Orchestrating a brighter world NEC

Disclosure range: Recipient only

15th Mar. 2025 @NUG25

New Brand “NEC BluStellar” Use Case -Research Information Infrastructure (RII)-

Futoshi Tabata
Director
Education and Science Integration Department
NEC Corporation

Contents

- NEC’ Vision,Overview of NEC BluStellar Research Information Infrastructure (RII)
- RII Use Case
  - Case of OSAKA UNIVERSITY
  - Case of JAMSTEC
  - RII Case of TOHOKU UNIVERSITY
- Conclusion

NEC’s Vision on Research

We aim to provide an advanced and comprehensive research information platform with a focus on HPC and data management

Background (Research Integrity, Open Science)

The 6th Science Technology and Innovation Basic Plan (2021-2025) and Integrated Innovation Strategy 2024 in Japan. In these documents, It is stated to ensure the security, and to promote "Open Science" by managing and publishing research data.

Integrated Innovation Strategy 2024 (extract)

Strategic Promotion of Advanced Science and Technology

Strategic promotion of important field

- AI, quantum, biotechnology, semiconductor, Beyond 5G etc.
- Space, ocean, green energy etc.

Strengthening economic security

- Ensuring research security and integrity at university and research institutions.

Promoting R&D and social implementation

- Promoting social implementation of science and technology that contributes to automation, power saving, and disaster prevention/mitigation.

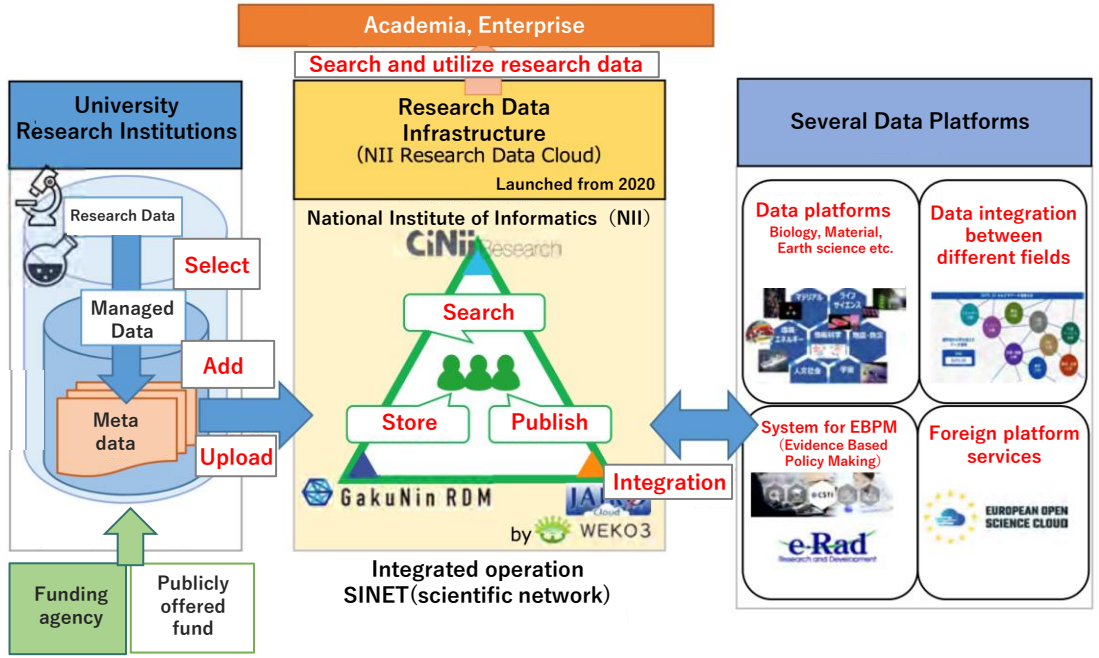
Enhancement of Knowledge Base (Research Capabilities)

Research universities with a regional core and distinctive characteristics

- Development of infrastructure supporting research DX, sharing of research facilities and equipment, and promotion of data-driven research.

