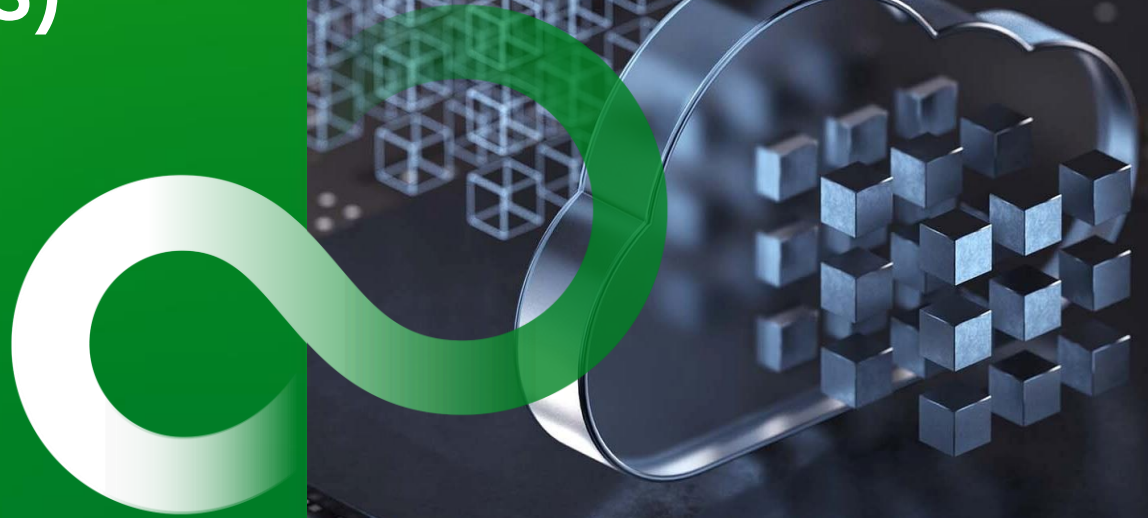


Fujitsu Computing as a Service (CaaS) Introduction



Our purpose

Make the world more sustainable by building trust in society through innovation.

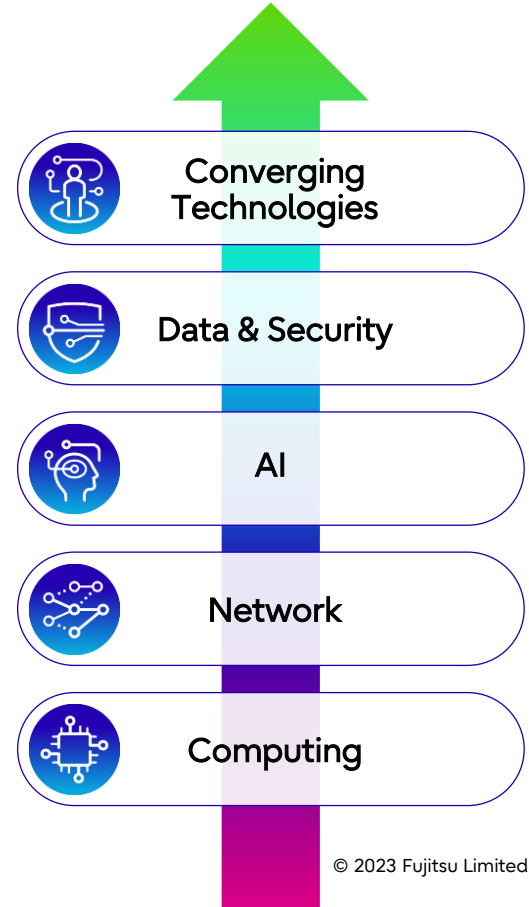
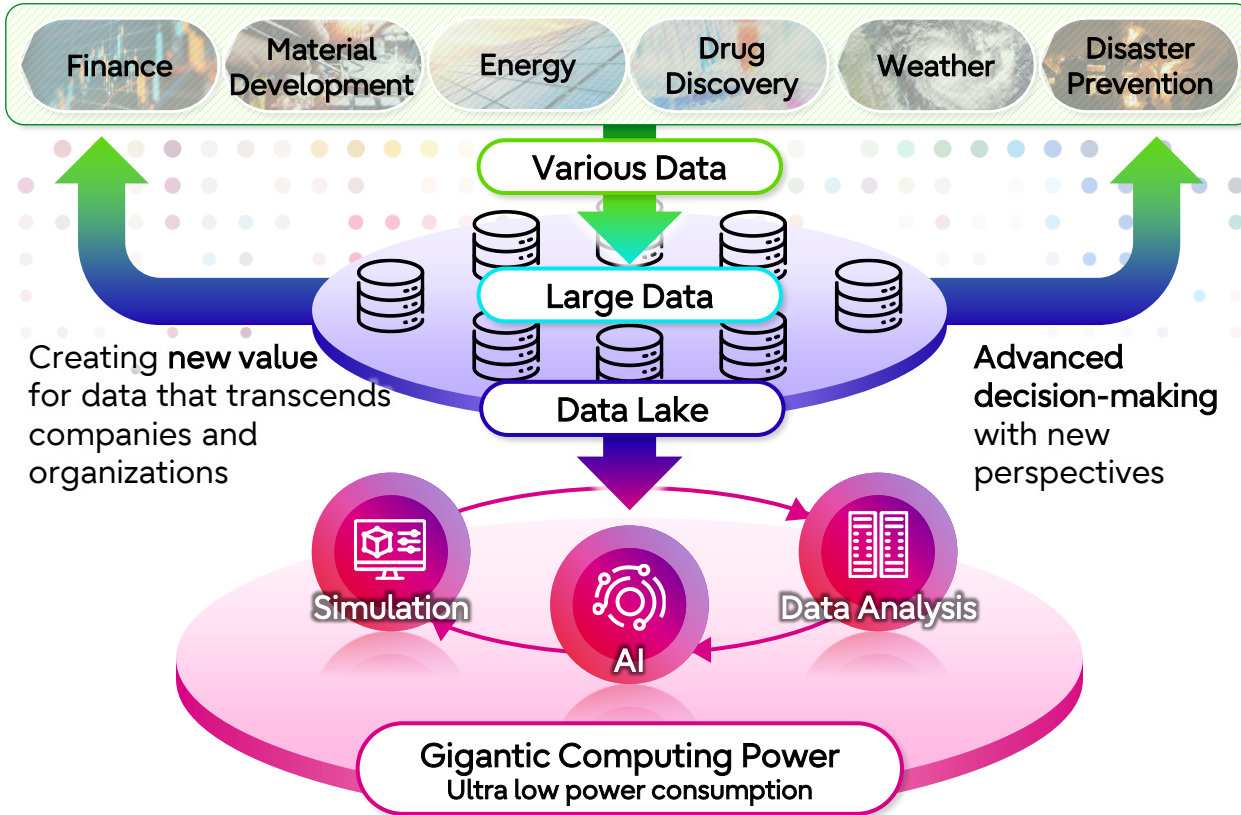


