative control **Secure agent gateway**

Engineering chain

Design Procurement Processing 1 Processing 2 Assembly Inspection Shipment

Building a reliable digital society platform through disinformation measures

Social issue Disinformation and misinformation increase the risk of social and economic confusion such as during an election and stock market manipulation

New technology to detect fake information on the internet
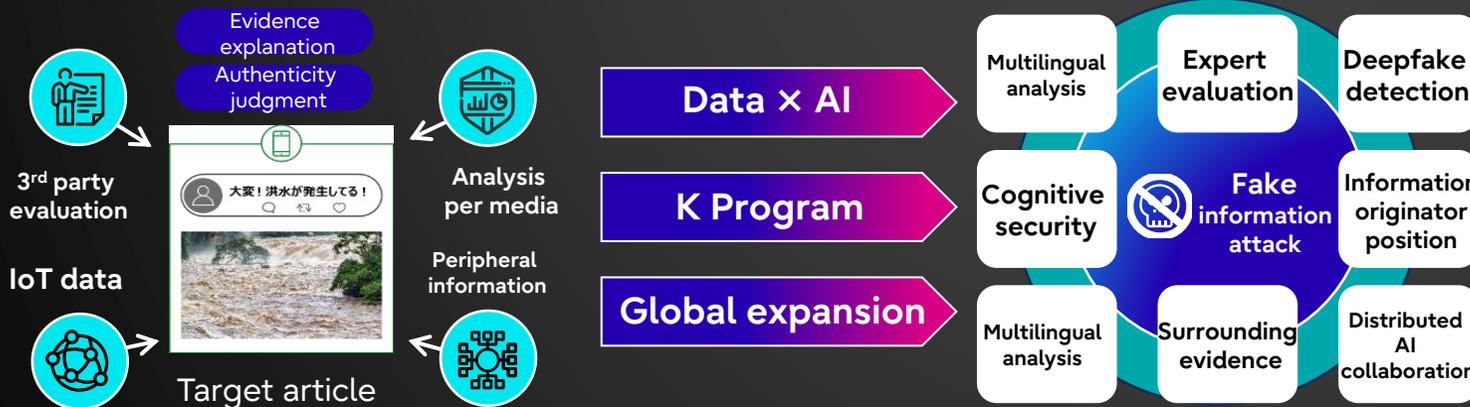
World's top-class authenticity analysis

■ Started to develop the world's first disinformation countermeasure platform to analyze whether the information is true or false based a variety of evidence (NEDO K Program: 6B yen business/4 years)

* Specific benchmark for only text

Trustable Internet technology
Analyzing authenticity
by gathering relevant evidence

Protecting people and society from fake and malicious information attacks in the digital world

Evidence explanation
Authenticity judgment

3rd party evaluation

Analysis per media

IoT data

Peripheral information

大変！洪水が発生してる！

Target article

Data × AI

K Program

Global expansion

Multilingual analysis

Expert evaluation

Deepfake detection

Cognitive security

Fake information attack

Information originator position

Multilingual analysis

Surrounding evidence

Distributed AI collaboration

Fujitsu is leading "NEDO K Program (Key and Advanced Technology R&D through Cross Community Collaboration Program)" as a prime operator

Through "K program," creating a disinformation countermeasure ecosystem by fusing data and AI technologies

Expanding the cutting-edge technologies to detect fake information in the digital world

DEMO

Solving power problem caused by generative AI development

Social issue — In 2026, datacenter power consumption is expected to increase to 2.3 times the amount in 2022

Keeping the system performance with AI Computing Broker, halve the number of GPUs and reduce the power consumption by up to 59%

Reducing by up to **59**%

- Achieving fine-grained allocation of GPUs in the process, which was impossible before (Computational efficiency increased to a maximum of 2.7 times)
- Supporting multi-GPU environments and container environments such as NVIDIA Inference Microservice

Release in April
Single GPU ver.

Release in September
Multi-GPU ver.

Release in January 2025
Multi-Server ver.