Open science

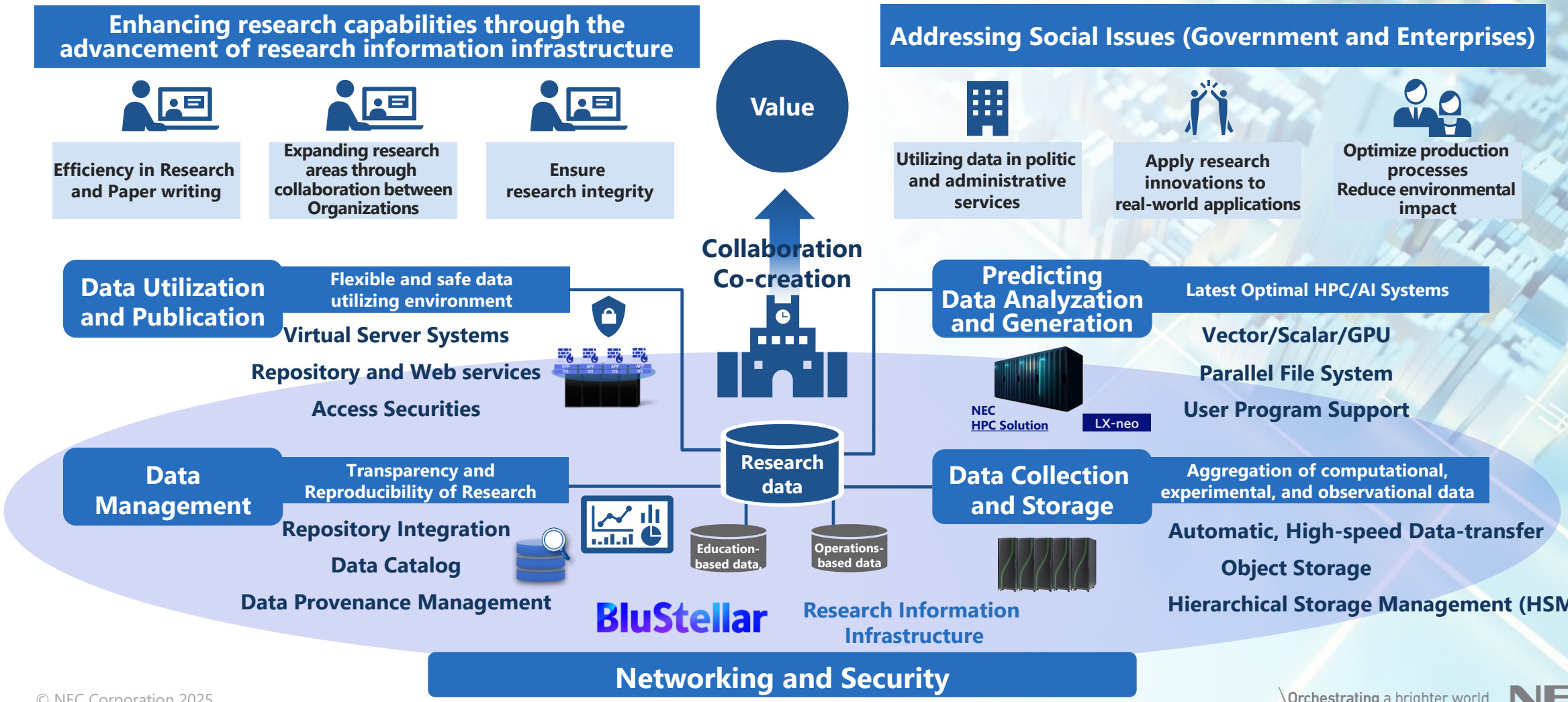
- Promoting open access to scholarly publications and scientific data.
- Promoting management and utilization of publicly funded research data.



Promotion image of open science and data-driven research Japan Cabinet Office document

NEC's Vision of the Research Sector

We aim to provide an advanced and comprehensive research information platform with a focus on HPC and data management.

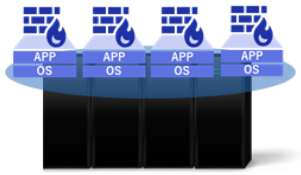


Solutions to Achieve NEC's Vision

We offer total integration for securely utilizing data through fast connections between HPC, storage, and servers.

Data Collection, Storage, and Management

Virtual Server Platform



- Flexible provision of servers as virtual machines tailored to users' needs, with easy removal after use
- Ability to individually add software and security configurations
- Virtualized networks separated for specific purposes, such as external data sharing and data transfer with HPC
- Compatible with VMware, Hyper-V, OpenShift, and Kubernetes

Data Processing and Publication

Optimized Storage for Data Operations

- Object Storage enhances data usability with S3 compatibility and a Web UI
- Hierarchical Storage Management (HSM) is ideal for the long-term preservation of research data

Research Data Management (RDM)

- RDM solutions ensure the reproducibility and transparency of research outcomes
- Features include data cataloging, repository registration, data provenance tracking, and metadata management

Simulation

NEC HPC Solutions

LX-neo

- Offers optimal integration with the latest architectures
  - Vector, Scalar, GPU, Quantum
  - File System, Network
  - Scheduler, User Management, Billing Statistics
  - Power Equipment, Cooling Systems
- Supports the migration and acceleration of user programs