Technology behind Key Focus Areas

- Focus R&D resources on five technology areas



Fujitsu Technology Vision



Goal of Computing as a Service and Service Overview

Changes in the World

- Huge amounts of data generated daily
- Complex risk factors (environment, economy, geo-politics)
- Decreasing decision-making time

Corporate Changes

- Change in usage pattern from "owning" to "purchasing only when you want to use"
 - Initial investment burden and lack of engineers for deployment and operation are big business issues
- Demand for diverse and advanced computing technologies that can deal with increasingly complex issues

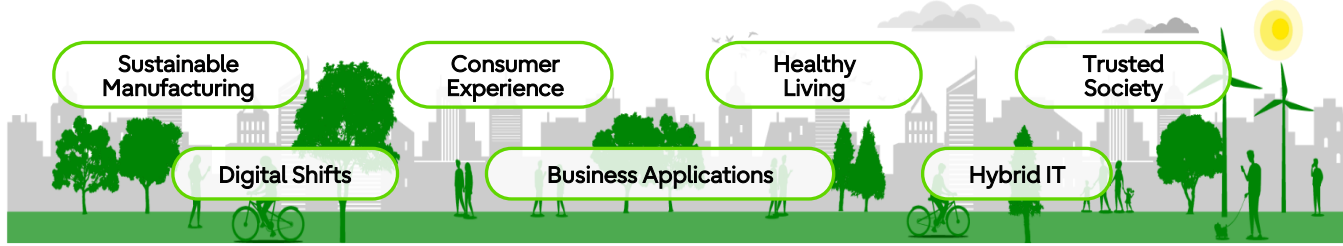
Society and companies continue to change, and the problems to be solved are becoming more complex

Choosing the best computing technology will be the key

Fujitsu provides advanced computing technology on the cloud that anyone can use to meet the rapidly increasing demand for computing

Computing as a Service (CaaS)

