A person wearing a winter coat and a headlamp is walking away from the viewer on a rocky, dirt path in a dark, mountainous landscape. A large, glowing blue light trail curves across the foreground and middle ground, leading towards the horizon. The background shows dark, silhouetted mountains under a twilight sky. The overall mood is futuristic and exploratory.

Responsible Innovation  
at with the speed of **light**  
at the edge of **space**  
and towards **quantum** futures

Our Brand is

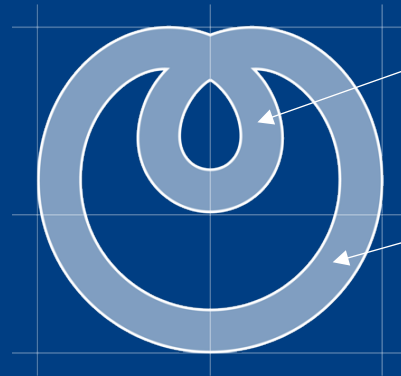
More than a logo

## It has a great story to tell

*Art, Science and Nature Combined*

We aim to become a human company that is truly useful to the world by keeping people as the starting point of our thinking, always thinking about the future and continuing to innovate dynamically.

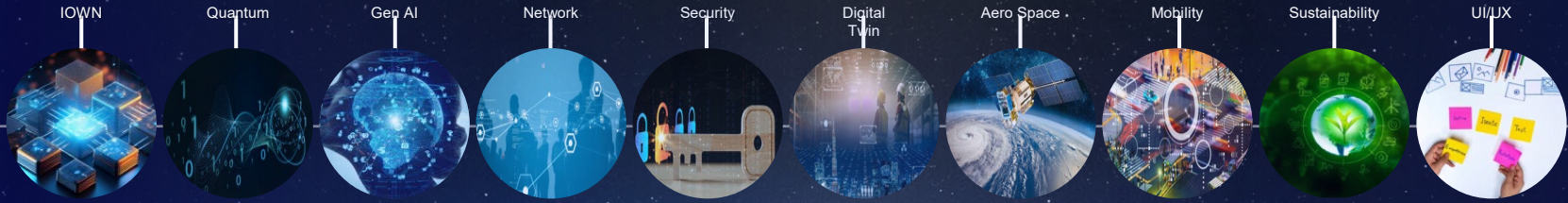
– 1985 Corporate Identity Statement



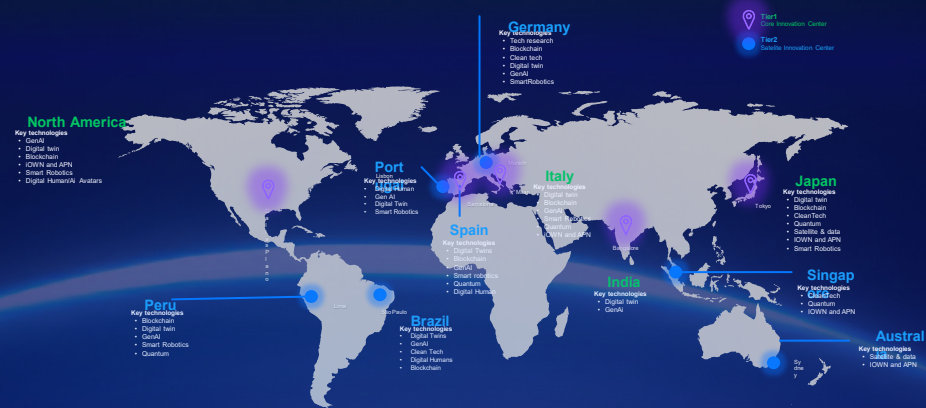
The small loop represents the voice of people, clients and society that is always at the heart of our business.

The infinite continuous curve represents NTT's dynamism and commitment to continuously innovate.

