

# Transforming to a Sustainable Future of Everything As A Service with Data-Driven AI

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NEC Asia Pacific



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# NEC MISSION

Our mission is to create value for all members of society.

Looking to a brighter future,

we believe that, with technology and co-creation,

digital solutions can address society's needs.

Together, we will find the answers to today's challenges.

Together, we will bring amazing ideas to life.

Orchestrating  
a brighter world



*Let's bring amazing  
ideas to life, together.*

# CORPORATE PROFILE OF NEC CORPORATION

NEC CORPORATION IS JAPANESE MNC HEADQUARTERED IN TOKYO, JAPAN

## Establishment

Established

**1899**

(123 years old)



## Global Network

**289**

Group companies  
in more than

**50** countries

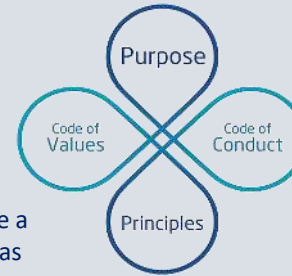


## NEC Way

Purpose

Orchestrating a brighter world **NEC**

NEC creates the social values of safety, security, fairness and efficiency to promote a more sustainable world where everyone has the chance to reach their full potential



## Corporate Executives

President & CEO

**Takayuki Morita**



## Employees

Over

**117,000**



## R&D Budget

As at Mar 2022

**US\$1.13B**

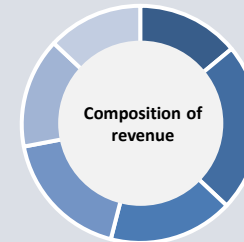
(4.2% of revenue)



## Revenue

As at Mar 2022

**US\$27.0B**



Business Segment	Percentage
Public Solutions Business	13%
Public Infrastructure Business	22%
Enterprise Business	19%
Network Services Business	17%
Global Business	16%
Others	13%

## Technological Capabilities

Global

**Leaderships**

- Biometric
- Artificial Intelligence (A.I.)
- Network



Corporate Executive Vice  
President, Chief Financial  
Officer

**Osamu Fujikawa**

Corporate Senior Vice President, Chief  
Global Officer

**Akihiko Kumagai**

Corporate Executive Vice President,  
Chief Technology Officer

**Motoo Nishihara**

# ORGANIZATION STRUCTURE

NEC Corporation

## Global Network

Consolidated subsidiaries

**301**

Across over

**50** countries



**HQ**

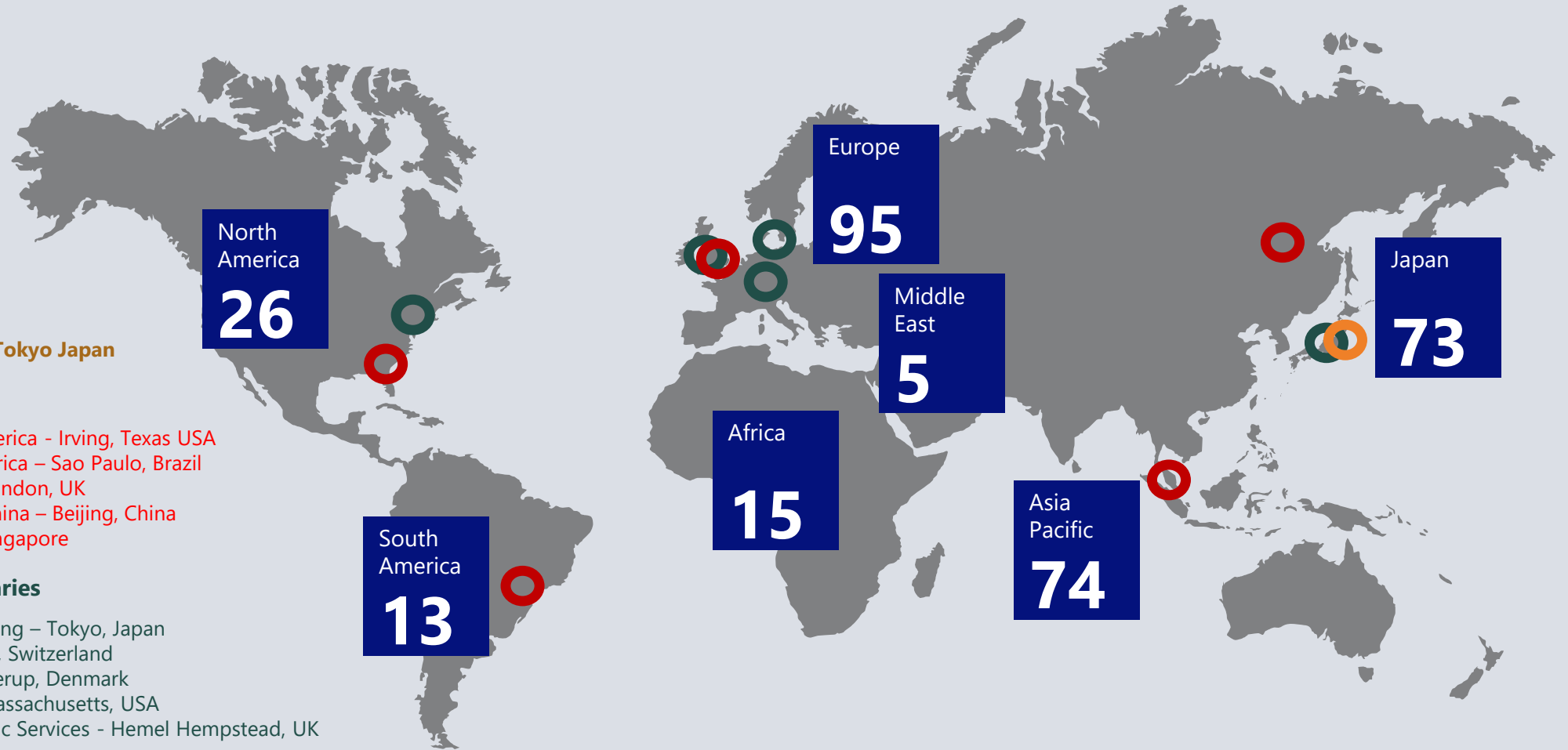
HQ – Minato, Tokyo Japan

**RHQ**

RHQ North America - Irving, Texas USA  
RHQ Latin America – Sao Paulo, Brazil  
RHQ EMEA – London, UK  
RHQ Greater China – Beijing, China  
RHQ APAC - Singapore