Computing as a Service Vision



Application



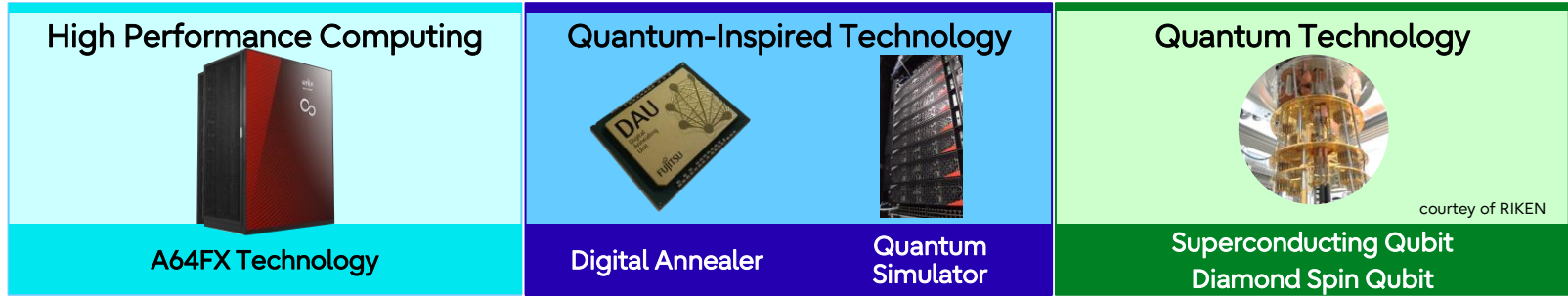
Platform



Middleware

OS

Hardware



Computing as a Service overview

Application
in a wide range of fields

Sustainable
Manufacturing

Consumer
Experience

Healthy
Living

Trusted
Society



Application in various industry areas



For Material
Informatics



For Logistics
Optimization



For Drug Discovery

Simulation

AI (training/inference)

Optimization



Data e-TRUST

- Secure data sharing



Service Integration

- API integration / Data integration



HPC

- PRIMEHPC FX1000
- x86, GPU etc.



Digital
Annealer

- Digital Annealer



Cloud Partner

- Public cloud
- Supercomputer center

Technical Consulting Services

- Clarify customer requests
- Create a plan for utilizing computing

Tuning

- Identify bottlenecks
- Tune users' programs

Advanced computing
technologies that
anyone can use easily

CaaS

Application Development/ Execution Environment

Providing a platform environment that seamlessly integrates advanced computing technologies as a cloud service

Computing as a Service HPC

CaaS HPC provides optimized computing environments for HPC applications. Cloud service HPC equipped with PRIMEHPC FX1000 which is based on the technology used in the supercomputer Fugaku, high-performance CPUs from Intel, and GPUs from NVIDIA, can be used as an environment for developing and running simulations and AI applications.

Computing as a Service Digital Annealer

It is possible to utilize quantum inspired technology "Digital Annealer" which solves combinatorial optimization problems at high speed. The best combinations that satisfies the specified conditions from a vast number of combinations has been selected which rapidly solve combinatorial optimization problems in various operations such as Delivery Planning, Production Planning, Drug Discovery Development, and Material Researches.

Computing as a Service Data e-TRUST

This service is a digital infrastructure service that distributes distributed personal and corporate information safely and securely. It manages data of individuals and companies distributed across different systems by linking it to the data owners. It controls the information that data owners disclose and to whom and use it to create new value by distributing data.

Consulting Services

Supporting everyone to make use of advanced computing technologies

Computing as a Service Technical Consulting Services

In the optimal application development and execution to solve customers' issues, the optimal environment from PRIMEHPC FX1000, PC clusters, and "Digital Annealer" has been selected according to the application characteristics to support application acceleration.

1 Cloud Services (Applications) that Create New Value

- Applications that seamlessly combine and utilize simulation and combinational optimization will enable users to enjoy new value from cutting edge computing technologies without having to worry about HPC/Digital Annealer.
- Carefully select and provide the functions that are required to solve issues in business and industry.

2 Technical Consulting Services by Engineers with Extensive Knowledge

- Consult engineers with a deep understanding of the customer's business and technology to solve the issues.
- Co-create Use-Case with startups and other innovative companies on CaaS.

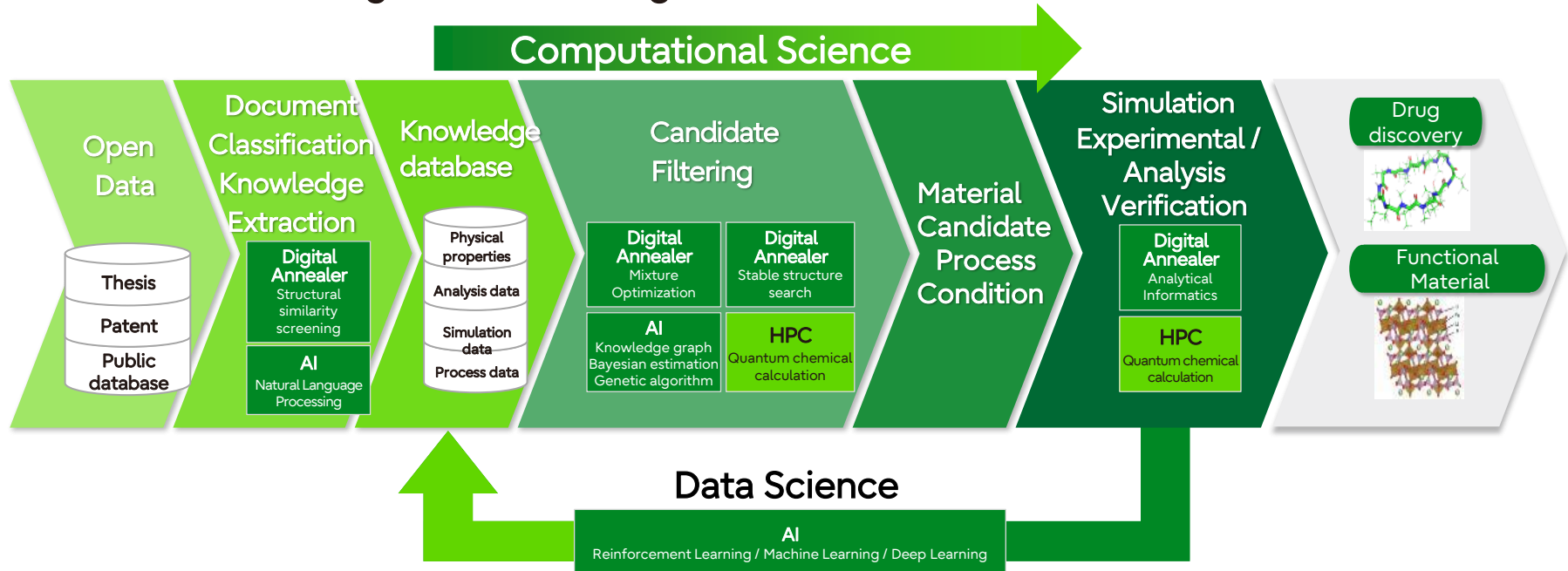
3 Infrastructure Environment that Uses Fujitsu's Original Advanced Technology

