OKI Group

Innovation and Technology Strategy Meeting
Technology Strategy

Kurato Maeno

Executive Officer

Chief Technology Officer

Head of Technology Division

November 16, 2023

Contents

Creating Future Businesses: Value Creation Strategy

OKI
Open up your dreams

**Supporting OKI's future business with technological innovations
that will be a source of enhanced competitiveness**

Internal strengthening

Solving social and customer issues

Business model transformation

Company-wide innovation activities to promote DX

Full Participation Innovation
• Yume Pro activities
• IMS(ISO56002) adoption and expansion
• Implementation and globalization

Edge solutions using AI and IoT

Edge Platform
• AI Edge Computing
• Data management
• Solutions in each area

Organizational transformation

Creation of new solutions

Productivity strengthening

Competitiveness improvement

Operational process transformation

Enhancement of existing solutions

Strengthen Mono-zukuri infrastructure to become manufacturing platformer

Strengthening Mono-zukuri infrastructure
• Virtual One Factory
• Portability, smart factories
• Environmental measures (ZEB/ZEF)

Products and services to help customers DX

Shift to front-office processing
• New IoT Products

Business process services
• Comprehensive Mono-zukuri services
• Recurring/ BPO services

Business process transformation

Addressing Growing Social Challenges through Enhancing OKI's "unstoppable / unceasing" Social Infrastructure with Global Innovation"

OKI's Strengths
Advanced "unstoppable / unceasing"
Technologies developed through social infrastructure

Increasingly Serious Social Issues

Application of technological innovations to solve issues

Safe and convenient social infrastructure
- Accelerated expansion of aging infrastructure
- Traffic concentration and congestion

Conservation of global environment
- Intensifying disasters
- Responsibility for environmental impact

Job satisfaction and productivity enhancement
- Declining birthrate and aging population
- Labor shortages

High-quality manufacturing to withstand harsh environments

Technology for stable, uninterrupted connections

Fast, reliable AI that performs in real-world environments

Operations that increase the availability of social infrastructure

AI	Productivity revolution in intellectual work
Automation	Manpower saving at critical sites
Mobility x IoT	Moving sensor infrastructure
Smart City	Advances in coupling digital twin technology with AI
Manufacturing technology x AI x Data	Innovative manufacturing

OKI
Open up your dreams

Advancing Edge Technology and Expanding Data Utilization with Global Technological Innovation: Leveraging OKI's Core Competency in "Toughness"

High-grade network
5G/Beyond 5G/V2X

Large-scale command, control, and centralized systems

Disaster prevention and marine IoT infrastructure
Comprehensive disaster prevention and watershed flood control

- Traffic probe analysis
- Delivery route optimization
- Infrastructure monitoring
- Advanced remote and high-availability operations

Cross-utilization of infrastructure data

Increasing the value provided by connecting data

High Reliability **High Availability**

Support mission-critical infrastructure
System Technologies

Non-stop service operation
Operational Technologies

Toughness

AI

Long-term stable operation on site
Product Technologies

High performance in harsh environments
Component Technologies

High Quality **High Performance**

Ruggedized zero energy IoT technology
(river, mountain, ocean, disaster prevention)

Silicon photonics, photoacoustics, wireless, AI chips

CFB technology enables advancement of compound semiconductors

- High-speed, energy-saving, high-sensitivity analog technology
- Signal processing and AI technology with high environmental resistance performance

Real-time sensing

Edge advancement

Self serve/automation technology

Ultra low-failure rate, high-quality components

Highly environment-resistant components
(aerospace, aviation, marine, disaster prevention)

**Enhance edge technology and connect data to increase value,
and reinforce with a view to global expansion**

Edge Platform	A solution platform technical concept that accelerates the combination of diverse edge components and data, and speedily solves diverse customer issues

Conservation of global environment

Safe and convenient social infrastructure

Job satisfaction and productivity enhancement

Cross-sectional utilization of infrastructure data
Multimodal Data Infrastructure

Toughness

AI

Data Management

Edge Platform

Expansion of disaster prevention and ocean IoT infrastructure
High-definition networks/Ruggedize technology