**Subsidiaries**

ABeam Consulting – Tokyo, Japan  
Avaloq – Zurich, Switzerland  
KMD A/S – Ballerup, Denmark  
Netcracker – Massachusetts, USA  
Northgate Public Services - Hemel Hempstead, UK



# NEC LABORATORIES WORLDWIDE

NEC Corporation

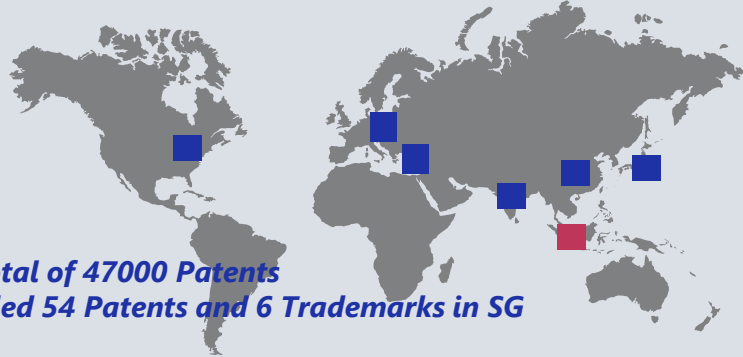
## Global Laboratories

Locations

12



Total of 47000 Patents  
Filed 54 Patents and 6 Trademarks in SG



- **JAPAN (6): Central Research Laboratories (Japan)**  
Takes the Central role in NEC R&D, focusing on AI (recognition, analysis), Security, ICT platform, & other cutting-edge technologies, Such as Quantum computing.
- **AMERICA:** Development of cutting-edge core technologies
- **EUROPE:** R&D thru EU projects & standardization activities
- **ISRAEL:** Promote marketing-type research
- **CHINA:** Development of core technologies in AI & Network
- **INDIA:** Core technologies to address challenges of emerging countries
- **SINGAPORE:** Co-creation of innovative solutions with customers and partners, mainly for developed countries.

## Biometric Leadership

World

**No. 1\***

(Backed with over 50 years of R&D in Biometrics)



NEC biometric authentication

**Bio-IDiom**

\* According to tests performed by the U.S. National Institute of Standards and Technology

## A.I. Leadership

A.I. Researchers & Data Scientists over

**1,800**

(Across the world in 10 laboratories)



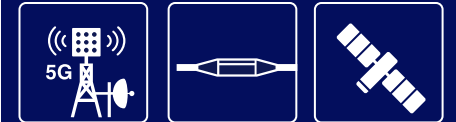
**NEC the WISE**

## Network Leadership

Support data flow for

**100 mil**

People



**NEC**  
Smart Connectivity

# TECHNOLOGICAL HIGHLIGHTS

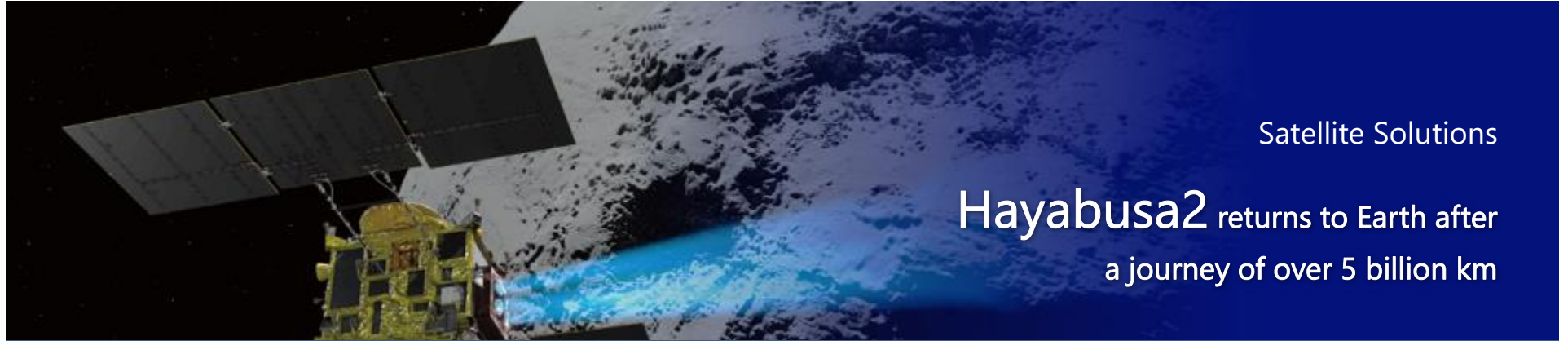
NEC Corporation

## ICT Technologies

From

## Sea floor to Outer space

Providing extensive value to customers in a wide range of fields, all across the world



