



## NEC Corporation

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# NEC Vision 2020

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For details, please refer to the following URL.

<https://www.nec.com/en/global/about/vision/notice.html>

### Other

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<https://www.nist.gov/>



# Bringing Amazing Ideas to Life

How can we change the future for the better?  
More freedom? More fascination?  
It's inspiring to dream up the endless possibilities,  
even more so when they actually come true.  
With optimal technologies and co-creations,  
NEC exists to realize these ideas,  
for our partners and for the world.

## CEO Message

At NEC, our mission is to create value for all members of society.  
We are looking ahead to a brighter future.  
We believe that, with invention and 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.



A stylized, handwritten signature in black ink, which appears to read 'T. Niino'.

Takashi Niino, President and CEO

# A Brighter Future for All of Society

Together let us discover new opportunities,  
connect with new partners and take on  
new challenges for a brighter future.



## Trust

### Safer and more convenient lives

For everyone to enjoy new and more convenient digital services, being able to place trust in how personal data is protected and secured by all parties involved is crucial. That is why NEC is committed to Privacy by Design and Security by Design. Technologies such as biometric authentication, blockchain and cybersecurity help ensure better data security and privacy, upon which trust is built.

## Awareness

### Discovering greater possibilities

Big data can be turned into valuable insights by using cutting-edge technologies such as AI. NEC's unique strength lies in being able to utilize explainable AI, whereby the logic behind the conclusion can be defined, so that the vast knowledge and experience of a wide range of industries can be utilized to discover unknown possibilities that can make the future brighter.

## Collaboration

### Real-time and borderless connectivity

Co-creation using 5G and AR/VR technologies can eliminate the hurdles posed by physical distance and enable people to interact more deeply in real-time and with more precision. People and even entire ecosystems can be connected digitally, yet feel as if they are meeting in person so that sharing of knowledge, expertise and passion can be done with great ease.

## Value Creation

### Exciting and novel experiences

Amazing ideas should always be designed around people. And any exciting and novel experiences should be carefully tailored to each individual. Transcending time and space, people will be able to take on new challenges more freely. NEC will create such amazing experiences and new value with our customers and partners for a brighter future where people can lead enriched lives.

# What Could the Future Bring?

What might the world be like in a future where amazing ideas have been brought to life? Let's take a look, through the eyes of the Smith family.



Meet the Smiths, a family of four made up of Dad, a doctor, Mom, a designer, and inquisitive twin girls who are in elementary school. They've decided to spend three months abroad, in search of new experiences. This is the start of their exciting new life.

1

What If Your Face Could Be Your Passport?

2

What If You Could Use Your Face as a Digital Key?

3

What If Admin Could Be Done with One Click?

4

Digital Infrastructure for New Experiences



# 1 What If Your Face Could Be Your Passport?

The family is at the airport, ready to start life in a new country.  
They get through check-in and immigration, just with their faces.

**Mom:** Immigration's so much easier now! Just walk through with the kids in tow.

**Dad:** No need to fumble for tickets either, so I never had to let go of the twins.

**Mom:** Our luggage's been automatically delivered to the house too. Nothing left to do but relax!



In the face of an ever-busier world from the increased movement of people and things, NEC is striving to offer a safer, more convenient and more enjoyable travel experience. NEC's smart biometrics, including face recognition, makes airport procedures, local transport, hotel check-in, sightseeing and shopping easy and seamless.

## Why NEC?

### No. 1

World's best video face recognition according to NIST\* testing

\*The U.S. National Institute of Standards and Technology

### 30

30 years of face-recognition-related research

### 230<sup>million</sup>

Able to distinguish 230 million people per second

## Case

## Delta Air Lines

### Supporting the first curb-to-gate biometric terminal in the U.S.

Delta Air Lines, in partnership with U.S. Customs and Border Protection, Transportation Security Administration and Hartsfield-Jackson Atlanta International Airport, has launched the first curb-to-gate biometric terminal in the U.S. at Atlanta's Terminal F. Travelers going direct to an international destination on Delta or its partner airlines can now choose to use face recognition technology to check in at the self-service kiosks, drop bags at the check-in counters, move through the TSA checkpoint and board a flight at any gate on Concourse F. This new option leverages NEC's NeoFace Express, which allows rapid identification and real-time screening of passengers, thus making travel through the airport easier.



# What If You Could Use Your Face as a Digital Key?

The family arrives at their new home. Biometric authentication makes life easy here, too.

**Daughter:** You unlocked the door with your face! Cool!

**Dad:** That's right! So we're never losing the keys again!

**Mom:** That's not all. I can pay with face recognition as well – and anywhere in the world, too.

**Dad:** No more loose change, credit cards or confusing foreign currencies.



**N**EC is realizing fast, simple and resilient personal authentication, at lower cost, to cope with the growing number of cross-sectoral and cross-border online services. Empowered by NEC's technologies, people are using their own biometric data to create trusted digital identities that serve as their personal keys for safely accessing digital services. These trusted digital identities also facilitate cross-industry data use and personalized services.