Networking and Security

High-speed data Communication and Distribution

- Design, deploy, and connect network infrastructure supporting high-capacity data communication at several hundred Gbps
- Leverage ultra-high-speed data transfer technologies that fully utilize the available bandwidth

Secure Data Access

- Robust authentication using biometrics and one-time passwords
- Protect and log access to systems and data with service like UTM, unauthorized access monitoring service, centralized log management, and encryption

RII Use Cases

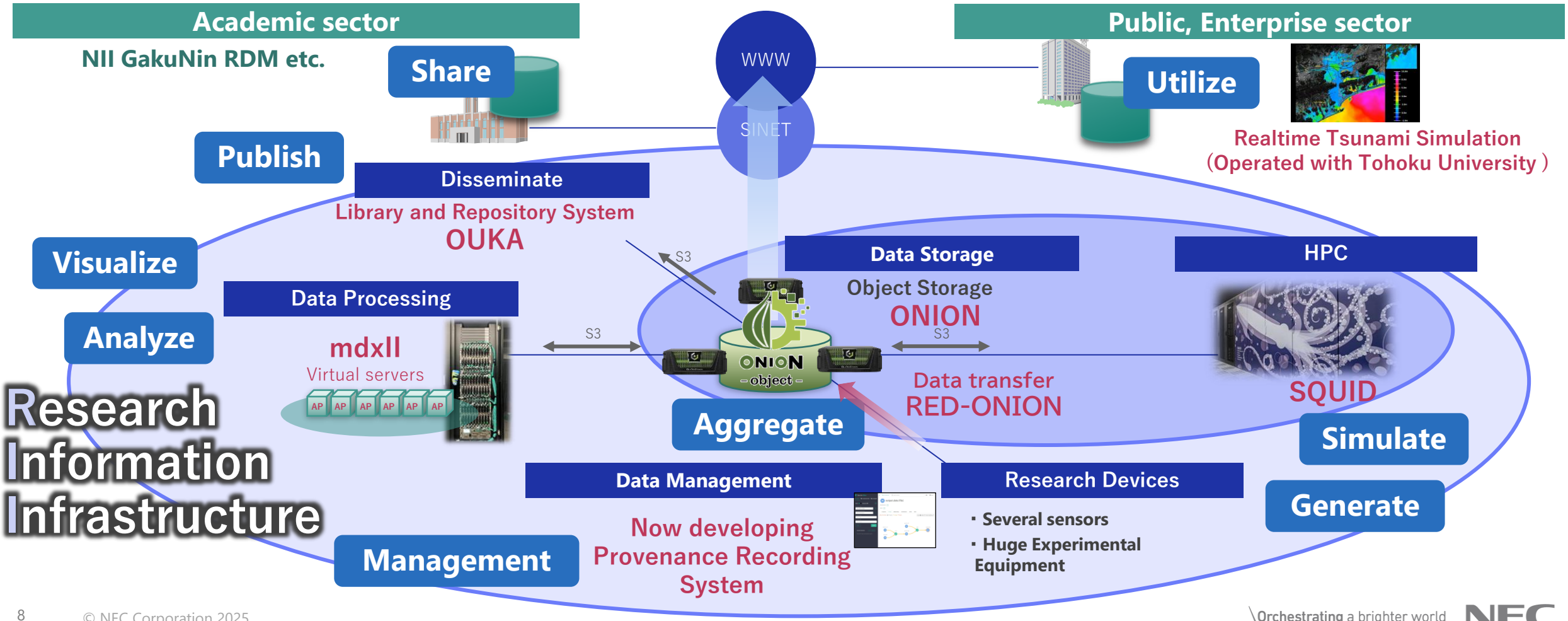
- OSAKA University
- JAMSTEC
- TOHOKU University