Satellite Solutions

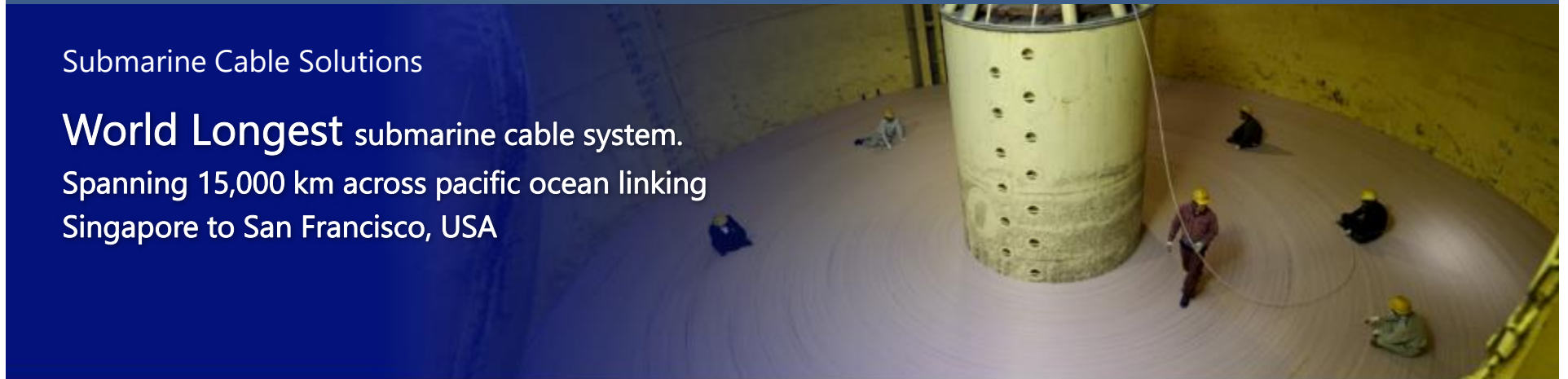
Hayabusa2 returns to Earth after a journey of over 5 billion km