Self-service and automation of real services
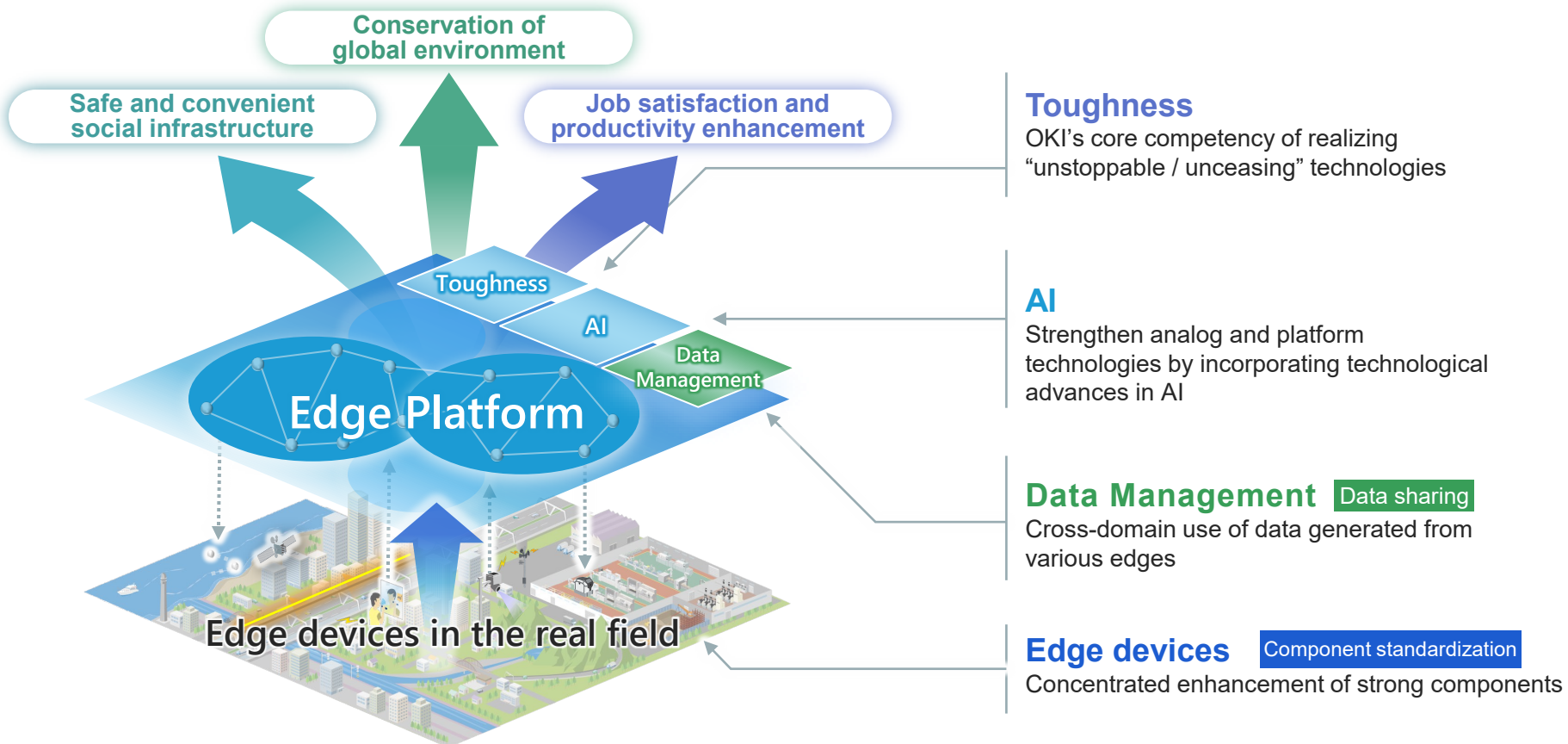High quality components

Advancement of transportation infrastructure
V2X/Real-time interaction

Edge devices in the real field

Real-time sensing of infrastructure
Photonics, sound, radio and vision

OKI Open up your dreams

Enhance edge technology and connect data to increase value, and reinforce with a view to global expansion
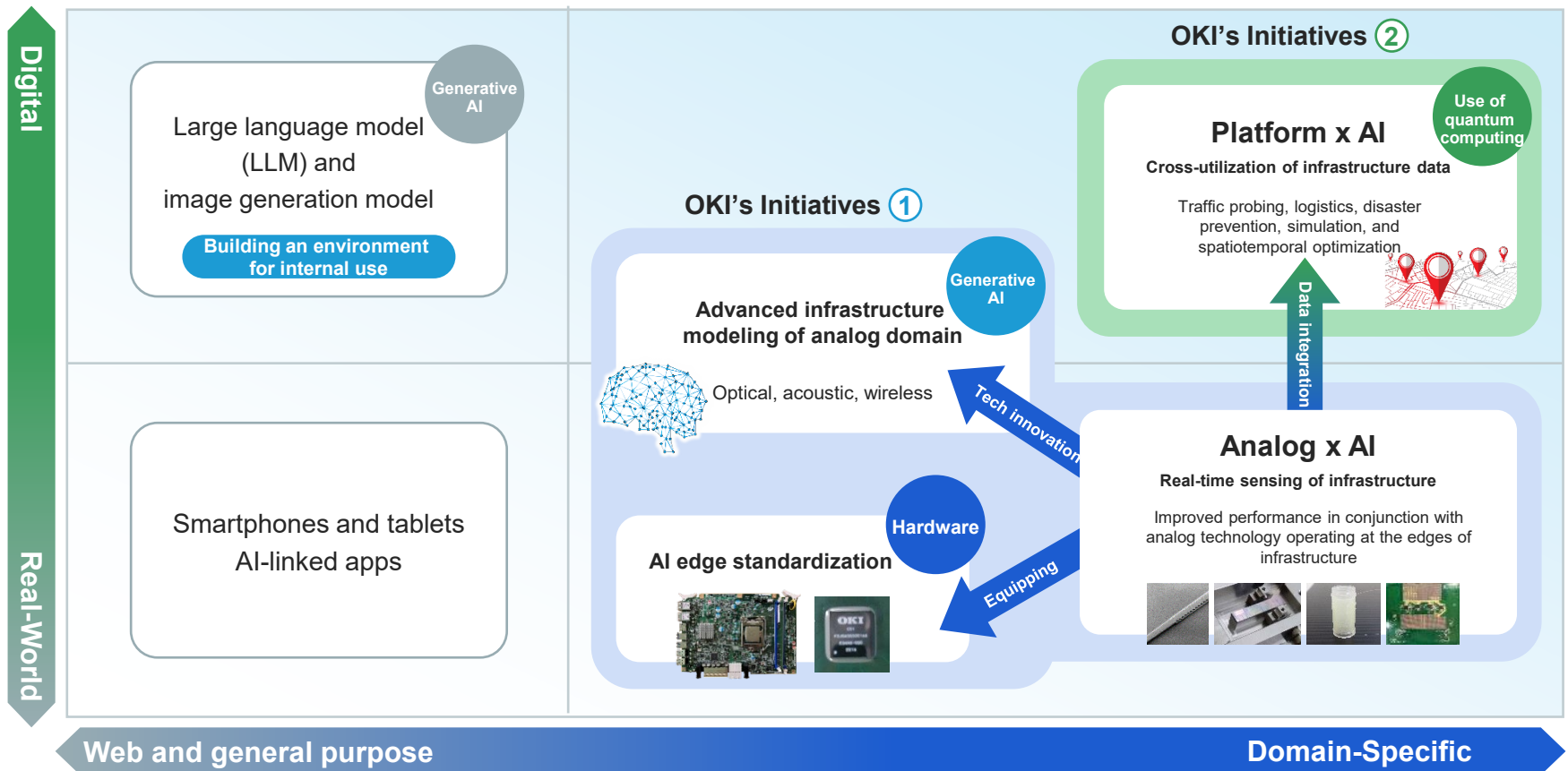
Edge Platform	A solution platform technical concept that accelerates the combination of diverse edge components and data, and speedily solves diverse customer issues