RII Use Cases

- **OSAKA University**
- **JAMSTEC**
- **TOHOKU University**

OSAKA UNIVERSITY's Systems Plotted on RII model

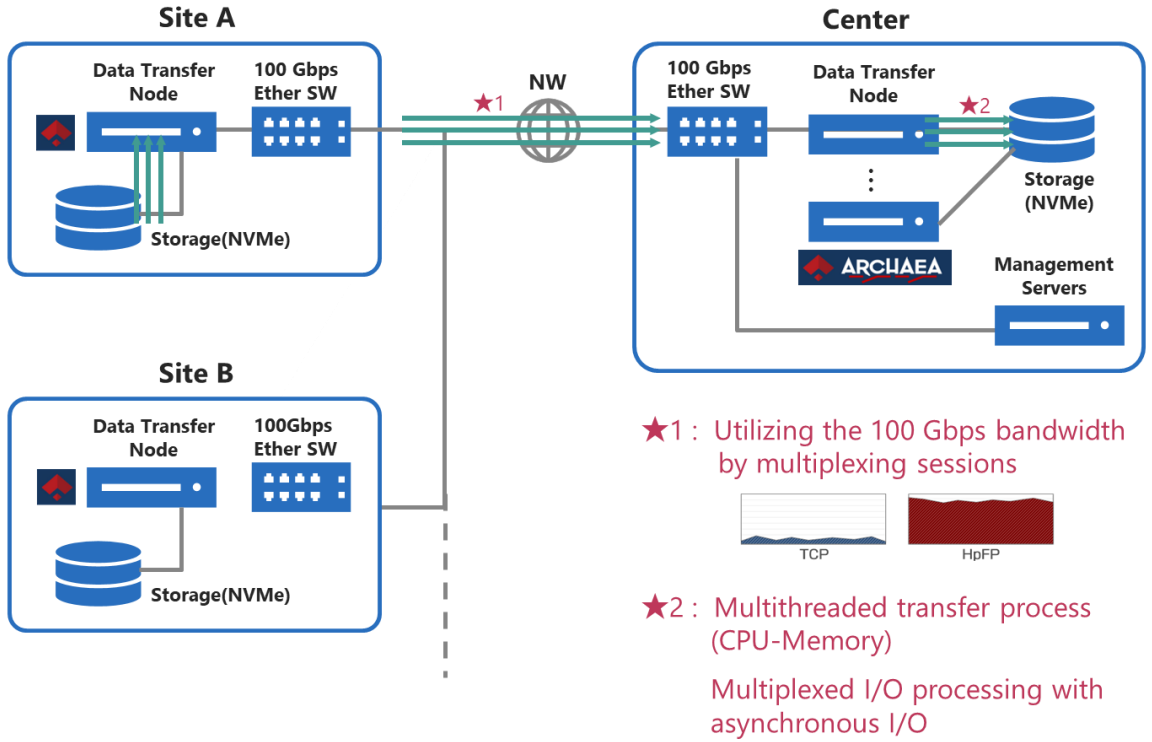
OSAKA UNIVERSITY has data aggregation platform "ONION", connecting HPC "SQUID", virtual server platform "mdxII", public cloud, and various devices via S3 protocol.



Ultra-High-Speed Data Transfer System

Highly efficient data transfer by maximizing the use of 100 Gbps network bandwidth.
Active data sharing enhances research efficiency and promotes better data utilization.

System Overview



High-speed data transfer from storage to storage without bottlenecks

Features

- Proprietary UDP-based transmission protocol.
- Fully Utilizing 100 Gbps bandwidth by multiplexing sessions and storage I/O processing with asynchronous I/O.

Advantages

- "Disk to Disk" data transfer at high speed.
- Proposal including configuration that delivers practical performance using verified hardware and software in actual operations.

Benefits

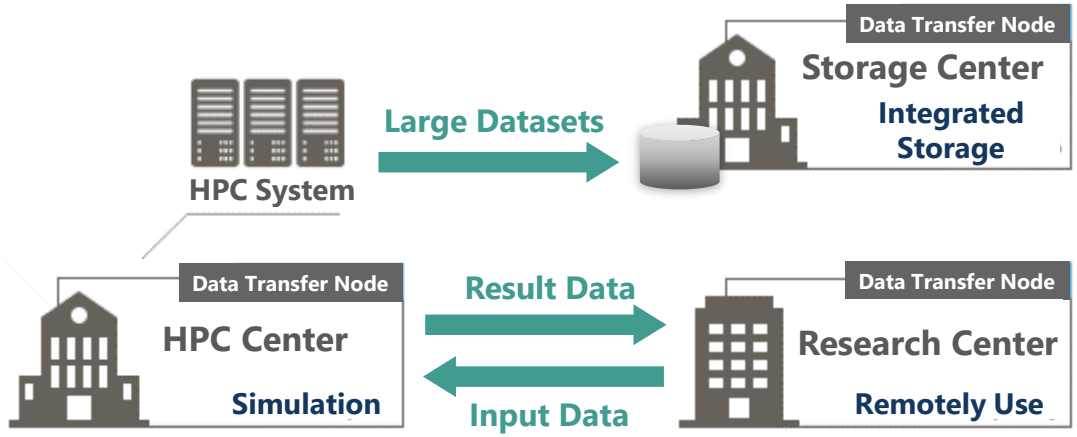
- Significantly reduces latency when transferring large volumes of data over the network - for example, between experimental facilities and HPC systems for analysis, and from multiple sites to integrated storage for collecting research data.