- Seamlessly combine and utilize advanced computing technologies (Supercomputer, Digital Annealer).
- Uses "Fugaku" compatible hardware and software. So, the application that was used in "Fugaku" can be run on "CaaS".
- Data e-TRUST enables secure and reliable data exchange and utilization between different services and between individual users and businesses companies.

Innovation through CaaS

(Example of Drug Discovery and Material Development)

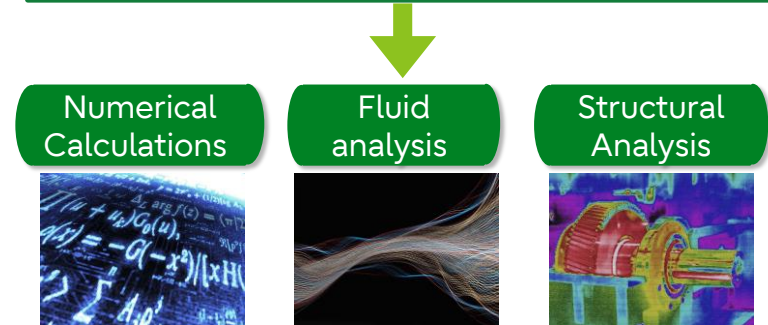
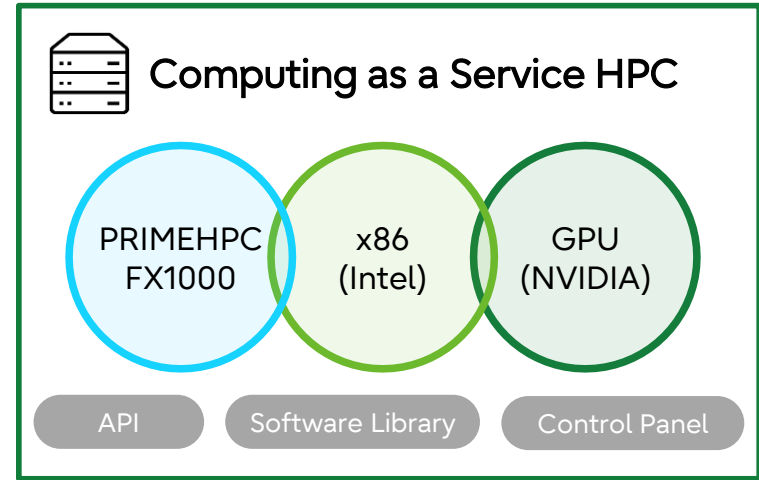
Through CaaS (HPC x Digital Annealer x AI), we will expand the possibilities of approaches such as drug discovery and new material development and realize innovations that lead to the solving social issues together with our customers.



Fujitsu Computing as a Service HPC (CaaS HPC)

- ✓ FUJITSU Supercomputer PRIMEHPC FX1000, featuring the technology employed by Fugaku, the world-leading supercomputer, will be offered as a cloud service

- ✓ We help you focus on research and analysis by providing them in an easy-to-use environment from deployment to operation



1 Fugaku technology for faster processing

- Fugaku compatible hardware and software for fast large-scale simulations.

2 On-demand HPC service

- All the necessary environment for HPC job execution is prepared by the service side, and the HPC environment can be available on demand by simply subscribing to the service.

3 Providing job operation API

- Job operations such as submission and cancellation can be performed from the customer's business application or newly developed application via API.