Conservation of global environment

Safe and convenient social infrastructure

Job satisfaction and productivity enhancement

Toughness
OKI's core competency of realizing "unstoppable / unceasing" technologies

AI
Strengthen analog and platform technologies by incorporating technological advances in AI

Edge Platform

Toughness
AI
Data Management

Data Management Data sharing
Cross-domain use of data generated from various edges

Edge devices in the real field

Edge devices Component standardization
Concentrated enhancement of strong components

OKI Open up your dreams

Tough AI that is robust in field applications, incorporates technological evolution, and enhances the value provided by social infrastructure

- Building internal environment for integrating GPT-4's technological advancements into overall operations.
- Leveraging Elemental technologies: Analog x AI to Hone the Strengths of Social Infrastructure, and Platform x AI to Expand Value

Digital / **Real-World**

Large language model (LLM) and image generation model

Generative AI

Building an environment for internal use

Smartphones and tablets AI-linked apps

OKI's Initiatives ①

Advanced infrastructure modeling of analog domain

Generative AI

Optical, acoustic, wireless

Tech innovation

AI edge standardization

Hardware

Equipping

OKI's Initiatives ②

Platform x AI

Use of quantum computing

Cross-utilization of infrastructure data

Traffic probing, logistics, disaster prevention, simulation, and spatiotemporal optimization

Data integration

Analog x AI

Real-time sensing of infrastructure

Improved performance in conjunction with analog technology operating at the edges of infrastructure

Web and general purpose / **Domain-Specific**

Technology Enhancement: Data Management

OKI
Open up your dreams

Connecting data generated by edge devices, which are robust in field applications, and utilizing it across domains to create new value
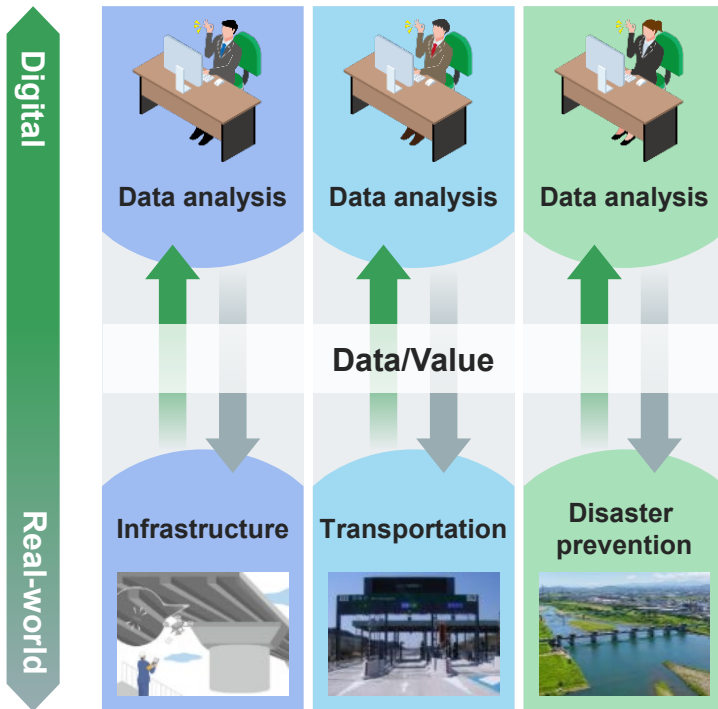
Improving data access capabilities in the service, operation, and systems integration
Promoting cross-domain data sharing to strengthen and advance social infrastructure comprehensively
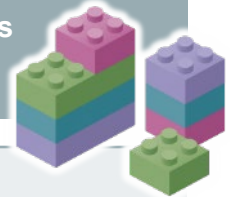
Until now

Vision for the future

Providing value on a single-operation basis

Expanding value through a cross-domain architecture

Digital

Real-world

Data analysis

Data analysis

Data analysis

Data/Value

Infrastructure

Transportation

Disaster prevention

Multimodal, composite, whole-area data analysis

Data

"Connect" "Expand"