## Why NEC?

**No. 1**

World's best still image face recognition according to NIST testing

**6**

6 modes of authentication: face, iris, finger/palm print, finger vein, voice and ear acoustic

**1000+**

1000+ systems installed in 70+ countries and regions

## Digital KYC

### Redesigning trust in digital finance

To empower individuals with digital technology, it is critical that we redesign digital identity in a way that ensures fair and inclusive access to digital services for everyone.

To that end, NEC offers Digital KYC software in Japan. Embedded with the world's best face recognition technology, NEC's Digital KYC software enables individuals to identify themselves for access to digital services, such as banking and ride-sharing.

Daichi Iwata, who leads business development in digital finance at NEC, explains, "Digital KYC software is the first step to build a new trusted digital identity and digital finance ecosystem."



### What is the source of trust in the digital economy?

Fernando Luis Vázquez Cao, General Manager of Cybersecurity Office, SBI Holdings, and NEC's Daichi Iwata held a dialogue on the digitalization of finance and ensuring trust. Scan the QR code to read the full article.





# What If Admin Could Be Done with One Click?

The twins are getting ready for their new school. All the necessary procedures were completed easily online.

**Twins:** We can't wait!

**Mom:** Your new school has all your schooling data so you're going to fit right in!

**Dad:** I've had all my relevant data transferred to the government here, too, so my work admin was done in no time. And so the family begins their new life, supported by innovative digital technologies, every step of the way.



As urban populations grow worldwide, there is increasing demand for digitalized government services. However, installation costs can be high, and the excess of IT service options makes user environments highly unfriendly. NEC offers a centralized data platform that reduces costs, and enables the provision of various services in a more personalized and administrator-and-user-friendly way. NEC is thus helping to realize one-stop government services that can be done in one quick and easy step, anywhere, anytime.

## Why NEC?

40+

Experience in 40+ digital government-related fields

No. 1

The No. 1 IT company in Denmark, the world leader in digital government\*

\*According to the UN E-Government Survey 2018

95%

95% customer satisfaction with digital government software\*

\*Among KMD Nexus customers in 2015



*"It is important to establish coherence between our efforts and spend as little time as possible on documentation and as much time as possible with citizens"*

Judith Poulsen, Head of Healthcare & Rehabilitation in Nordfyn Municipality, Denmark

## Case

## Nordfyn Municipality

### Enhancing collaboration in health, care, social and children services

Nordfyn Municipality in Denmark and its partner institutions use KMD Nexus as a case management platform to improve collaboration and create more effective workflows across the areas of health, care, social and children. This enables direct exchange of benefits and action plans, prevents double entries and facilitates easier follow-ups on citizens' progress.

KMD Nexus is a market-leading healthcare software in Denmark. It is used by around 70,000 healthcare professionals across 60 of the country's 98 municipalities for administration and collaboration.



KMD, a subsidiary of NEC Corporation, is the largest Danish IT company. KMD develops and delivers software and service solutions for customers in local government, central government and the private sector. NEC and KMD are going to promote international digital government business.





# 4 Digital Infrastructure for New Experiences

**S**uch seamless and comfortable experiences are only possible with 5G networks, which have ultra-high speed, ultra-low latency and multiple simultaneous connections that can handle ever-increasing data traffic and diversifying vertical markets and service requirements. NEC is working with global partners to build ecosystems that include fully virtualized, end-to-end cloud native mobile networks, in support of the service providers implementing 5G initiatives. NEC will also work with customers to co-create new customer experiences and services over 5G networks, leveraging our IT and network expertise. Our goal is to change how people live, work and do business for the better.

## Case Rakuten Mobile

### Rakuten Mobile selects NEC and Netcracker to bring unique cloud-native mobile vision to life

Rakuten, a global internet services leader based in Japan, has announced plans that mark two major firsts for the global communications industry: the first non-telecom to build a facilities-based mobile network and the first cloud-native 5G-ready mobile network. NEC and Netcracker have been named publicly as strategic suppliers for this exciting and ground breaking initiative.

NEC is collaborating with Rakuten to deliver innovative vRAN technology that is key to Rakuten's goal of creating a fully cloud-native, virtualized, 5G-ready network that will operate at a substantially lower cost than traditional mobile networks.

Netcracker will play a critical customer-facing role, delivering next-gen customer and revenue management solutions that bring Rakuten's unique digital- and mobile-first vision for online and in-store customer experiences to life while integrating Rakuten Mobile services into Rakuten's expansive membership ecosystem, which rewards customers with redeemable points and membership status across more than 70 lifestyle services.



Example of a 5G base station affixed to a smart street lamp (for illustrative purposes only)



Tareq Amin, CTO, Rakuten Mobile, Inc.