# Leading in various technology fields

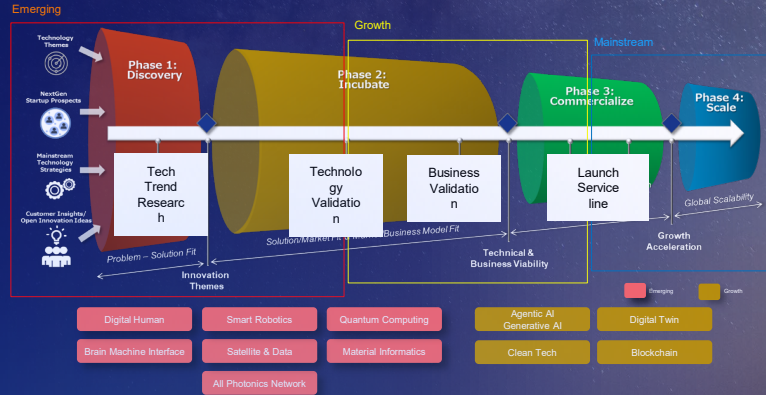


# Innovation Center expansion (as of Oct 2025)



A global innovation network and ecosystem of advanced technologies supporting growth

# Innovation Lifecycle Model



# At With the Speed of Light

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# Next generation infrastructure transformation (from Earth to Space)

Powered by photonic technologies

## IOWN Photonic Computing

01

Converting electricity into light to surpass energy limitations.



Building a low-power computing infrastructure to support the AI era.

## Optical Quantum Computer

02

Overcoming the limits of computation using quantum technology.



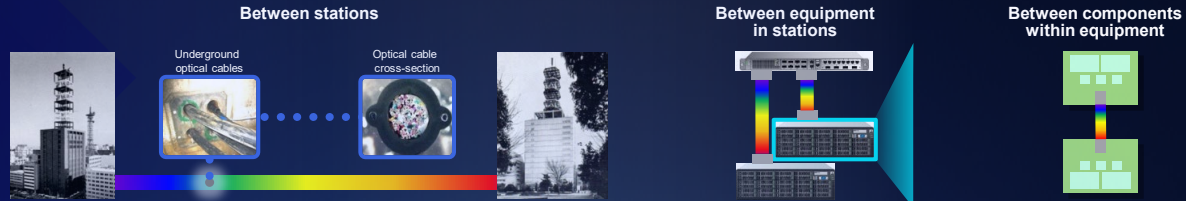
Solving previously intractable problems with dramatically lower power consumption.

# IOWN

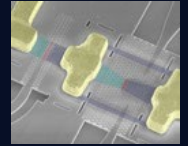
Innovative Optical and **W**ireless **N**etwork

---

# NTT's history of optical communication innovation



Continuously advancing optical communication at smaller scales to meet the demands of each era.



**1977**

VAD method  
(optical fiber  
mass production)

**1983**

Flame deposition method  
(optical fiber mass production)

**1990**

AWG  
(Arrayed Waveguide  
Grating)

**2000**

FTTH splitter (outdoor  
optical splitter)

**2015**

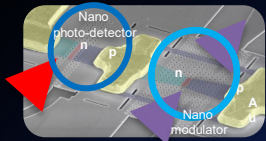
COSA  
(optical interferometer)

**2019**

Ultra-low-power optical  
device core  
technology

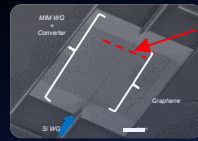


# NTT's Key Breakthroughs



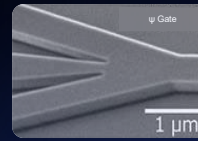
Photonics transistor

Apr. 2019



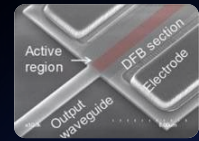
All-optical switch

Nov. 2019



Optical logic gate

Mar. 2020



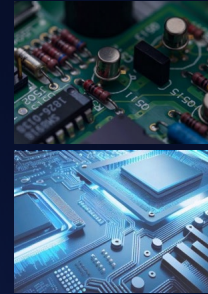
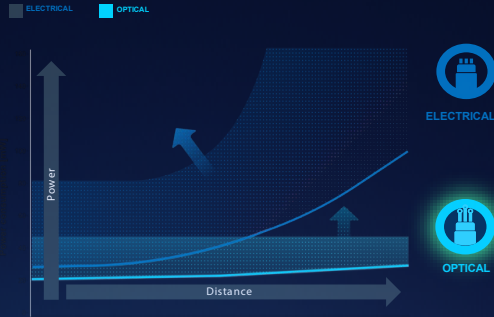
Directly modulated laser