**NEC Wins 2021 Leading Lights Award for 'Best New 5G Core Product' and 'Best New Open RAN Product'**

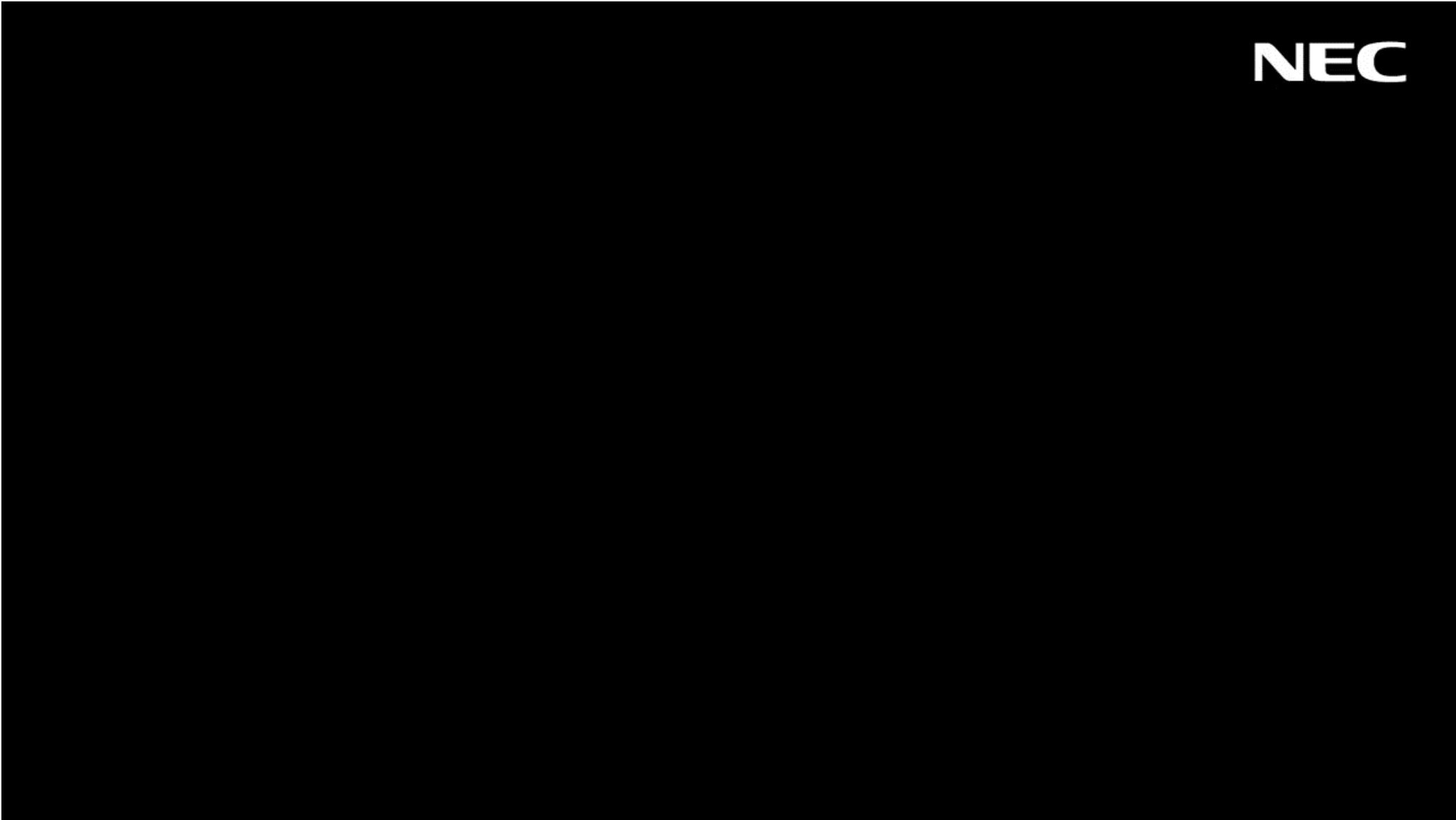
Submarine Cable Solutions

**World Longest** submarine cable system.

Spanning 15,000 km across pacific ocean linking Singapore to San Francisco, USA



# Seeing the Future Now – Vision 2030 <https://www.youtube.com/watch?v=uPzecX7Jz6Q>



**NEC**

Article • Sustainability

# Surge in XaaS adoption can help save the planet

By Marcus Law

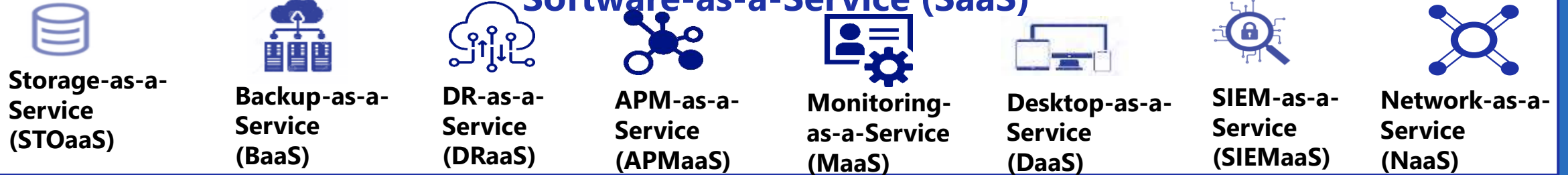
May 15, 2023 • 6 mins





# Everything-As-A-Service Platform Model

## Software-as-a-Service (SaaS)



## Platform-as-a-Service (PaaS)



## Infrastructure-as-a-Service (IaaS)



# How AI can enable a Sustainable Future

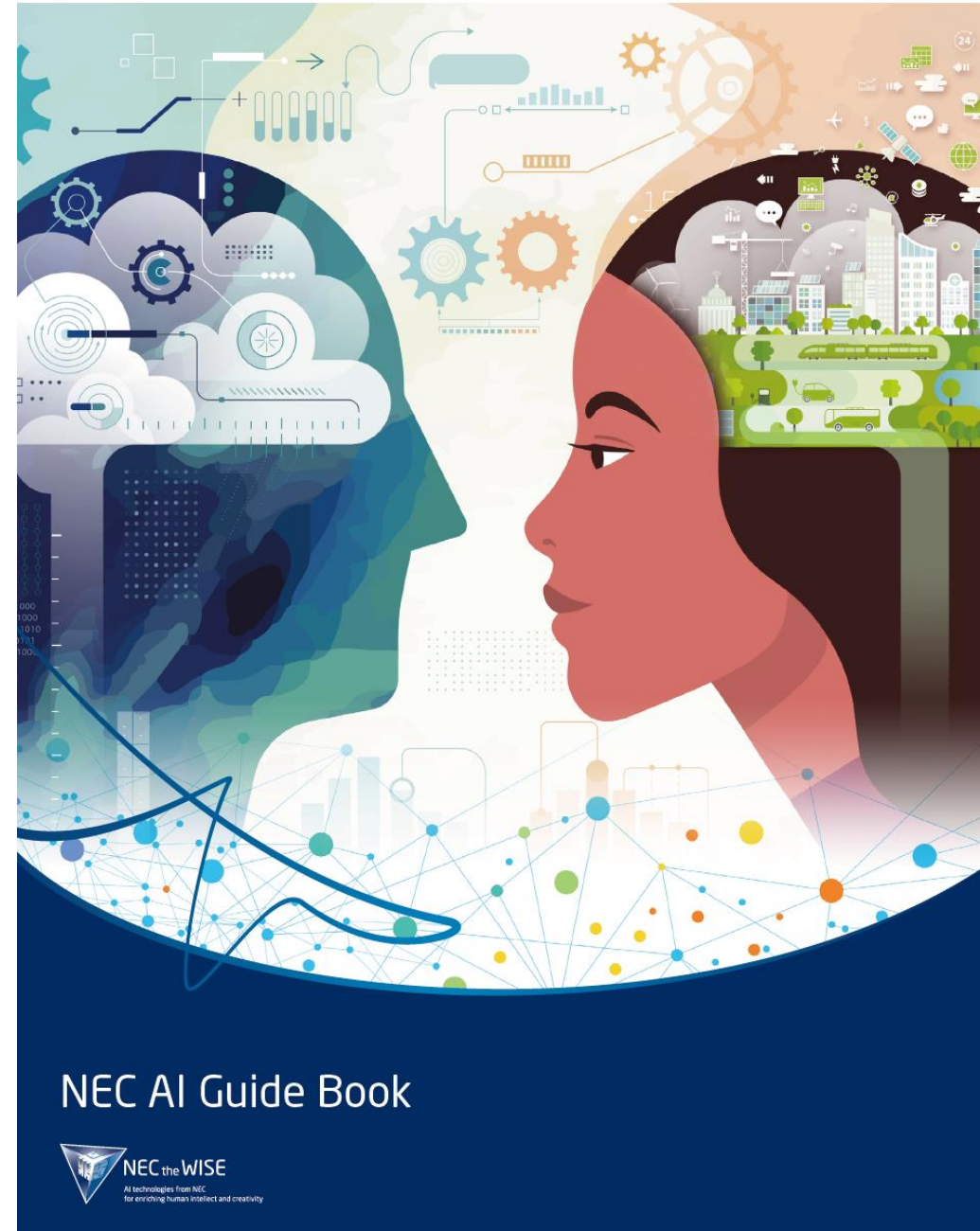


*“With the environmental applications for artificial intelligence broadening, how might AI influence economic growth and the global ambition to reduce emissions between now and 2030?”*

# Key Findings from report:

- ◆ Using AI for environmental applications has the potential to boost global GDP by 3.1 – 4.4% while also reducing global greenhouse gas emissions by around 1.5 – 4.0% by 2030 relative to Business as Usual (BAU).
- ◆ Economic benefits could be predominantly captured by Europe, East Asia and North America regions as they each achieve GDP gains in excess of US\$1 trillion
- ◆ AI applications in energy (up to -2.2%) and transport (up to -1.7%) have the largest impact on GreenHouse Gas Protocol (GHG) emissions reduction of sectors covered, but water and agriculture still have an important role to play for the environment

# NEC AI GUIDE BOOK



# NEC AI STRATEGIES

1

NEC, by combining AI technologies from among our rich lineup, can flexibly and speedily respond to diversified situations.