Growth of value

Ocean   Infrastructure   Transportation   Logistics   Infrastructure

Dual use, integration of extraterritorial data, new value creation
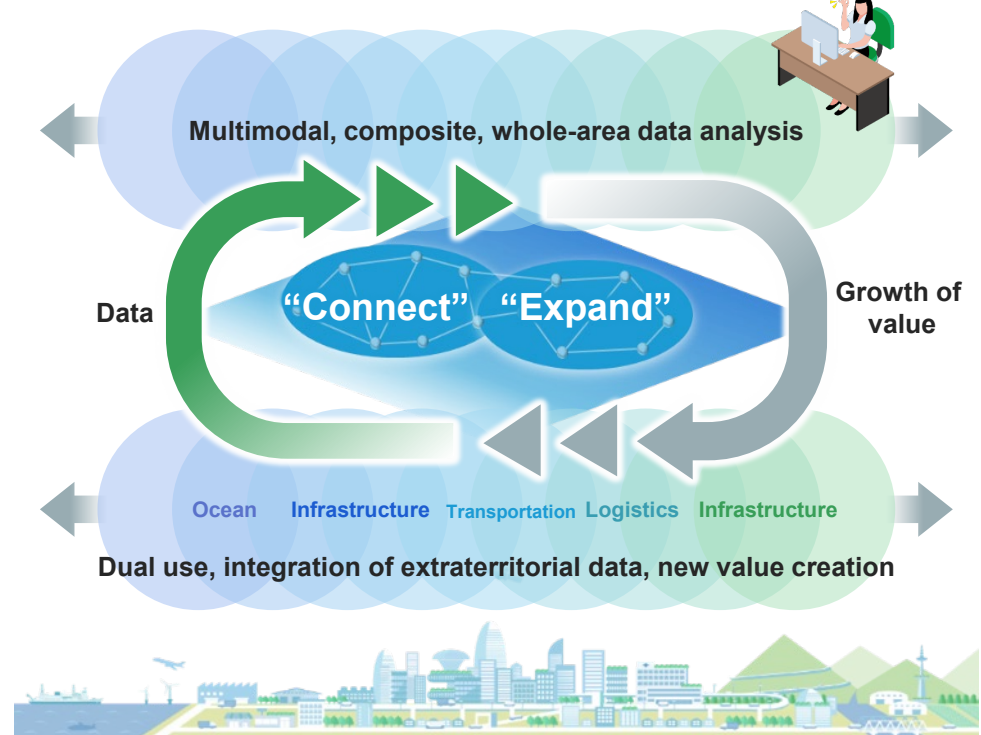
Standardizing tough components and enhancing their value in field applications

Shifting from individual development to standardized development using our robust components
Concentrate technological enhancement and increase efficiency of new product development
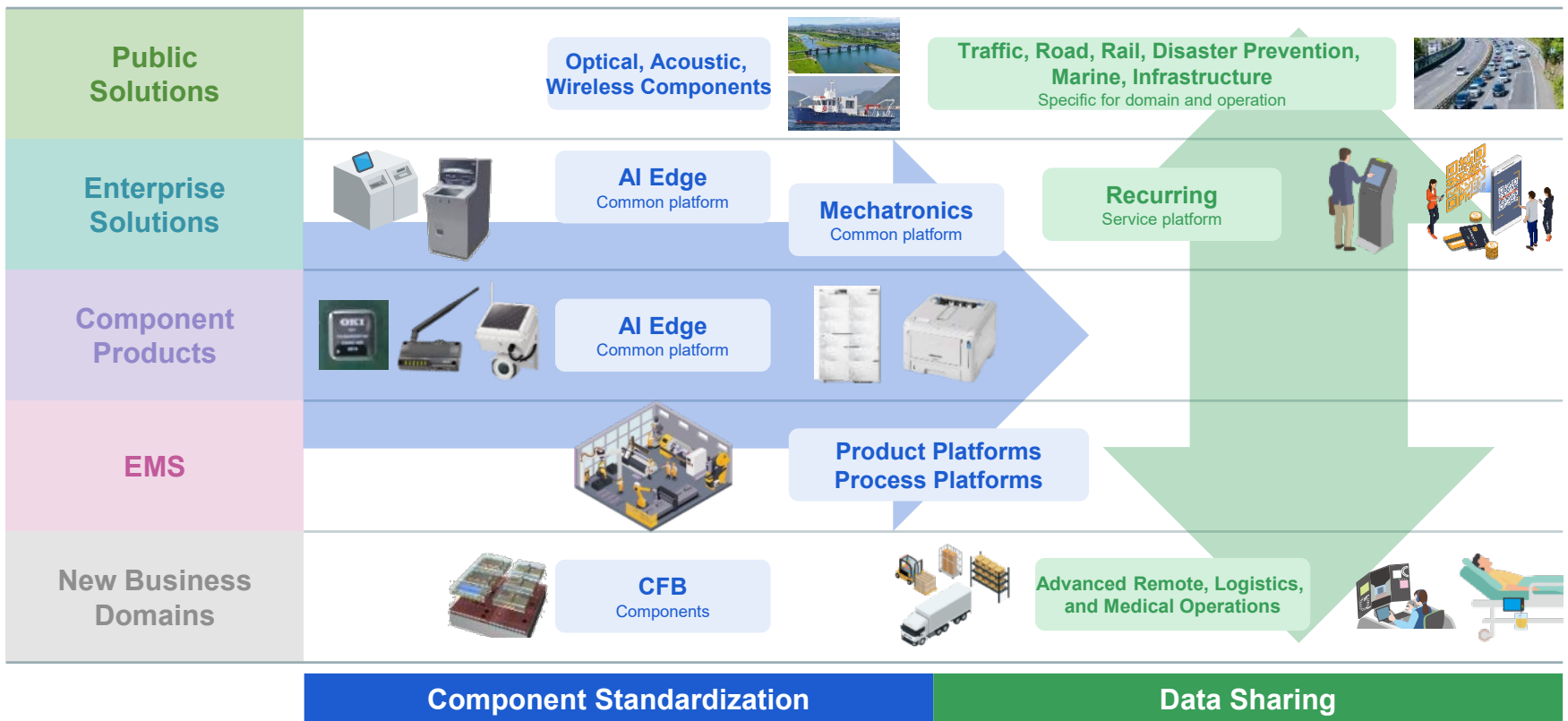
Promote standardization of robust components centered on the AI edge