Oct. 2020


Published in: ● Nature Photonics  
● Communications Physics

# Innovation At With the Speed of Light

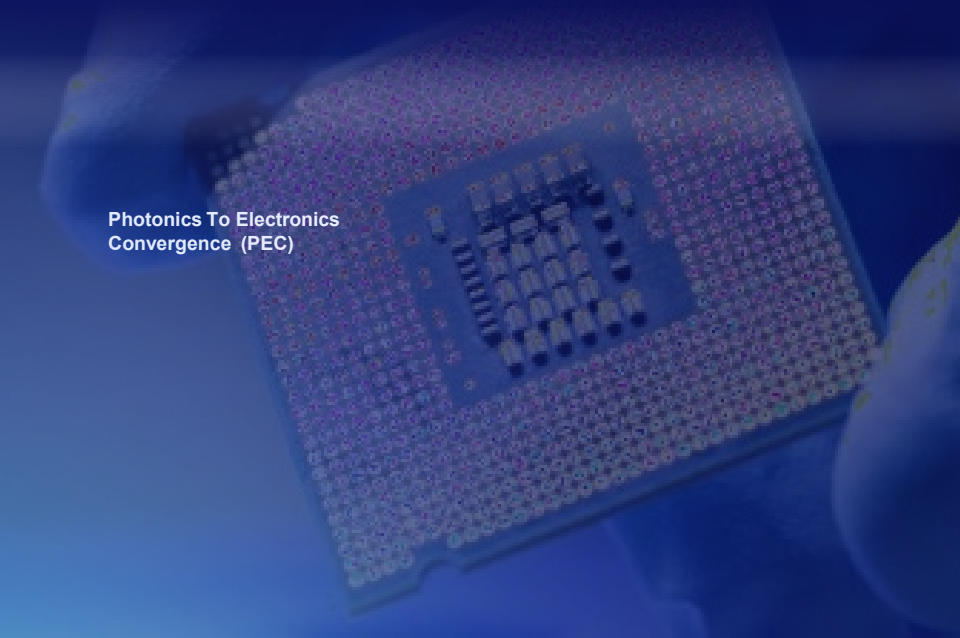
Relation between transmission distance and power consumption



# The IOWN Vision – AI Infrastructure of the Future



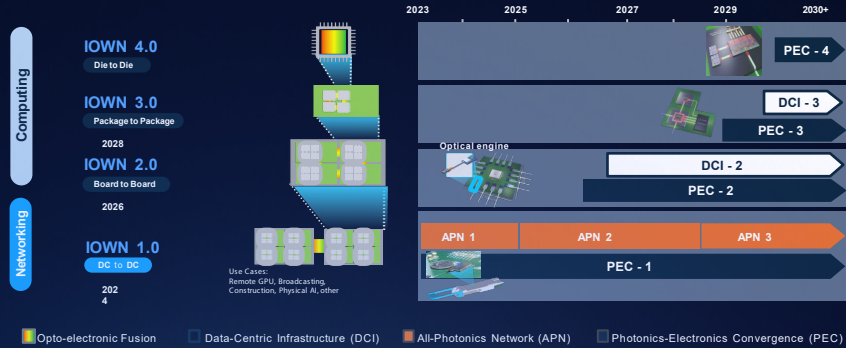
Transmitting  
All Photonic Networks (APN)



Photonics To Electronics  
Convergence (PEC)

# The IOWN Roadmap

Optical transmission between data centers, ASIC boards, Integrated Circuits and within IC's





Lower power  
consumption by

**100x**



Higher transmission  
capacity by

**125x**



Lower end-to-end  
latency by

**200x**

# Initial IOWN based Use Cases

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Primary – Backup  
Data Center  
interconnect, DB  
synchronization,  
DR failover, etc.