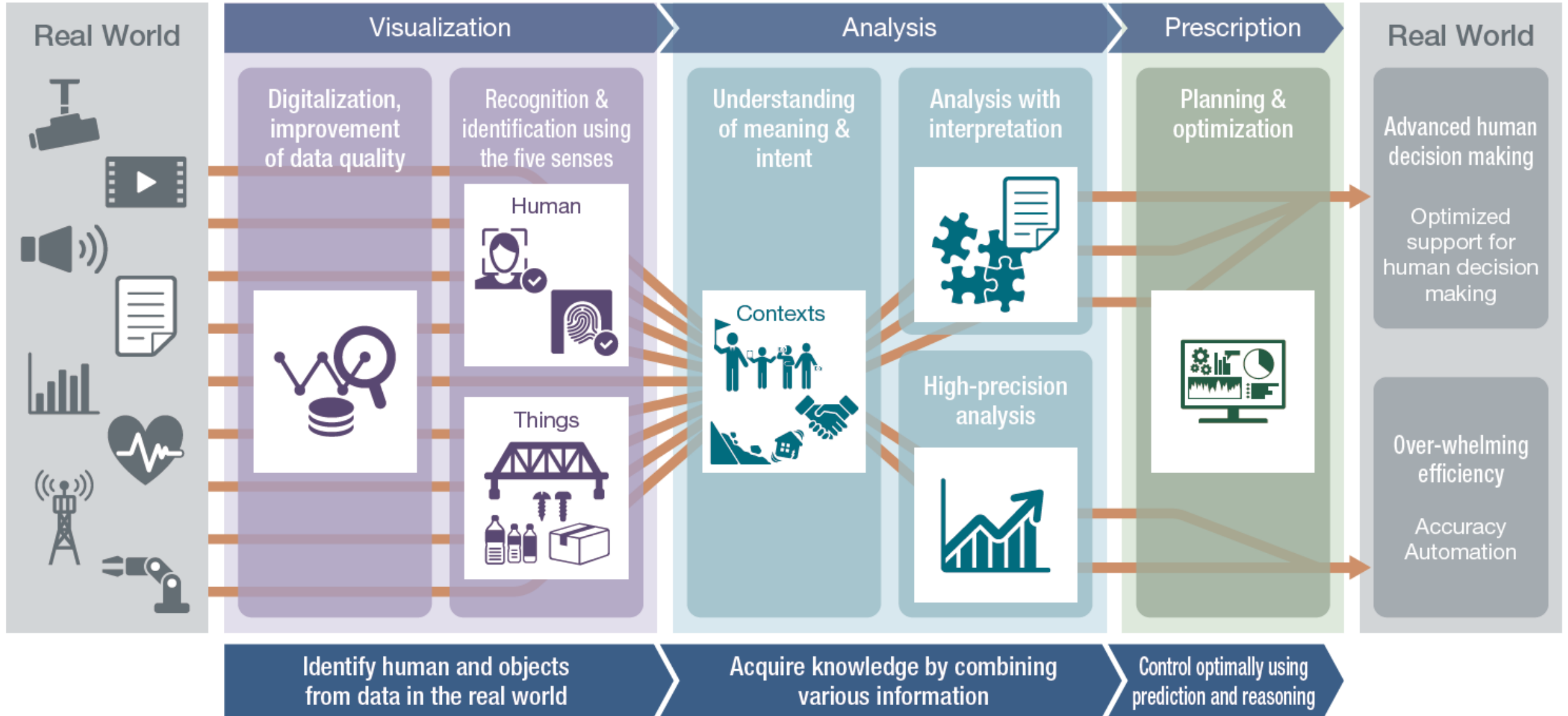
2

We work toward providing reliable AI (e.g., white-box AI, which makes reason for its prediction result explainable), for which we take account of operation and respect for human rights such as privacy. Our reliable AI supports customers who use responsible AI.

3

We provide a scheme for human resource training for AI in order to make it possible to leverage AI in all types of industries. We train people to become professionals specialized in AI by giving them opportunities for both learning and practically utilizing AI.