Public Solutions		**Optical, Acoustic, Wireless** Components
Enterprise Solutions	**AI Edge** Processing board / **High-Speed Mechatronics** Components	**High-Efficiency Power** Components
Component Products	**Centralized Controls** Components	**ASIC AI Chips** Embedded components
EMS	**High-End Modules** (Space, medical, semiconductor manufacturing, etc.)	
New Business Domains	**ROMBOX** Remote control components	**CFB Technology** (Elemental technology)

Advanced Processing | **Energy Conservation**

Relationship with Business Segments

Advance the edge platform, accelerate the combination of components and data across segments, and move to a structure that speedily delivers high-quality services

Accelerate Component Standardization across Business Segments and Next-generation Device Development
Accelerate data sharing by establishing data management functions

Public Solutions	**Optical, Acoustic, Wireless Components**	**Traffic, Road, Rail, Disaster Prevention, Marine, Infrastructure** Specific for domain and operation
Enterprise Solutions	**AI Edge** Common platform — **Mechatronics** Common platform	**Recurring** Service platform
Component Products	**AI Edge** Common platform	
EMS	**Product Platforms Process Platforms**	
New Business Domains	**CFB** Components	**Advanced Remote, Logistics, and Medical Operations**

Component Standardization | **Data Sharing**

OKI
Open up your dreams

Sharpening five technology domains to strengthen edge platform
Advancing and integrating analog, AI, hardware, network, and platform

- Enhance development efficiency and "toughness" through component standardization and data sharing
- Advance core technologies through a combination of five focused technology domains
- Strengthen core technologies and complement technologies through global innovation

R&D Investment

¥35.0 billion
(Three-year total)

Analog × AI
Real-time sensing of infrastructure
- High-performance analog technology (optical/acoustic/wireless/power)
- Real-time sensing/Compact AI
- Multimodal sensing/Platform models

Platform × AI
Cross-utilization of infrastructure data
- Data sharing/Cross-utilization of infrastructure data
- Highly reliable AI prediction/Data infrastructure construction technology
- Wide-area simulation/spatiotemporal optimization

Global Innovation
Global collaboration of research institutes, strengthening core technologies

Expand technology portfolio with startups

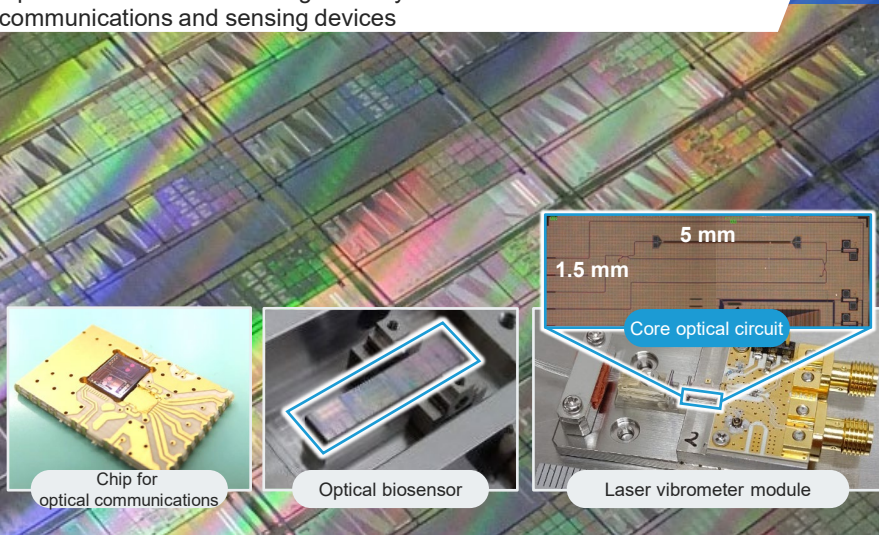Strengthen the edge platform ecosystem

Analog × Network
High-definition networks
- High-capacity optical access and virtualization technology
- Zero-energy IoT
- Disaster prevention and marine IoT infrastructure

AI
Analog / Platform
Toughness
Network / Hardware

Hardware × Platform
Component standardization
- Enhanced integrated design of hardware, software, and AI
- Self service/automation of real-world services
- AI edge standardization/CFB technology

Externalization
Accelerate technology maturation by using the sites within OKI-G as experimental/demonstration fields

Hardware × Network
**Real-time interaction**
- Advanced remote operation with constant connection
- High-performance new mechatronics technology
- Advancement of V2X and transportation infrastructure