Connectivity to Cloud  
Service Provider



Virtual Data Center  
extension to utilize  
available land and  
power (preferably  
renewable)



Remote GPU  
access for  
training and  
inference



Equipment Remote  
Control (mining,  
factory robots)



# IOWN for Peru

# Resilient Financial Sector Solutions

NTT DATA Industries Services Insights About Us Careers Investors News Global English

## MUFG Bank, NTT DATA and NTT West Publish PoC Report on Inter-Data Center Connectivity Using IOWN APN

December 19, 2025  
 MUFG Bank, Ltd.  
 NTT DATA Group Corporation  
 NTT WEST, Inc.

**Tokyo, December 19, 2025** – MUFG Bank, NTT DATA and NTT West today announced the public release of a new white paper, “PoC Report on IOWN APN Inter-Data Center and Long-Distance DR Realization for Strategic Business (v.1)”, published through the IOWN Global Forum. The report summarizes the results of joint technology validation initiatives developed to assess how IOWN’s All-Phaseless Network (APN) can support real-

**News Release**  
 The services, prices of products and services, specifications, equipment, contents, etc. for purchase and other information included in this release are the data available on the day of the release. This information may be changed at any time without notice. In certain circumstances, due to various risks or unexpected circumstances, actual results may also differ from the plans or assumptions



## High-precision remote operations

Deterministic, ultra-low-latency links for real-time control of equipment and processes



Compute



AI



Storage

Enable fully autonomous operations without needing to send personnel into hazardous areas



P5G or WiFi



Mining



Construction



Manufacturing

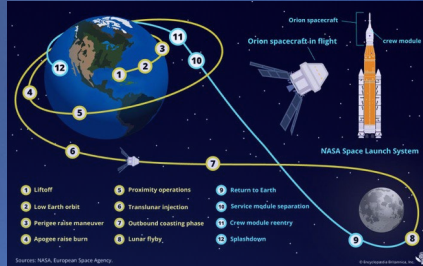
APN link

Branch



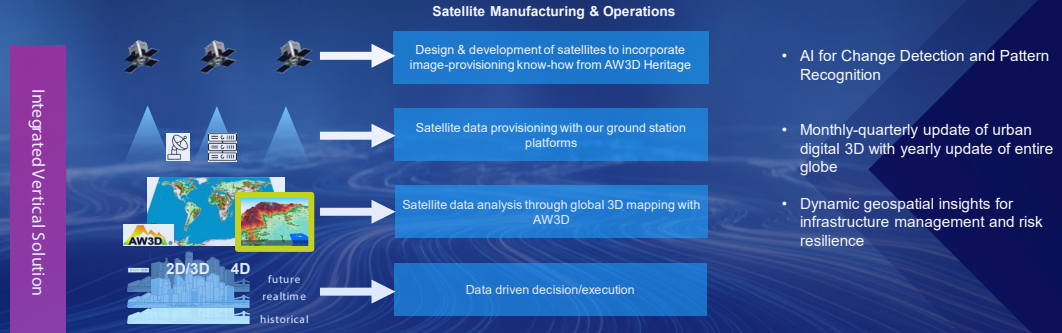
# At the Edge of Space

A person is silhouetted against a bright light streak on the horizon of a dune. A horizontal blue line is positioned below the person's silhouette.





# Leo Earth Observation x Dynamic Digital Twin Solutions

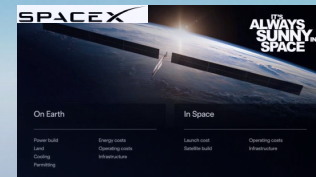
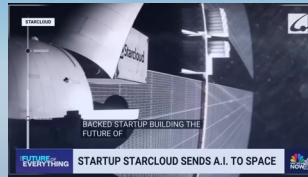
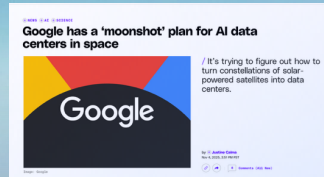


## Our hybrid solution: cellular + satellite



One SIM. Cellular and standardized satellite coverage, now and in the future.