Phased integration of our technology for efficient use of GPUs and HPC technology for coordinated operation of multiple GPUs/servers

日本語特化LLM (with RAG)

汎用LLM (with RAG)

SAKURA internet   TRADOM   AWL   Xtreme-D   MORGENROT
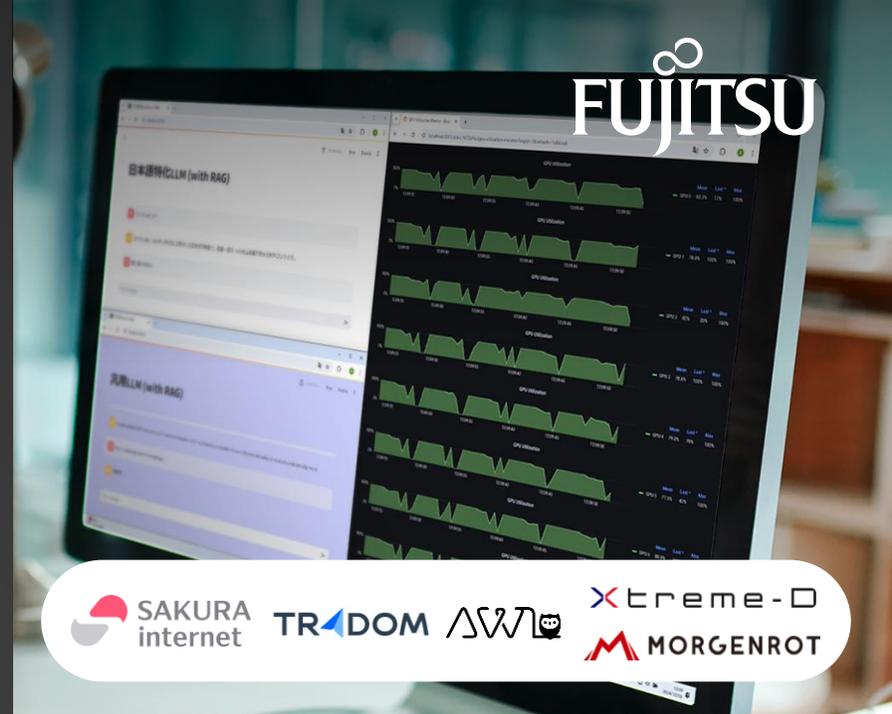
Full-fledged deployment after field trials with customers

Providing to various AI developers and datacenters for solving the global issues of GPU shortage and increasing power consumption

Quantum-HPC hybrid calculation
Realizing next-generation quantum chemical calculations by promoting development of real quantum machines and a large-scale parallel computation technology using HPC

Drive powerful innovation through computing power

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Social issue | Computing power contributing to dramatic improvement in the science and technology area, etc. by surpassing the conventional computer performance
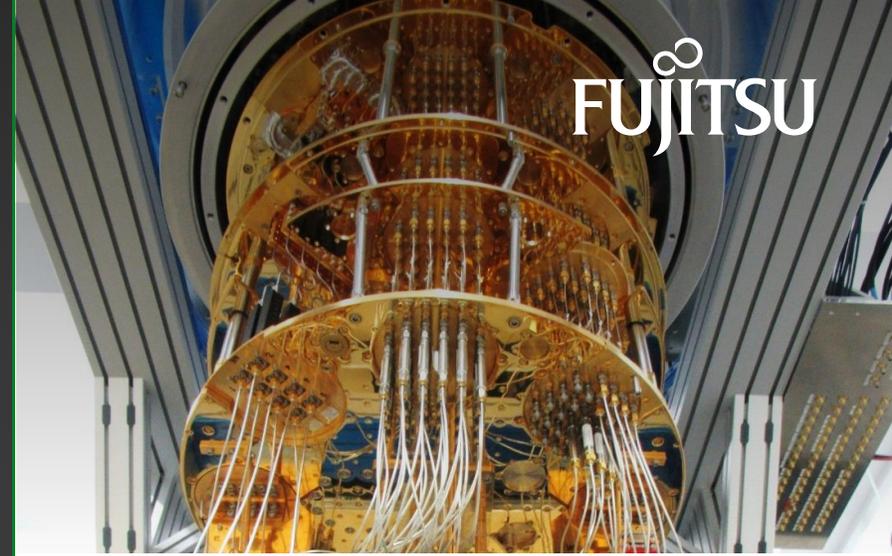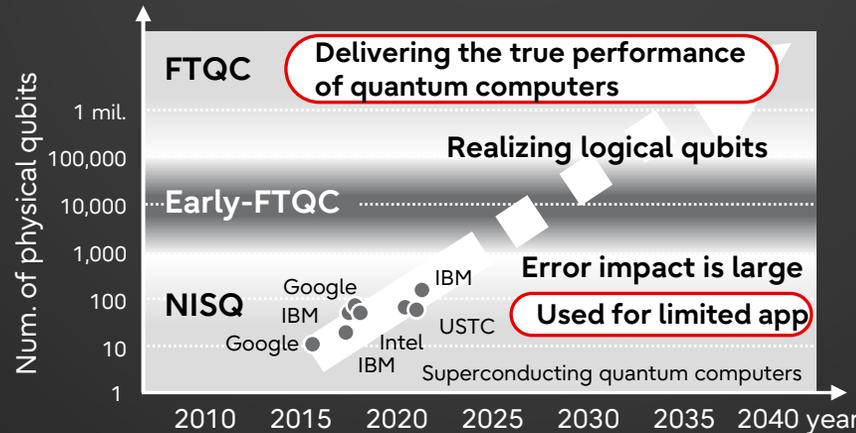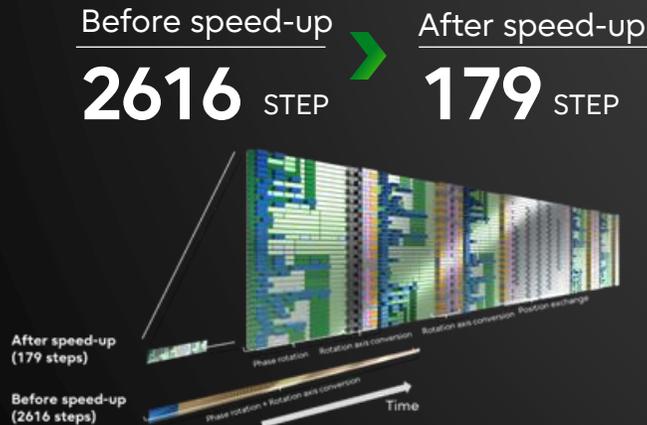
Promoting R&D in all technology fields globally from quantum devices to software platform and applications