Fujitsu Computing as a service

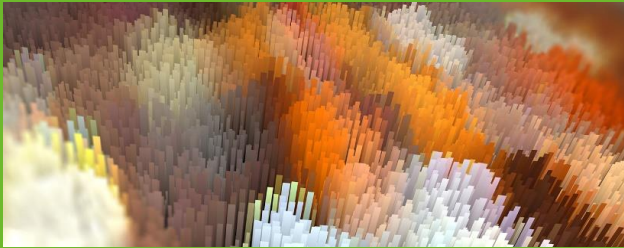
Digital Annealer

(CaaS Digital Annealer)

Fujitsu's own architecture with digital circuits inspired by quantum phenomena that solves combinatorial optimization problems.

Still in research stage...

 Quantum Technology



- Difficult to maintain quantum state
- Connection and extension constraints

Applicable to real problems

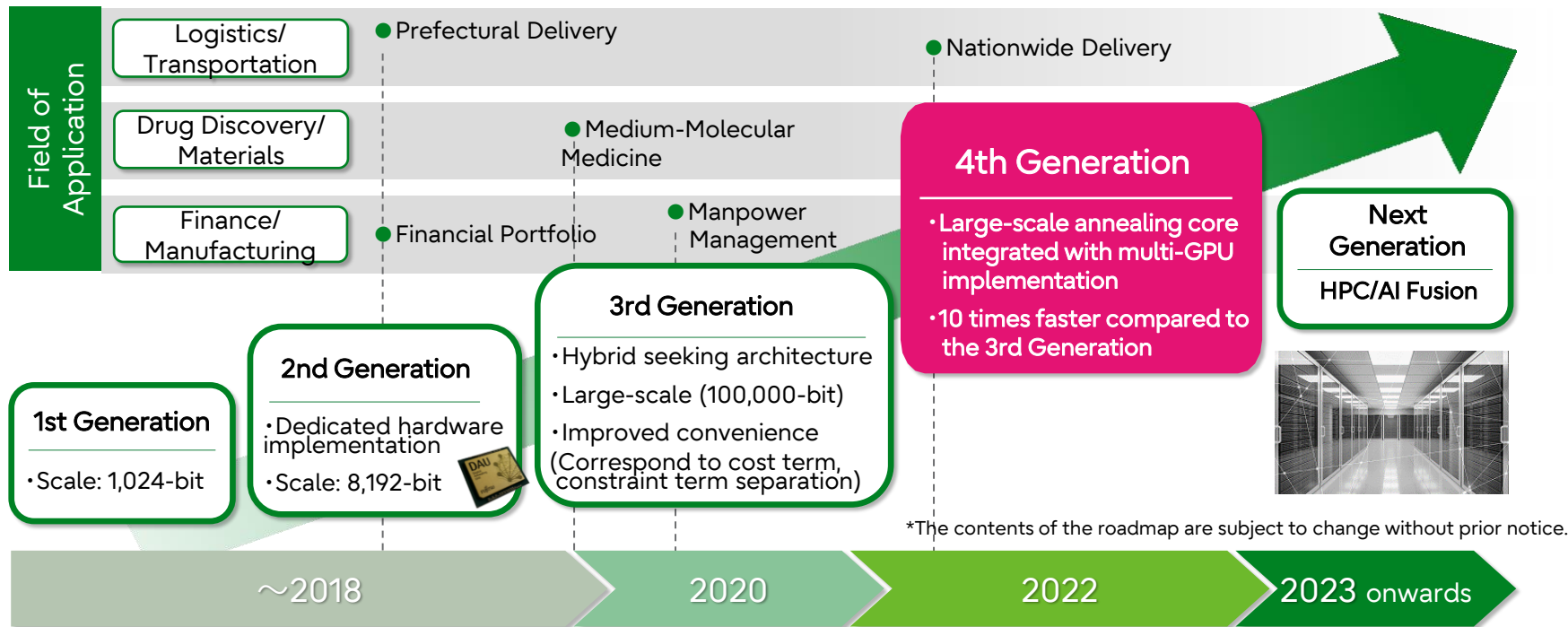


Digital Annealer



- Digital circuit makes stable operation and miniaturization easy
- Fully coupled architecture allows for easy mapping of complex problems

Release of the 4th generation Digital Annealer Service



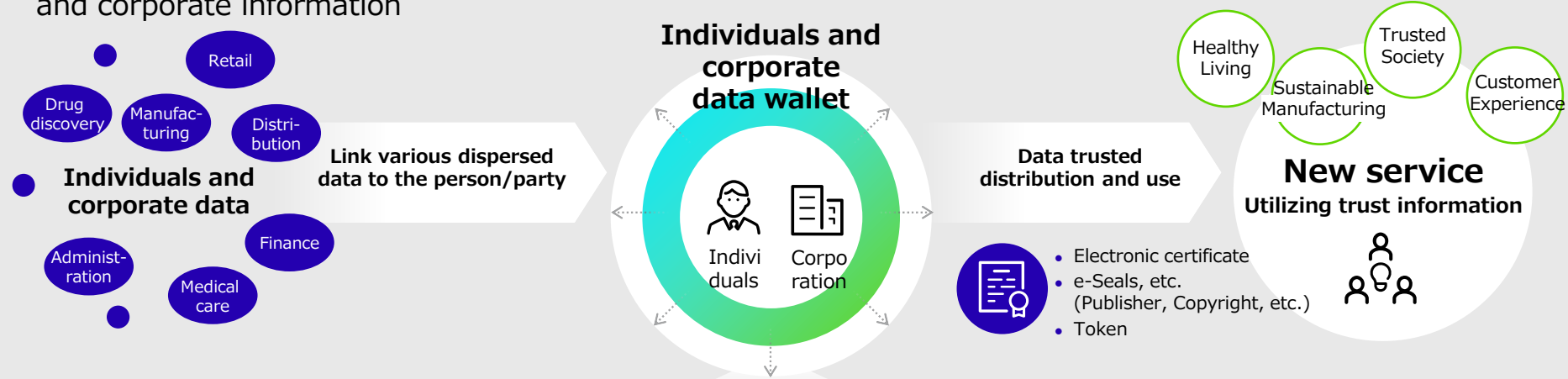
CaaS Digital Annealer Field of Application