OKI
Open up your dreams

Silicon Photonics

Optical silicon circuits that significantly reduce the cost of communications and sensing devices

5 mm
1.5 mm
Core optical circuit

Chip for optical communications

Optical biosensor

Laser vibrometer module

Fiber Optic Acoustic Sensors

Highly sensitive reception of acoustic waves coming from all directions underwater

Fiber Optic Acoustic Sensor

Offshore Experimental Facilities

SENTEC NEO
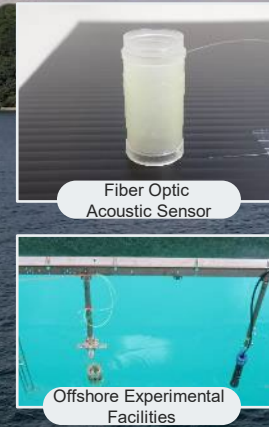
Millimeter Wave Sensing

Highly sensitive detection of vehicles, people, etc. in a wide range of environments

Millimeter wave module

Merging support sensors
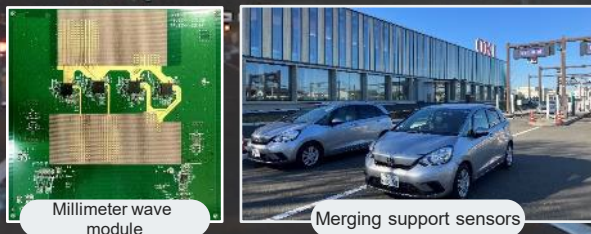
Fiber Optic Temperature/Strain Sensors

Real-time measurement of temperature and strain distribution over a 500 m length in 10 cm increments

Sensor optical circuit
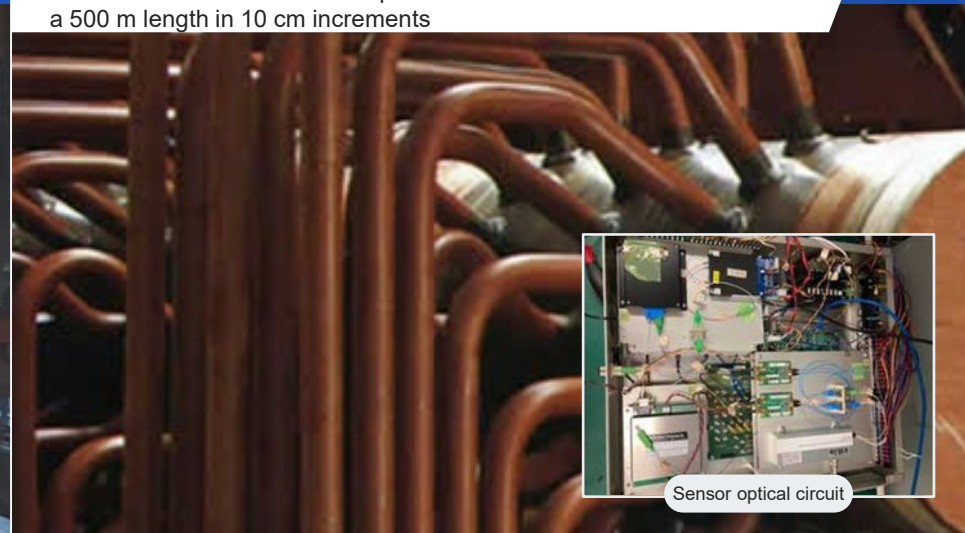
Remote Operation Support System

Numazu, Honjo, and Tomioka Factories

Remote, real-time work instructions and on-site status monitoring

Smartphone support   HMD support

IoT Security

Numazu and Honjo Factories

Responding to new threats to on-site networks with traffic analysis

Management console

AI Model Compression Technology

Thailand Factory

Cutting printer label inspection time by more than half

Inspection screen

AI-based Task Evaluation System

Honjo Factory

Automatic process error detection in assembly work

Rapidly realize new businesses through the combination of component standardization and data sharing
Apply OKI's technological strengths in "toughness," AI, and data management

Advanced Remote Operations
Integrated heterogeneous operations with real-time collaboration between people and edge devices

OKI's Technological Strengths
- Cross-industry collaboration infrastructure
- Highly reliable wireless networks
- Multi-device integration
- Environmentally tolerant edge devices

Logistics (Transportation x Warehousing)
Advancement based on real-time automation and total supply chain optimization
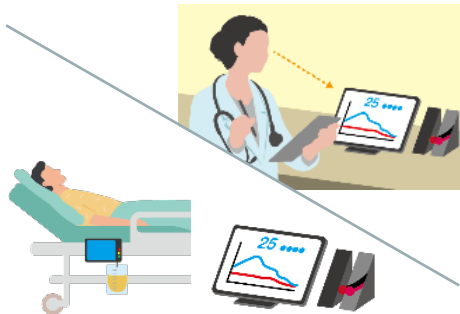
OKI's Technological Strengths
- Delivery route optimization
- Optimization of automatic in-plant conveyance
- Mechatronics x Retrofit
- Unstoppable IoT

Healthcare / Medical care
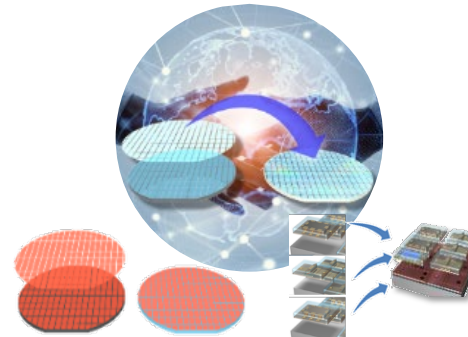Sensing and data utilization for social wellbeing