RIKEN 大阪大学 OSAKA UNIVERSITY **TUDelft**

- Developing a next-gen 256-qubit quantum computer for release in March 2025
- Developing software applications by using a quantum computer already released

TEL TOKYO ELECTRON **FUJIFILM** **MIZUHO** みずほ第一フィナンシャルテクノロジー

- STAR architecture enables to advance the realization of practical computation by 5 to 10 years

Before speed-up **2616** STEP > **After speed-up** **179** STEP

After speed-up (179 steps)
Before speed-up (2616 steps)

Phase rotation + Rotation axis conversion Time

Num. of physical qubits

| | FTQC | **Delivering the true performance of quantum computers** |

1 mil.

Realizing logical qubits

100,000

10,000 — **Early-FTQC**

1,000

100 — **NISQ** Google IBM

10 IBM USTC **Error impact is large**
Google Intel **Used for limited app**
IBM

1 Superconducting quantum computers

2010 2015 2020 2025 2030 2035 2040 year

Decided to deliver the system, which is expandable to several hundred qubits, to AIST (G-QuAT)

Aiming to realize error-tolerant quantum computation, developing a large-scale machine and implementing error correction functionality

External sales of quantum computers
Developing actual machines with hundreds of qubits of scalability in Japan and overseas

Internal installation
End-Sep. 2025: Completion of Quantum Computer Center
Install and disclose the world's largest-scale of 1000-qubit superconducting quantum machine
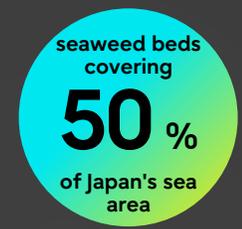
19

DEMO

Contributing to decarbonization and biodiversity through Ocean Digital Twin
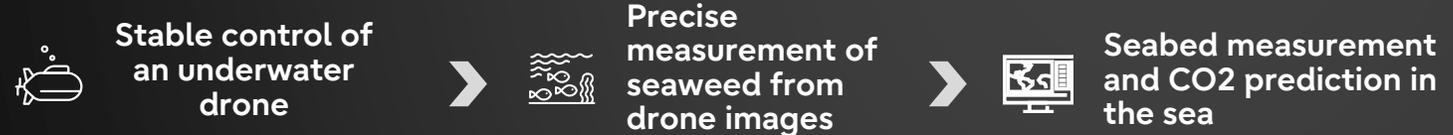
Social issue Blue carbon ecosystems are decreasing about 2 to 7% annually
Most of them may disappear in the next 20 years

Predict the total amount of CO2 absorption in the target sea area by combining AI technology and marine ecology

seaweed beds covering

50%

of Japan's sea area

*Estimating from target seaweed

- Our three technologies enable to quantify the carbon captured and stored in seaweed beds extensively in real time with low cost

Stable control of an underwater drone

> **Precise measurement of seaweed from drone images**

> **Seabed measurement and CO2 prediction in the sea**

REC.