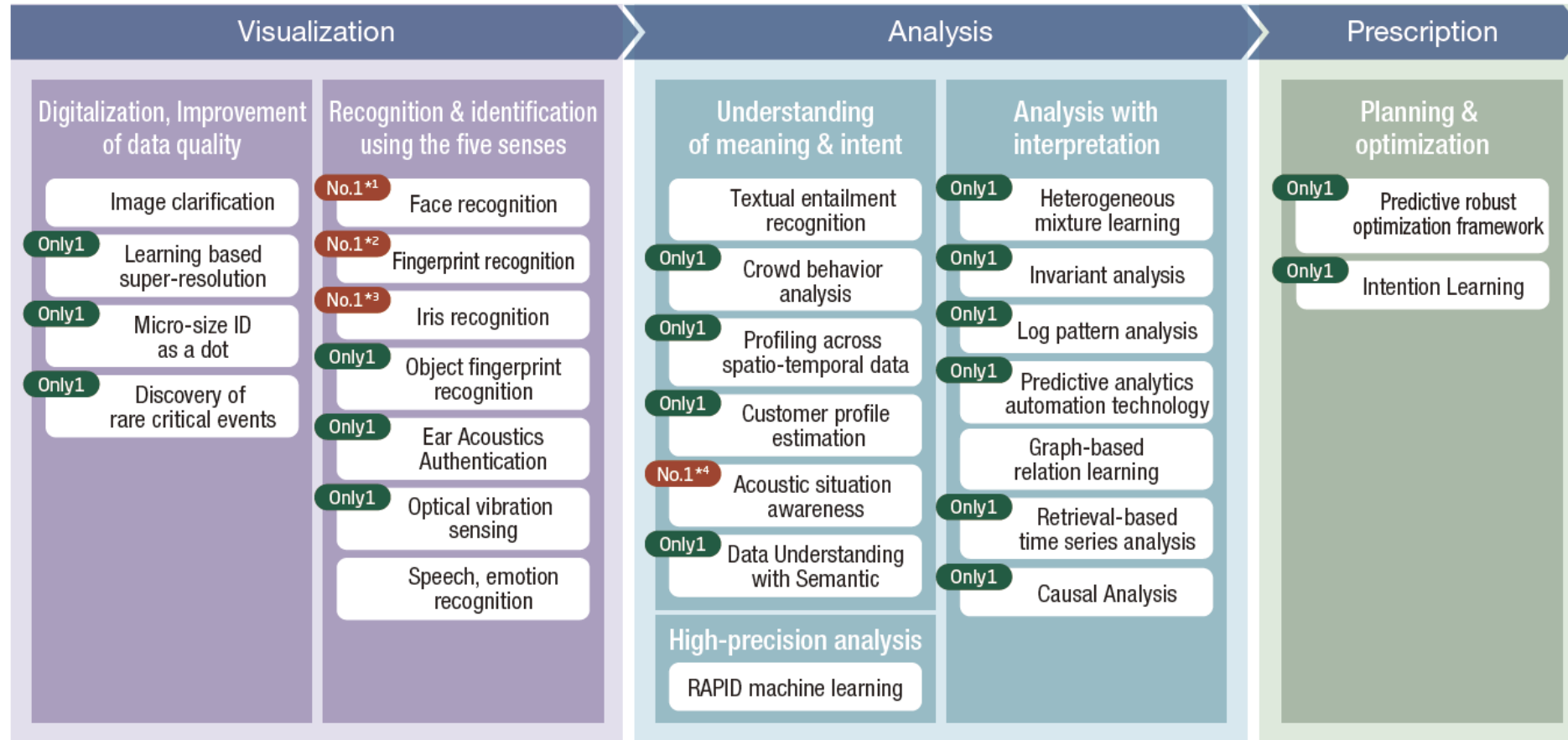
# AI – VISUALIZATION, ANALYSIS AND PRESCRIPTION





# NEC the WISE

AI technologies from NEC  
for enriching human intellect and creativity



\*1: Ranked 1st five times in task assessment sponsored by a US Government agency. \*2: Ranked 1st eight times in task assessment sponsored by a US Government agency.  
 \*3: Ranked 1st in task assessment sponsored by a US Government agency. (2018) \*4: Ranked 1st in task assessment sponsored by IEEE AASP Challenge DCASE2016.



# NEC's AI Drug Development Business

We are challenging various activities related to drug development, such as personalized cancer immunotherapy using broader IT technologies including AI.



# Using AI for Vaccine Discovery

- NEC collaboration with CEPI using AI for Vaccine Discovery.
- The Coalition for Epidemic Preparedness Innovations' (CEPI's) mission is to accelerate the development of vaccines and other biologic countermeasures against epidemic and pandemic threats so they can be accessible to all people in need.



### Solutions and Benefits



## Solution

Security

National Digital Identity

If you live in Singapore, you experience trusted solutions provided by NEC such as Identity Cards, Work-Permits, etc/



## Benefits

- Enhance national security
- Convenience to citizens and residents for critical services
- Trusted and Secure form of identification



National Library Board (NLB)

## Solution

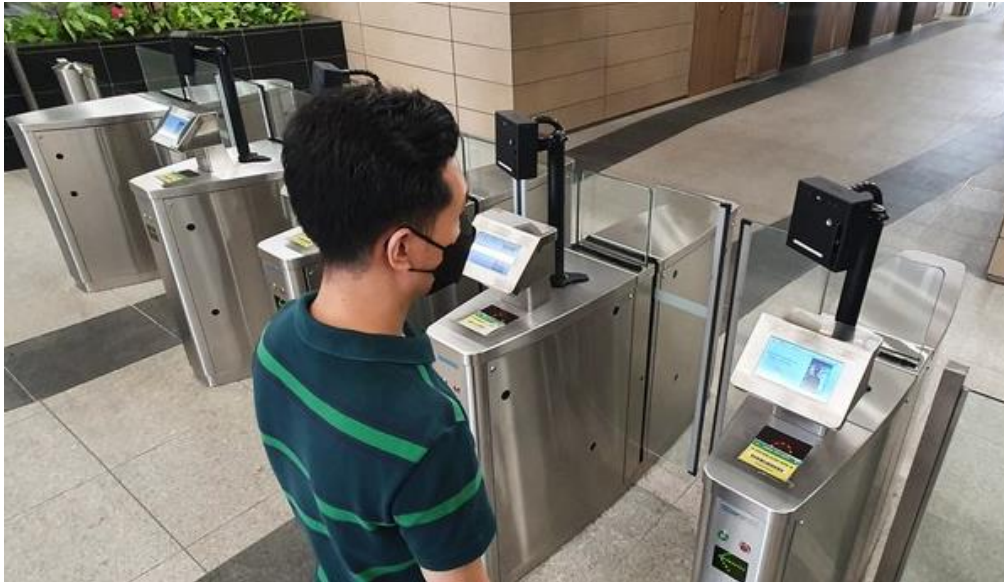
Process Automation

Self-service check-out kiosks, reservation lockers, automated book sorters, library materials control system for National Library Board (NLB)



## Benefits

- Highly efficient library management systems that significantly reduce manual work
- Fast, simple and reliable self-services for public to borrow / return books
- Improve customer experience with technologies



## **OCH Facial Recognition Automated Visitor Management System (FRAVMS) Case Study**

### Security

Outram Community Hospital (OCH) wanted to conduct a trial system that provides a seamless patient visitation experience at hospitals by **ELIMINATING** the

- Hassles of entering and exposing visitor's personal information at each visit
- Need to physically touch common surfaces where infectious germs may still be active
- Crowds from forming at registration lobbies and thereof cause human traffic congestion and inadvertently break safe distancing rules should a pandemic arise

The trial project was awarded to NECAP in April 2022 using NEC's Facial Recognition Software

# NEC SG SUCCESS STORY

Solutions and Benefits

Tourism & Hospitality



## Solution Hospitality

Unmanned Check-in System for JEN Tanglin and JEN Orchard gateway (both by Shangri-La)