Proven Track Record

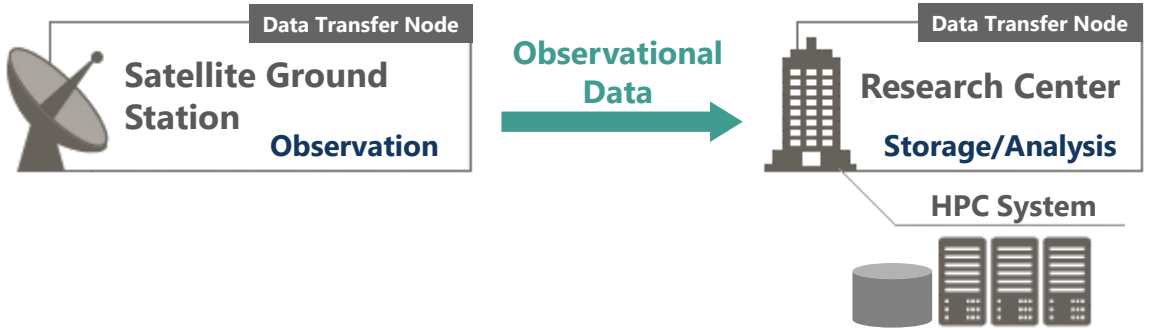
- The University of Osaka and NEC jointly demonstrated a prototype data transfer system at SC24 in Atlanta.

Use Case of Ultra-High-Speed Data Transfer System

- Rapidly transfer large-scale research datasets to an integrated storage at a different location.
- Remotely access an HPC system and efficiently retrieve the result data over the network.



- Transfer large volumes of data from a remote overseas observation facility to a HPC system for analysis.



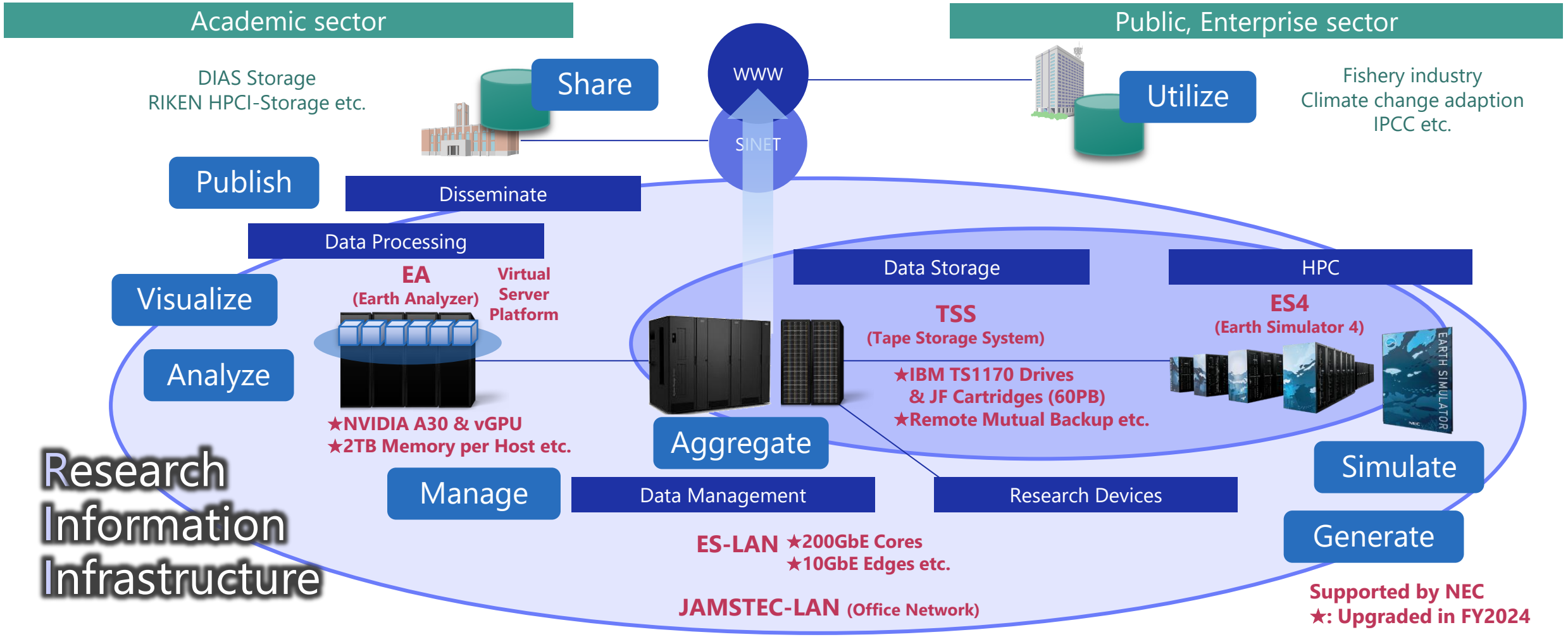
- Securely and efficiently transfer large volumes of sensitive data, such as medical images.