## Space Based Data Centres



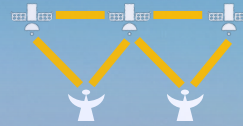
# From Earth to Orbit with IOWN

## Current

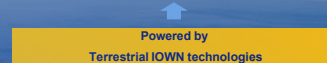


RF based communication with international license approved by ITU-R and dominated by first movers

## What's Ahead



Optical based (with data relay features)  
**High Capacity & Low Latency**  
**Low Energy**  
 with no license required



## Innovation in Computing Powered by Photonic Technology

### IOWN Photonic Computing

**1** Converting electricity into light to surpass energy limitations.



Building a low-power computing infrastructure to support the AI era.

# Towards Quantum Possibilities

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## Innovation in Computing Powered by Photonic Technology

### IOWN Photonic Computing

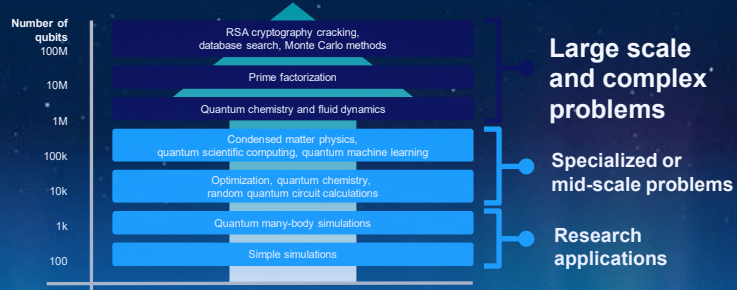
- 1 **Converting electricity into light to surpass energy limitations.** ➤ Building a low-power computing infrastructure to support the AI era.

### Optical Quantum Computer

- 2 **Overcoming the limits of computation using quantum technology.** ➤ Solving previously intractable problems with dramatically lower power consumption.

## Relationship between qubit count and solvable problem complexity

- The more qubits available, the more complex and impactful problems can be solved.
- General-purpose applications with major societal impact will require between 1m-100m qubits



# Quantum Innovation at NTT

## QUANTUM SOFTWARE

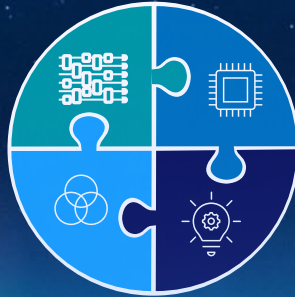
Based on our industry experience and best practices we develop our own algorithms, simulators and a Quantum Computing SDK called **Alquemy™**.



ABS2 SimCIM TensorNet

## PROFESSIONAL SERVICES

NTT Data has 20+ dedicated Quantum Technology Consultants and Developers.



## QUANTUM HARDWARE

NTT Research and NTT R&D have built the world's first optical quantum annealer called **LASOLVE** providing strong benefits compared to superconducting technologies.



Gate-based QC



CIM

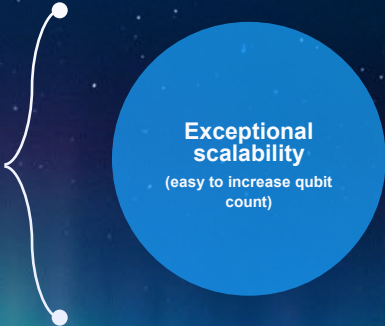
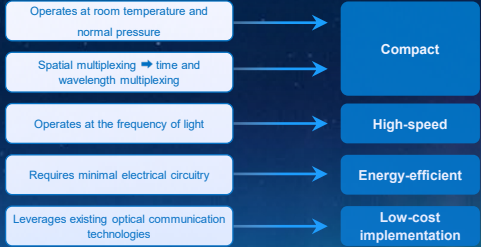


CyberCIM

## BASIC RESEARCH

NTT Research and NTT R&D have 2500+ scientist working globally across all relevant technology fields, with over 50 scientific publications on Quantum Computing in the last 5 years.

# NTT's Focus: Optical Quantum





Realizing scalable and reliable optical quantum computers

2030

1 million qubits - world-leading performance

2027

10,000 qubits - top-level performance in Japan

# Value Created by Optical Quantum Computing

Creating a New Paradigm with Large-Scale and Highly Reliable Optical Systems

Calculation Time Example (Conventional → Quantum)



# VIDEO

# Quantum “Community of Concept” at NTT DATA

**NTT Research**  
Build simple, efficient and practical solvers for real-world problems in our information intensive society.