Aims to solve real world issues



Fujitsu Computing as a Service Data e-TRUST (CaaS Data e-TRUST)

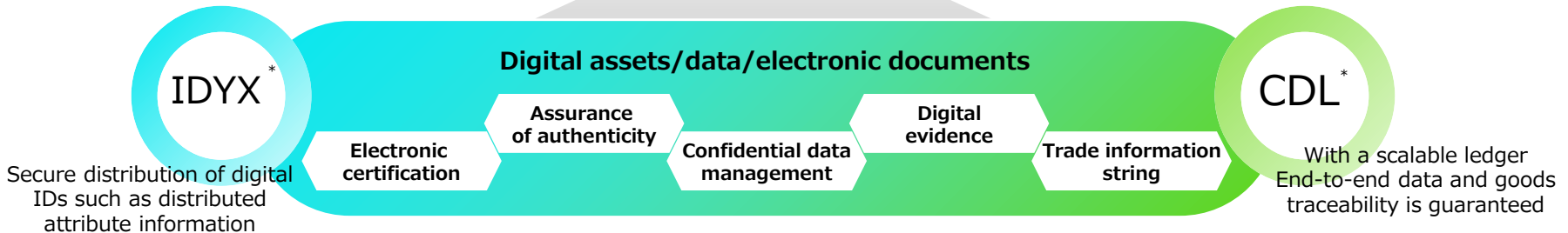
- Secure, safe, and free cooperation through Fujitsu technology that secures trust in distributed personal and corporate information



Trust Data Sharing

Data e-TRUST

Trust of the data itself



Various Digital Economies Created by Data e-TRUST

3 Features and Value Offerings

※These are currently being offered and demonstrated to customers.

Economy



Service

Digital Proof

Provides a variety of digital certificates to authenticate people, organizations, and companies

Trusted Data Hub

Enables data collaboration across people, organizations, and companies and provide governance such as individual/organizational consent and access control

Digital Footprint

Link and manage trails of transactions and activities across people, organizations, and companies, and visualize value chains and customer journeys

Trust APIs

Digital Copyright

Digital Identity

Data Privacy

Digital Evidence

Digital Seal

Individual Consent

Data Wallet

Data History

Issuer Certificate

Non-Tamper Assurance

Legitimacy Assurance

Relevance Management

Data Distribution

History Tracing

Data e-TRUST on CaaS

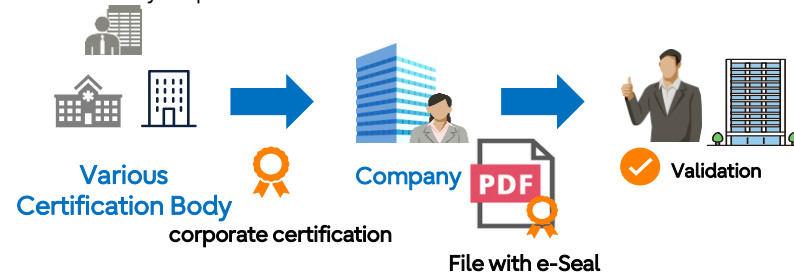
Personal Career Certificate

Utilized for authentication by attribution certification such as skills and experience