RII Use Cases

- OSAKA University
- **JAMSTEC**
- TOHOKU University

JAMSTEC's Systems Plotted on RII model

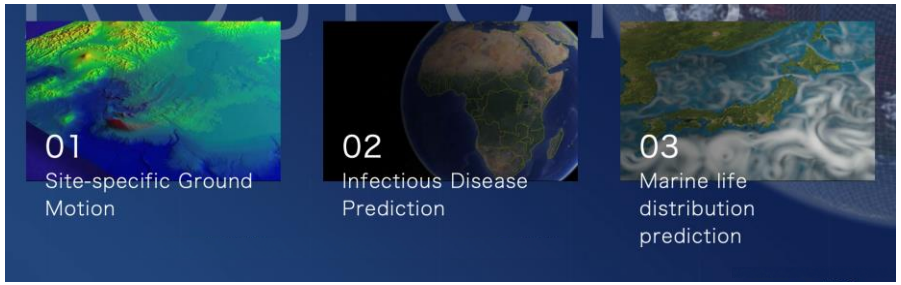
JAMSTEC operates Earth Analyzer and TSS, which are connected to Earth Simulator via ES-LAN, to support research data utilization. These systems have been upgraded over the past year.



Development of Digital Twin of the Ocean and Its Supporting Systems

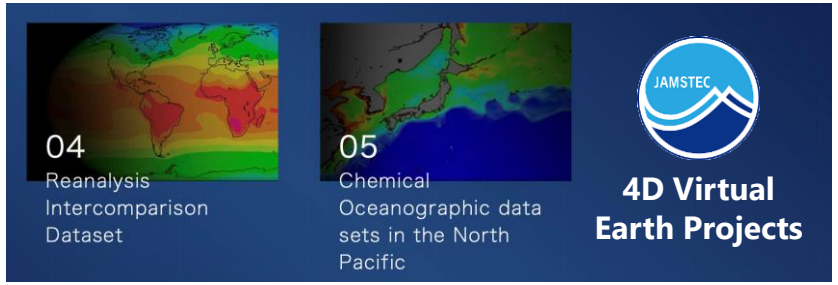
JAMSTEC is developing a digital twin of the ocean for monitoring and future prediction.

IT consists of 4DVE and NAMR, supported by the coordinated operation of ES and EA.



Society

Create Value-added Information

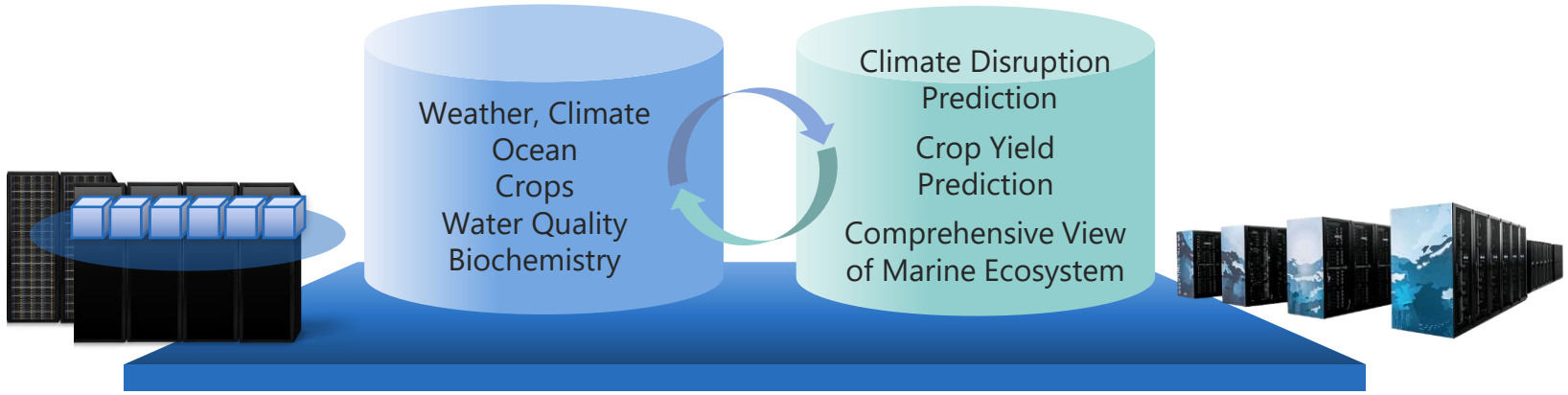


https://www.jamstec.go.jp/4dvep/index_e.html

4DVE
(4D Virtual Earth)

NAMR
(Numerical Analysis Model Repository)