## Benefits

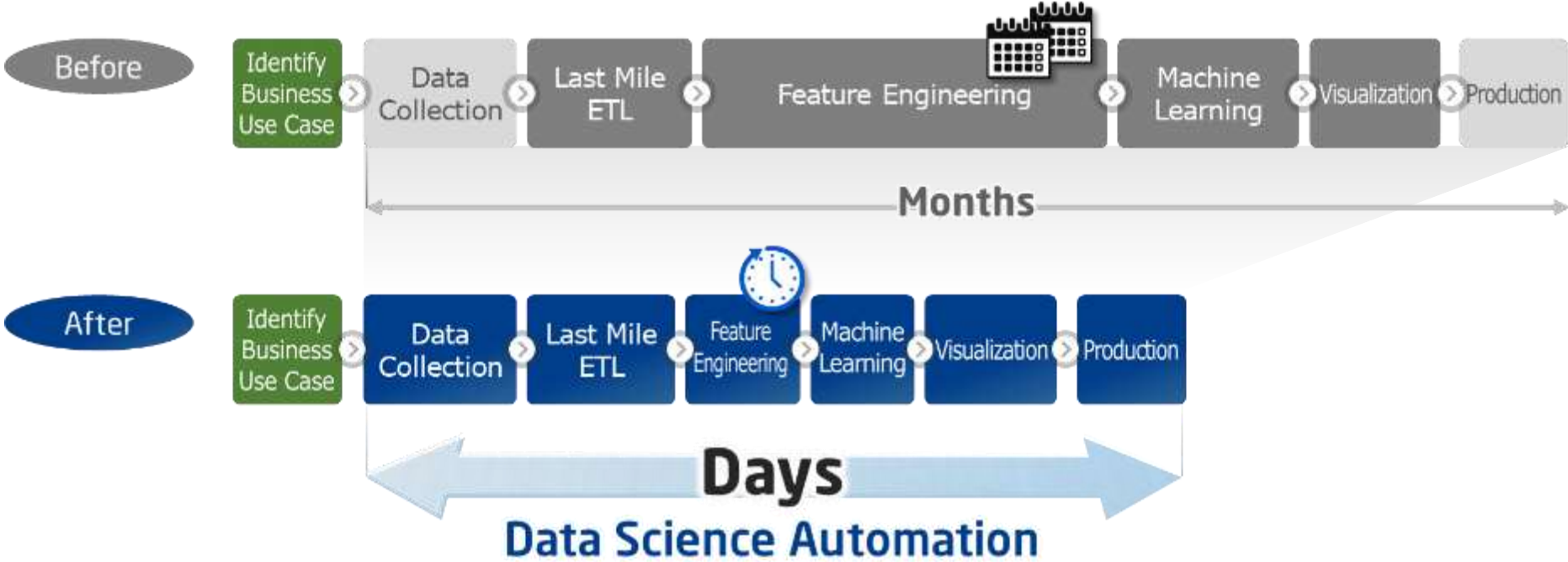
- Reduce risk of virus spreading by DIY smart check-in process
- Reduce operating costs and transform operations digitally and efficiently

Vathsala Subramaniam, General Manager, JEN Singapore Tanglin by Shangri-La, said, *"With a high-tech, high-touch service philosophy, JEN by Shangri-La are lifestyle-centric hotels that offer cutting-edge technology, so that guests can make the most out of their stay. The check-in process is a significant part of our guests' arrival experience. It presents the first impression and sets the tone of the rest of one's stay. Hence, we looked closely into this and sought intelligent hassle-free front desk solutions to enhance the check-in and check-out processes."*



# Accelerating AI solutions with dotData (a NEC spin-off)

dotData accelerates data science and creates new business value.