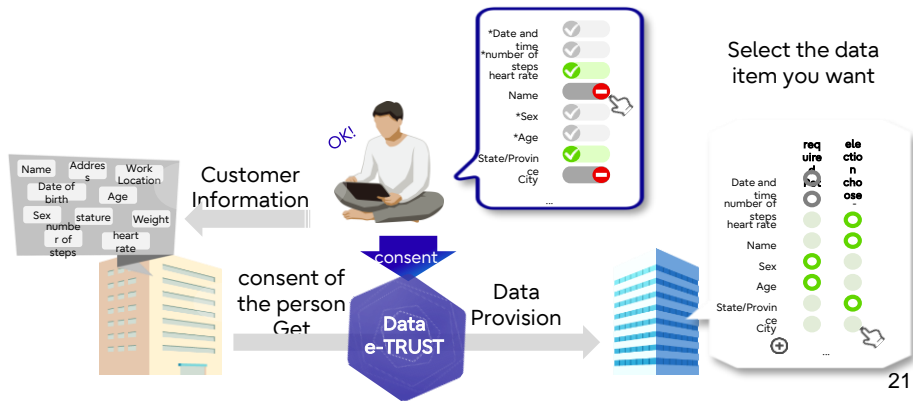
Corporate Certification/e-Seal

Cross-Industry corporate certification mechanisms



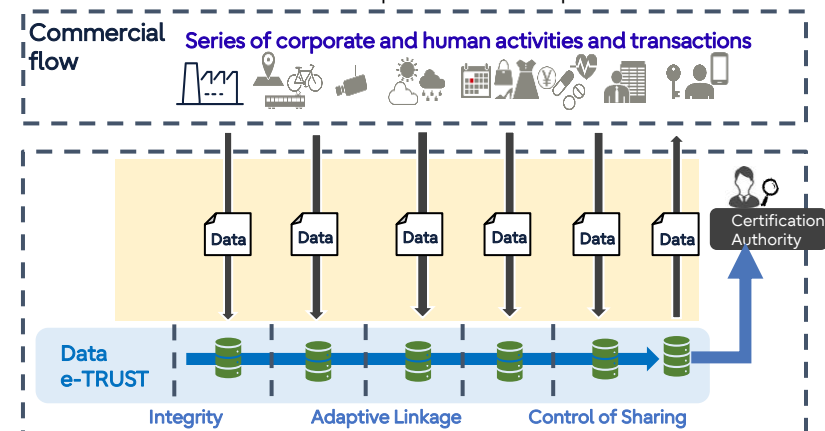
Personal Data Linkage based on user consent

Personal data linkage between different services by user consent



Carbon Neutral/Data Integration Infrastructure

Business-to-Business Data Partnership for Carbon Footprint

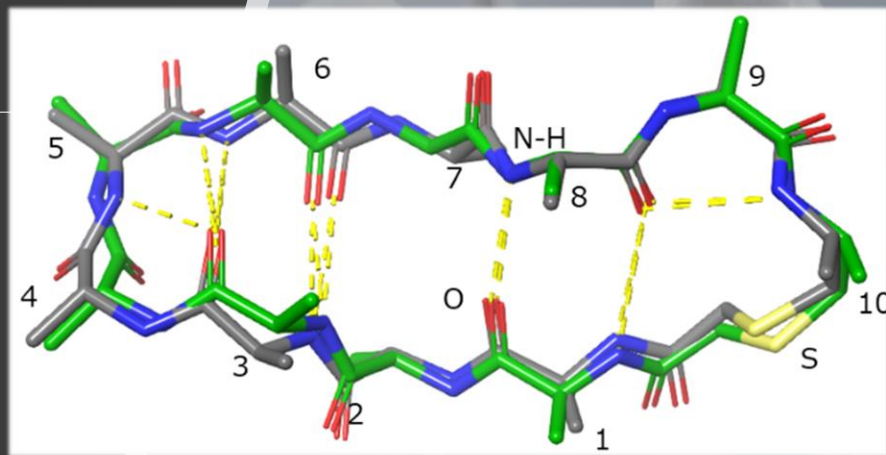


CaaS Use Case

Drug Discovery Use Case

Stable structure calculation of middle molecules with high accuracy!

Green: Calculated Result
Gray: Experimental Result



- ✓ Compared the experimental and calculated structures of cyclic peptides. The experimental structure and the calculated structure match

with amazing accuracy (RMSD 0.73 Å).

* RMSD: Root Mean Square Deviation

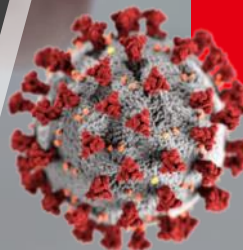
- ✓ **Accurate calculation overnight.**

Accuracy of RMSD 3 Å even after several days with conventional technology.

Dramatically improved efficiency in the search for middle molecule drug candidates.

- ✓ Comment from PeptiDream Inc.
“We believe that the creation of innovative new drugs will be accelerated more than ever while maintaining high precision and taking on the challenge of shortening search times.”

Accelerating the development of new drugs, including novel coronavirus



Materials Case

Mixture design support that makes the most of small, fragmented, and biased data

- ✓ Search for optimal mixture components, ratios, and process conditions for multiple required properties from a large number of candidate combinations
- ✓ Digital Annealer demonstrates its power in complex problems with many candidates
- ✓ Applicable to a wide range of mixtures regardless of organic/inorganic, solid/liquid

Related patent : patent 2021-127418



Production Sequence Optimization



Toyota Systems Corporation

Quantum-Inspired Digital Annealer to streamline automobile production sequence

- Optimized the complex automobile production sequence with enormous number of combinations
- Respond quickly to production fluctuations and reduce the workload of its employees
- Plan to roll-out the service globally to markets outside of Japan

Press Release :
<https://pr.fujitsu.com/jp/news/2022/10/21.html>



Trustworthy Information Coordination between Companies

Nagase & Co., Ltd.