Earth Analyzer

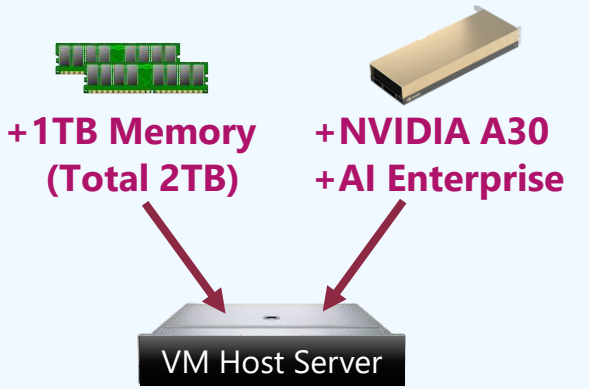


Earth Simulator

Digital Twin of the Ocean

(Extreme Events, Biodiversity)

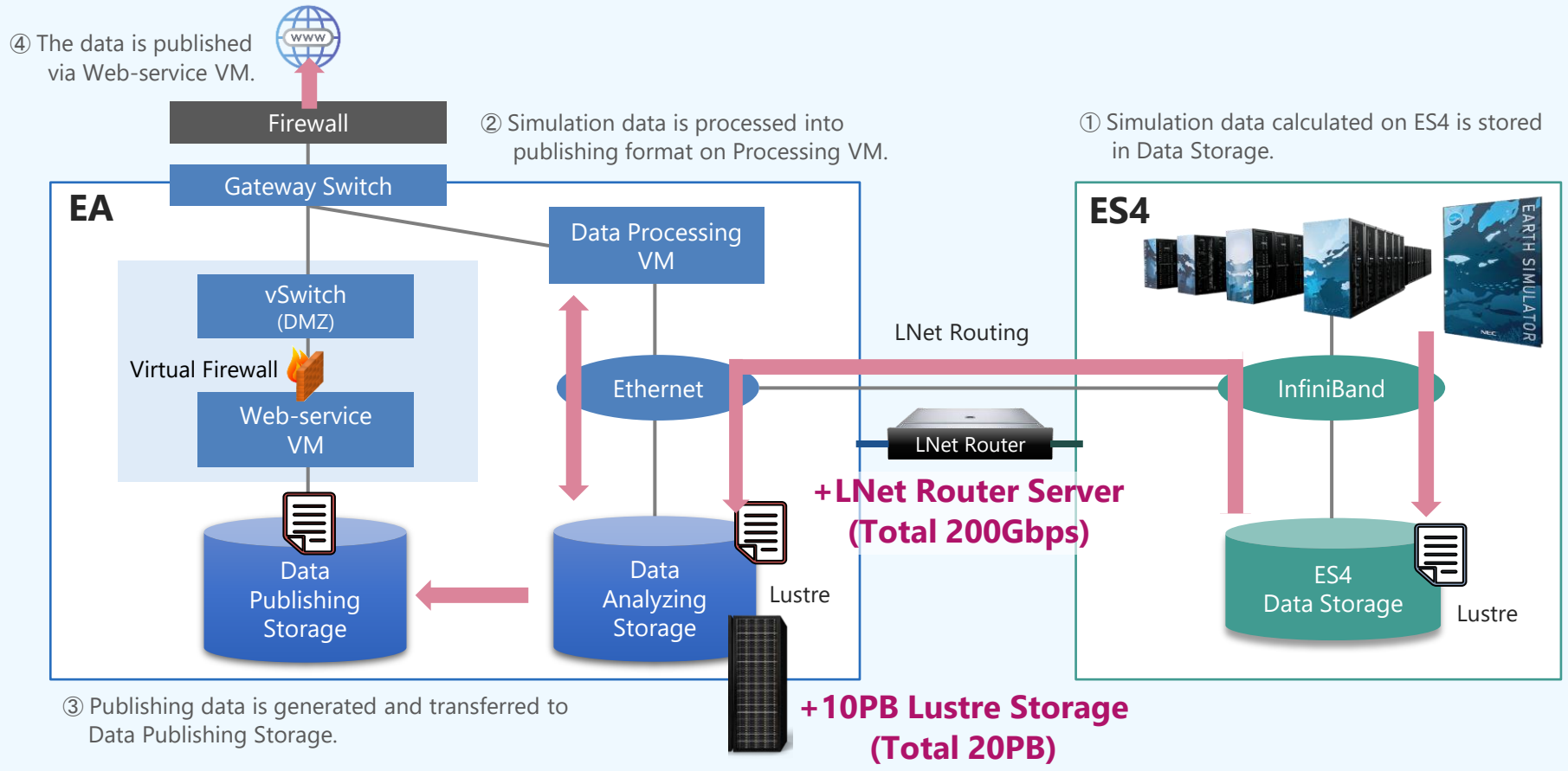
Enhancing Research Capability through EA Upgrades



Total 30 Servers

17 host servers have already been utilized over the past year.