**1** Time

Move from raw data to business impact **in days, not months**

**2** Skill

**Enable everyone on the team** to effectively execute on projects

**3** Insight

**Automatically extract insight** from the past **as features** to predict the future

# Explainable A.I. empowered by dotData



## Data Science



Human resource

Asset management

Resource management



Risk management



# Our Facility

## Advanced Centre for Experimentation (ACE)

Other NEC Labs



Technologies

NEC Labs Singapore



Social Solutions & Platforms

Customers



Experimentation

### Technologies/ Solutions Showcase



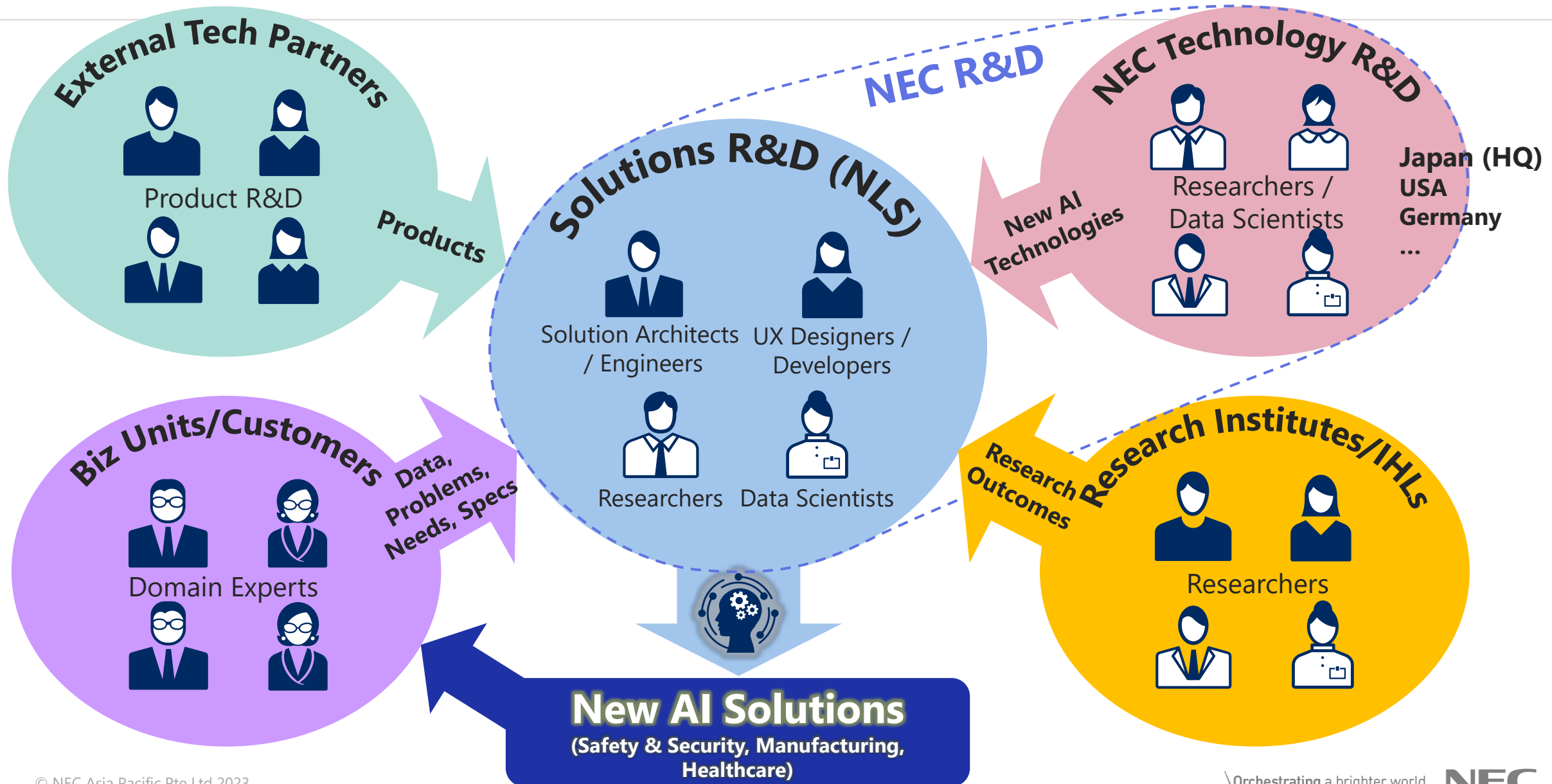
### Co-creation Workshops



### Testing of Technologies from NEC Labs Solutions Testing before deployment to PoC Sites



# Co-create New AI Solutions with Customers / Partners





# Certification in AI Ethics & Governance

(by SCS and NTU)

**CERTIFICATION IN AI ETHICS & GOVERNANCE**  
Transforming the AI Specialisation with Ethics

Know what it takes to embrace ethics and governance in AI systems, products and initiatives that will help build trust in the ecosystem.

Certification Body:  
**SCS**  
SINGAPORE  
COMPUTER SOCIETY

Examination Body:  
**NANYANG TECHNOLOGICAL UNIVERSITY**  
SINGAPORE

Supported By:  
**IM** INFOCOMM MEDIA DEVELOPMENT AUTHORITY

**>25% of NLS Staff are Certified or are attending the course now!**

**NEC has also pledged to support the AI E&G Body of Knowledge!**

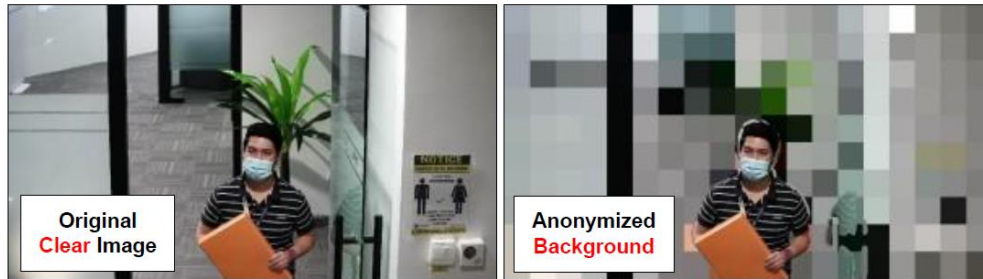
<https://www.scs.org.sg/list-of-supporting-organisations-for-ai-ethics-and-governance>

# Learning Journey of the SUSS Public Safety & Security Graduating Cohort

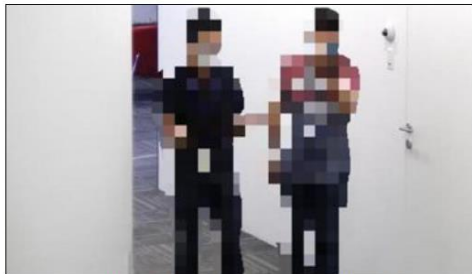


# NEC-N-CRiPT Research Collaboration on Privacy Preservation

Research collaboration to look into regulatory policies, techniques, processes and technologies that can be incorporated into Video-based solutions to address Privacy issues yet retaining the original intent of the solutions



Anonymized Non-Target + Reveal Background



Algorithm: **Pixelate** Strength: **0.90**



Algorithm: **Blur** Strength: **0.96**



Algorithm : **Solid Color** Strength: **0.50**

Whitepaper –  
Handling Privacy  
Regulations in Video  
Surveillance Systems



N-CRiPT is short for  
**NUS Centre for Research in Privacy Technologies**

# Centre for Healthcare Innovation (CHI) Co-Learning Network

- ◆ NLS is a member of this network to work with the consortium to jointly look at new innovations for the Healthcare sector



CHI Fellowship Industry (Virtual) Visit Sep 2021



# A\*STAR Industrial IoT Innovation (I<sup>3</sup>) Programme

- ◆ NLS is a member of this programme to work with the consortium to jointly provide solutions to the Industries in Singapore in the area of Sensing and Sense-making



Seeing the Future Now – The Future of Workplace (<https://www.youtube.com/watch?v=cK29P1NS3YY>)



\Orchestrating a brighter world

**NEC**