Result : Hondawar
Volume : 14.16 cm^3
CO2 = g

Automatic control technology

Ocean measurement technology

Seaweed bed AI modeling technology

環境省 TOKIO MARINE ASSET MGT 沖縄セルラー OKINAWA CELLULAR

Seagrass bed regeneration project on Ishigaki Island designated as Nationally Certified Sustainably Managed Natural Site by Japan's Ministry of the Environment

Promoting carbon neutral measures globally by forming partnerships to verify the effects in various use cases

Collaborating with BLUABLE Ltd. spun out from Fujitsu

Blue carbon
Energy companies, Blue carbon consulting companies

Port inspection
Port facility operators/management companies

Biodiversity conservation
National/Local governments, Companies

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List of today's demonstrations

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No.	Area		Title	Interactive	Remarks
1	AI	(New exhibit)	**AI Agent for Meeting:** Helping People to Find a Better Solution through Collaboration	●	**First public demo**
2	AI	(New exhibit)	**Video Analytics AI Agent:** Video Analysis with Enhanced Spatiotemporal Event Understanding Capabilities	●	**Today's Press Release**
3	Data & Security	(New exhibit)	**Multi-AI Agent Security System:** Suggesting Proactive Countermeasures to Address Attacks Against System Vulnerabilities or New Threats	-	**Today's Press Release**
4	Computing	(Update)	**Computing Broker:** Supporting Multi-Server Systems to Provide Multiple LLM Services!	-	**Supporting multi-server system**
5	Converging technologies	(Update)	**Ocean Digital Twin:** Realizing Net Positive through Fusion between AI and Marine Ecology	-	**Field Trial at Ishigaki Island**
6	Converging technologies	(New exhibit)	**AI Tool for Customer Harassment Experience:** Helping People to Learn Appropriate Response Methods through Fusion between AI and Social Psychology	●	**First public demo**
7	Quantum	(Update)	**STAR Architecture:** Accelerating Realization of Practical Quantum Computation through Our Unique Technology for Error Correction	-	**Exhibit at QCE24**

AI and professional creators collaborate for creating new music

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- Clearing a copyright problem, which is the biggest challenge in the use of generative AI
- Creating a new style of composition that musicians take when they are inspired in their interactions with AI for arrangements

Jun Inoue

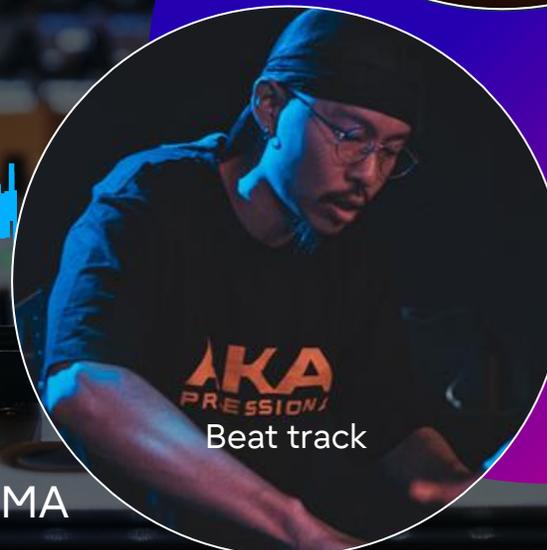55 works ranked No.1 in Oricon chart. Famous music producer and President of Amadeus Code, Inc.

Bass synthesizer

Music generation AI

Amadeus Code, Inc. x Fujitsu

Copyrighted training data of 40,000 songs

Beat track

KOENMA

Sampling hip-hop composer

Guitar

Yukihide YT Takiyama

B'z tour guitarist

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Thank You!

Internal Practices to Accelerate the Transformation of Fujitsu and Our Customers

Yuzuru Fukuda

Corporate Executive Officer, EVP
CDXO, CIO

Fujitsu Limited

December 12, 2024

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Current Status of Generative AI Implementation

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Fujitsu accelerated its transformation by establishing a company-wide environment enabling the utilization of generative AI in May 2023, driving its adoption across the entire organization.

170,000
times

- Thorough internal implementation of AI
- AI used 170,000 x a day.
  (About 10x more than one year ago)
- Approximately 31,000 Monthly Active Users (*1)
- AI used for:

| Code Generation | Proposal Creation |
| Report Automation | Questionnaire analysis |

920,000
hours

- Fujitsu Kozuchi used to analyze cause and effect for work time efficiency using AI
- Approximately 920,000 hours of work time saved in the first year

1,100
people

- AI Task Force: A DAO(*2)-type community leading the promotion of AI at Fujitsu
- 1,100 participants from 356 organizations
- Various themes such as AI business revitalization and AI governance

AI Agent

- Practical use of AI Agents to drive further business transformation
- AI agents initially deployed for customer-facing operations

(*1) Monthly Active Users: The number of users who use Generative AI at least once a month.
(*2) DAO: Decentralized Self-Sustaining Organization. An organization that does not have a specific manager and is operated by consensus building among all participants.

Thank you