OKI's Technological Strengths
- Behavioral change technology
- AI/Data analysis/Networks
- Wireless/Vital sensing
- Silicon photonics/ Optical biosensors

CFB
Realize new displays and devices with the technology of bonding dissimilar materials

OKI's Technological Strengths
- CFB semiconductor bonding technology
- Device composite technology
- Mounting/Mass production technology
- Manufacturing platform

Business Contributions: Domain-Specific Edge Platforms

OKI
Open up your dreams

Accelerating service diversification through data utilization by recurring shifts
Enhance responsiveness through component standardization and combination and expand value

Domain-Specific Platform
(Road and Disaster Prevention Domain)
Utilizing diverse infrastructure data for client operations in road and disaster prevention

OKI's Technological Strengths

- Forecasting arrival/congestion
- Vehicle location management
- Wireless communications/DSRC
- On-board and roadside sensors

Marine Platform
Promoting the Blue Economy by enabling the collection
and provision of oceanographic information

OKI's Technological Strengths

- Knowledge processing/ Data processing
- Individual identification and processing
- Design of environmentally durable mechanisms
- Underwater hydrophone/ Acoustic positioning

Infrastructure Monitoring (monifi)
Using data analysis of infrastructure to contribute to
countermeasures against natural disasters and aging

OKI's Technological Strengths

- Analysis of infrastructure health
- Data collection and accumulation
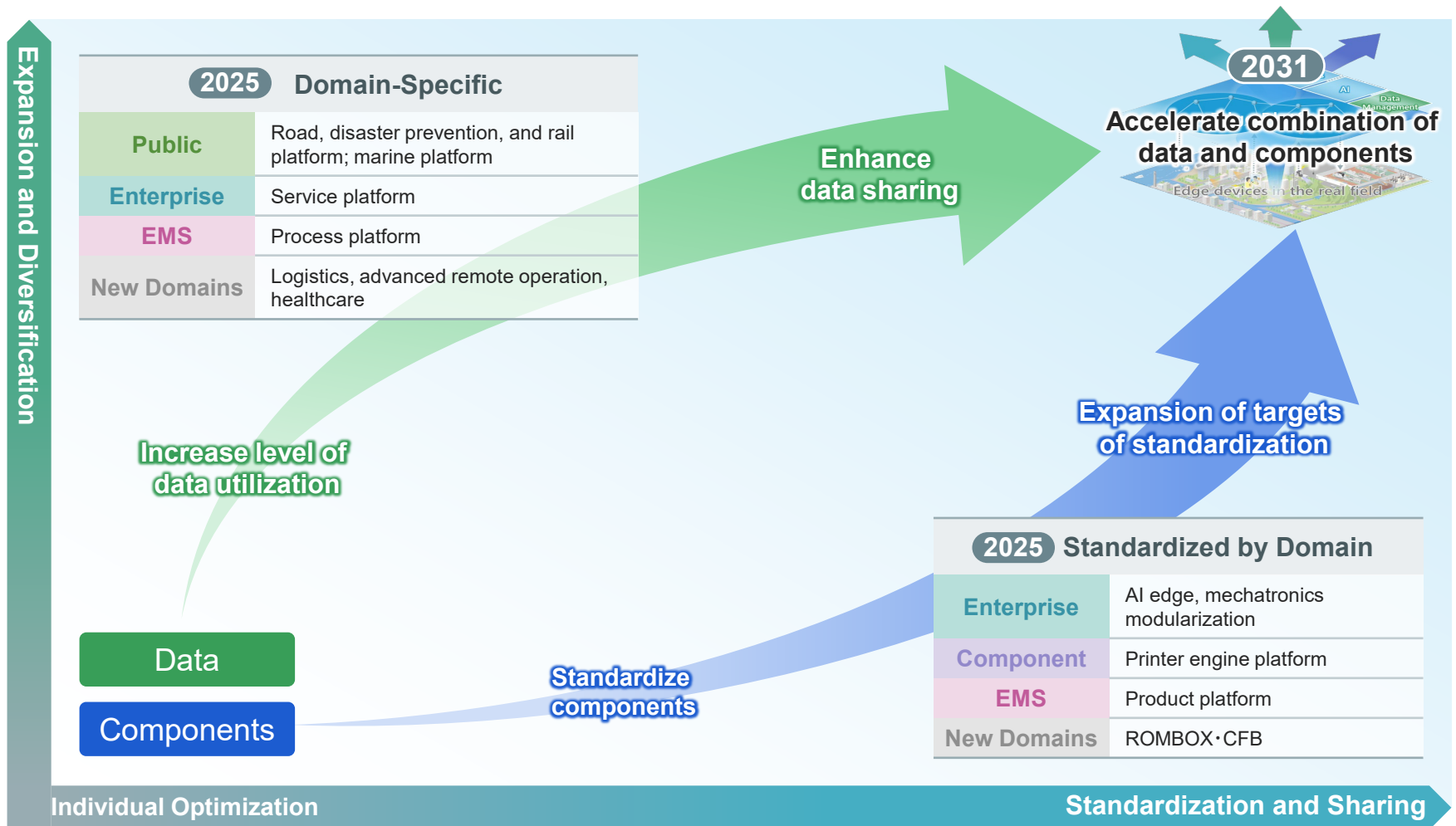- 920 MHz band multi-hop
- Zero-energy sensors