**1QBit**  
Perform research in design and analysis of a stack of algorithms that bridge commercially viable applications.

**Classiq**  
An Israeli startup, developing a software platform to transform high-level functional models into optimized quantum circuits.

**Quantinuum**  
Quantum full stack platform, expertise on quantum machine learning, quantum chemistry, and quantum augmented cybersecurity.

**IQBit**  
**NTTResearch**

**MIT**  
**IONQ** **ZAPATA**

**Fraunhofer**  
**QUANTINUM**  
**NTT DATA Lab EMEA**  
Integrating client business cases with quantum and quantum-inspired techniques. NTT DATA Quantum Team and internal academy.

**IQM**  
**NTT DATA**  
**XANADU**  
**CLASSIQ**

**IQM**  
A spin-off from Aalto University and NTT Research, focused on building the first European superconducting quantum computer.

**Terra Quantum**  
A spin-off from Innsbruck University, Alpine Quantum Technologies is a leading player on quantum hardware based on ion-trap technologies.

**NTT**  
**NTT DATA**

**IonQ**  
Founded in 2015, it partners with AWS and Microsoft to make its ion-trap quantum computers available via the cloud.

**Zapata**  
Spun out of Harvard in 2017, Zapata Computing develops quantum software and algorithms for business.

**Cornell University**  
Develop a k-SAT solver based on error detection and error correction feedback.

**University of Michigan**  
Theoretical studies of topological states with anyon statistics in nonlinear optics and synthetic topological matter.

**Caltech**  
Develop scalable architecture for efficient quantum simulation of many body spin systems using OPO networks.

**Stanford University**  
Optical and superconducting devices for studying the quantum to classical crossover and critical phenomena in neural networks.

**MIT**  
Develop the photonic accelerators for deep learning and the superconducting CIMs for fundamental study.

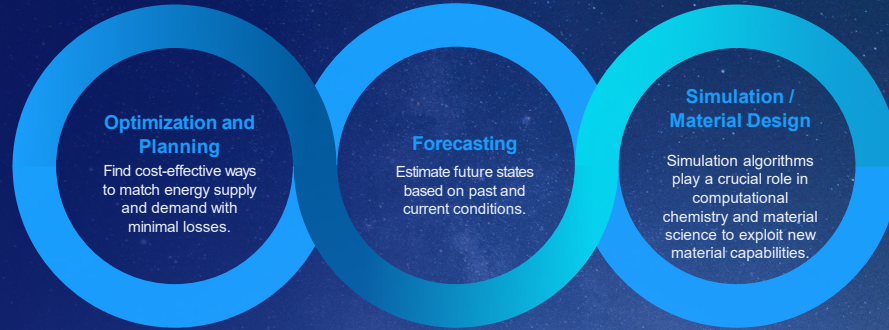
**NASA Ames Research Center**  
Perform benchmark studies of CIMs vs. modern heuristics on various optimization problems.

**Swinburne University**  
Develop and implement quantum phase space methods for CIMs.

**SWINBURNE**

The NTT Group Global Network on Quantum Technologies

# Use Case Areas



### Optimization and Planning

Find cost-effective ways to match energy supply and demand with minimal losses.

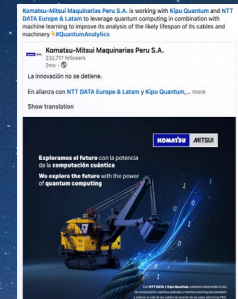
### Forecasting

Estimate future states based on past and current conditions.

### Simulation / Material Design

Simulation algorithms play a crucial role in computational chemistry and material science to exploit new material capabilities.

These problems have the common theme that there are potential future issues concerning scalability of current approaches, that quantum computing will help address.





**Next-generation infrastructure anchored  
in optical and photonic transitions**

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# ¡Asu Mare!

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# Gracias

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**Rika Nakazawa**

Chief Commercial Innovation NTT

in