DX of analog business processes in the chemical supply chain

- Applying Data e-TRUST to the DocuValue document management cloud service provided by Nagase Sangyo
- In the management of the distribution of complicated chemical documents, a mechanism has been established for the confidentiality management of the distribution information of users and the secure information linkage between companies.

Press Release: October 2022
<https://pr.fujitsu.com/jp/news/2022/10/17.html>



Actual Example of Social Implementation of "Japanese e-Seal"


Teikoku Databank, Ltd.

Construct a system for the delivery of trustworthy documents between multiple companies, assuming actual operations of "corporate verification" and "e-Seals"

- Japan's first demonstration test for the social implementation of the Japanese version of e-Seal, a technology that certifies the authenticity of companies issuing digital documents, was conducted, and issues and proposals were published as a report.
- In the future, it will aim to link with digital signatures for companies in Europe, which have different standards from Japan's.



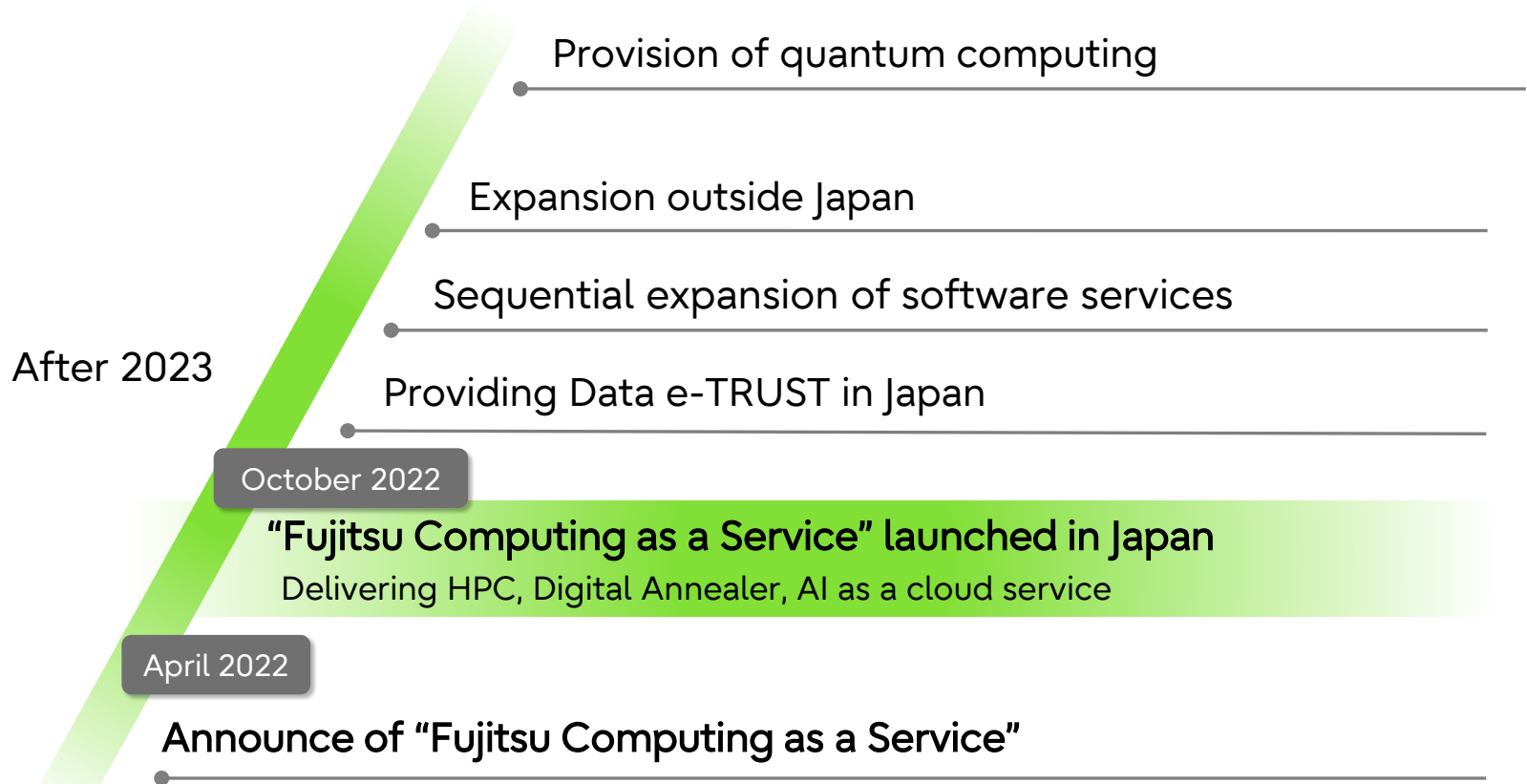
FUJITSU



Press Release: November 2022
<https://pr.fujitsu.com/jp/news/2022/11/9.html>

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CaaS Road Map



Thank you