Service Platform
Providing "convenience" to society through a safe and secure recurring model
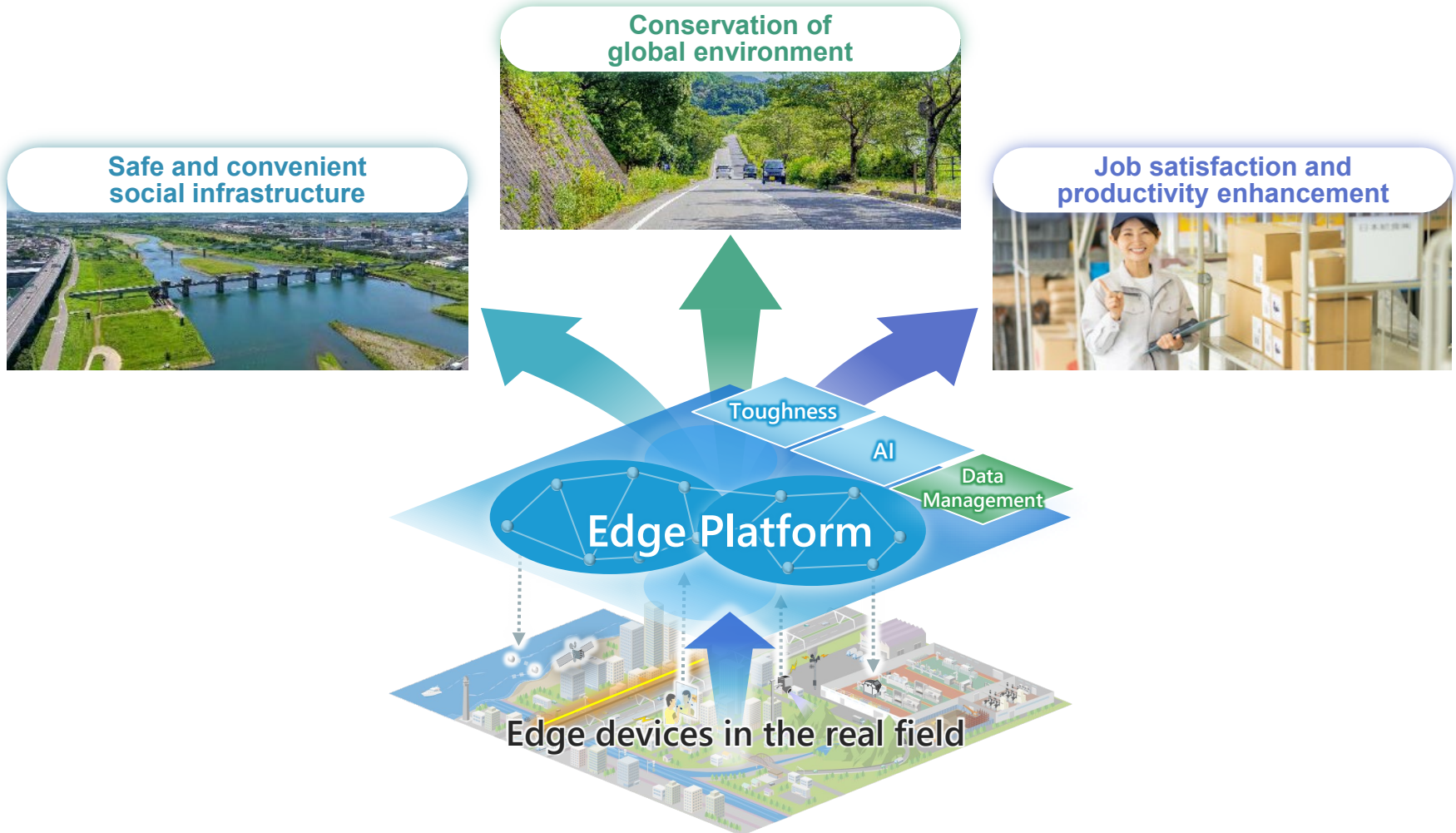

OKI's Technological Strengths

- Operation and maintenance knowhow
- Data collection and accumulation/analysis
- UI/UX
- Toughness/Edge design manufacturing

Domain-specific platforms to raise the level of data utilization for each domain and then promote shared use
Develop into a platform that accelerates component combination alongside component standardization

Expansion and Diversification

2025 Domain-Specific

Public	Road, disaster prevention, and rail platform; marine platform
Enterprise	Service platform
EMS	Process platform
New Domains	Logistics, advanced remote operation, healthcare

Enhance data sharing

2031
Accelerate combination of data and components
Edge devices in the real field

Increase level of data utilization

Expansion of targets of standardization

Data

Components

Standardize components

2025 Standardized by Domain

Enterprise	AI edge, mechatronics modularization
Component	Printer engine platform
EMS	Product platform
New Domains	ROMBOX・CFB

Individual Optimization

Standardization and Sharing

Providing "safe and convenient social infrastructure" through technological innovation on the edge platform

Conservation of global environment

Safe and convenient social infrastructure

Job satisfaction and productivity enhancement

Toughness

AI

Data Management

Edge Platform

Edge devices in the real field

OKI *Open up your dreams*

Delivering OK! to your life.