Upgraded



Up! Data Processing Performance + Up! Data Storage Capacity + Up! Data Transfer Bandwidth

Enhancing Research Capability

RII Use Cases

- OSAKA University
- JAMSTEC
- **TOHOKU University**

Conclusion

Conclusion

- NEC has announced new brand “NEC BluStellar”.
  It is a value creation model that leads our customers to their future.

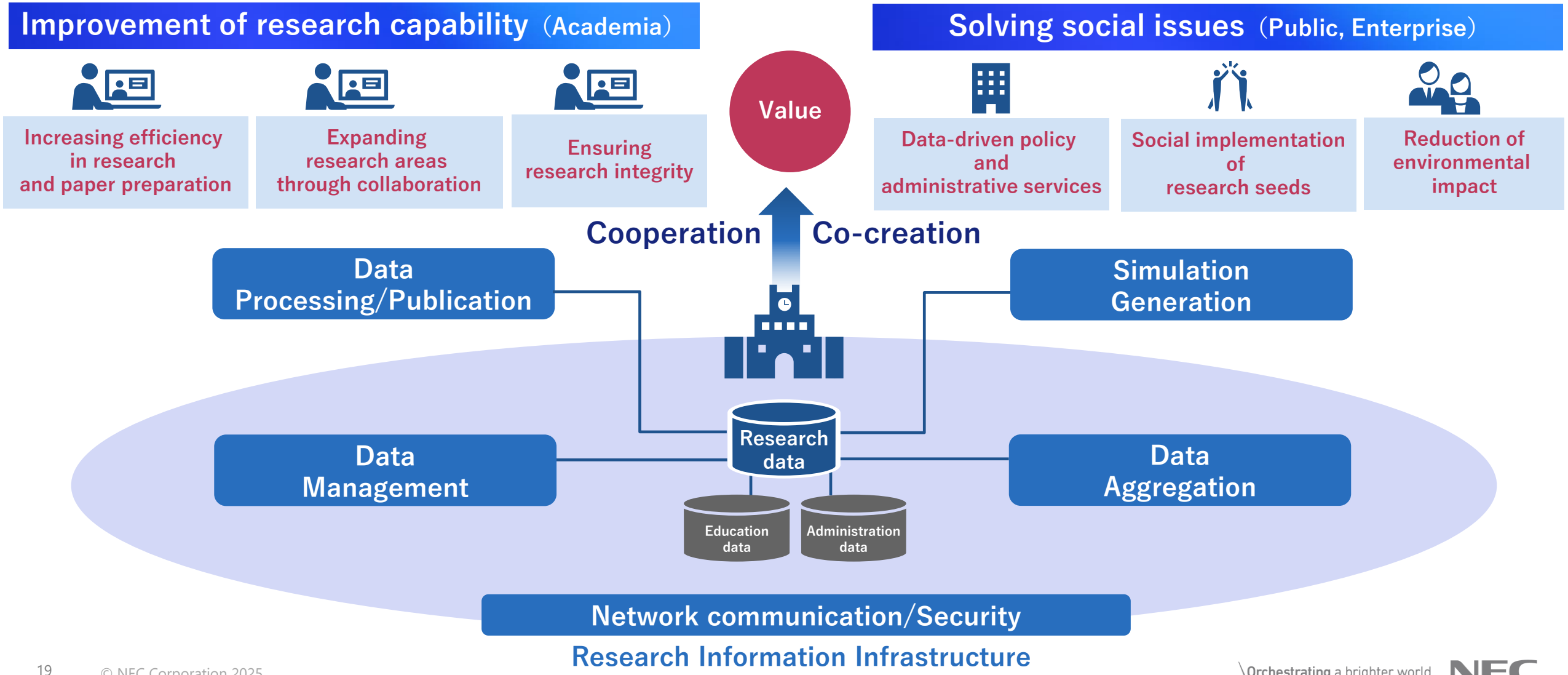
- For Academic customers, NEC will provide the total solution of Research Information Infrastructure (RII) , which supports Research Data Management (RDM).

- There are two cases of RII in Japan.
  OSAKA UNIVERSITY with ONION and developing Provenance Recording System. JAMSTEC with Tape Storage System highly conservating data.


Orchestrating a brighter world
NEC

Value Provided by RII

NEC provides value to academic customers, Improving their research capability, with RII.



Overview of RII Case in Japan

**OSAKA UNIVERSITY and JAMSTEC recognize the importance of huge data handling.
NEC has supported in line with their vision of data-utilizing research.**