Rakuten Mobile's visionary CTO Tareq Amin says, "Netcracker's digital BSS solution will give us the foundation we need for our mobile business to deliver the best customer experience across all channels," and "NEC's technology and expertise will allow us to not only cost-effectively create a highly secure, high-quality 5G network, but by designing and producing the antennas in the local market, we look forward to contributing to the acceleration of the Japanese telecommunications industry and economy."

Netcracker Technology, a wholly owned subsidiary of NEC Corporation, offers mission-critical digital transformation solutions to service providers around the globe.



### Why NEC?

**120**

Underpinning communications for 120 years

**100** million

Platform able to support the data flows of 100 million people

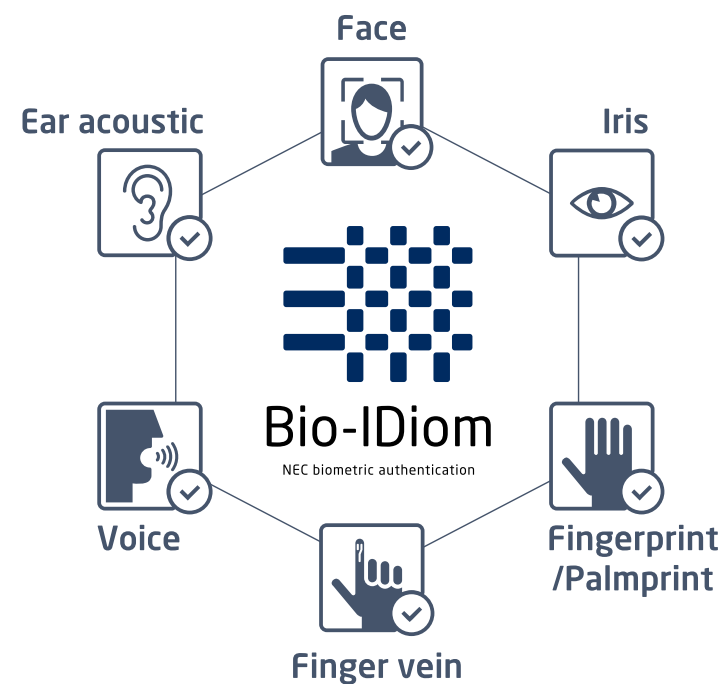
**177**

Network infrastructure provided to 177 countries



# NEC's Unique Technologies

This is an overview of NEC's unique technologies, as well as NEC's AI and Human Rights Principles. They are essential to our efforts to realize an amazing future.



50+

Biometric authentication based on 6 sources, backed by 50+ years of R&D

No. 1

World's best face recognition, iris recognition and fingerprint recognition technologies\*1

1000+

1000+ systems installed in 70+ countries and regions

\*1 According to tests performed by the U.S. National Institute of Standards and Technology

## Case National Soccer Hall of Fame

### Personalizing visitor experience at the National Soccer Hall of Fame

The National Soccer Hall of Fame is providing visitors with a unique and personalized experience, powered by NEC's face recognition technology NeoFace. Upon entering, consenting guests take a photo and share information such as their favorite soccer position or teams. Digital touch screens, virtual reality and gesture technology then recognize guests and customize their visit based on that information.

This initiative has transformed the traditional museum experience. It offers visitors an interactive and personalized environment, creating an immersive, custom-tailored tour unlike anything they have experienced in a sports and entertainment setting. As a result, each visitor can celebrate the rich history of American soccer in his or her own way.



## Case AI-Driven Drug Development

### Developing individualized immunotherapies as NEC's new endeavor

In 2019, NEC announced that it will expand the application of its cutting-edge AI technologies, "NEC the WISE," to advanced cancer immunotherapy, thereby enhancing its healthcare business. NEC initiated clinical trials for individualized neoantigen vaccines with French biotechnology company Transgene SA, to become the first Japanese company to start such trials. Central to this endeavor is NEC's neoantigen prediction system, which utilizes its proprietary AI such as graph-based relational learning.

Additionally, NEC acquired OncoImmunity AS, a Norway-based bioinformatics company, which further strengthened its ability to develop its own individualized immunotherapy pipelines.



NEC the WISE

AI technologies from NEC for enriching human intellect and creativity

No. 1

Largest share of the Japanese image recognition market\*2

500

500 AI researchers and 1400 data scientists

Top 5

Top 5 in the world for cumulative number of AI-related patent applications\*3

\*2 NEC (and its RAPID machine learning technology) ranked 1st by total revenue by vendor (FY2017), according to ITR Market View: AI Market 2018

\*3 WIPO/WIPO Technology Trends 2019 -Artificial Intelligence [https://www.wipo.int/edocs/pubdocs/en/wipo\\_pub\\_1055.pdf](https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1055.pdf)

## AI and Human Rights Principles

1	2	3	4	5	6	7
Fairness	Privacy	Transparency	Responsibility to Explain	Proper Utilization	AI and Talent Development	Dialogue with Multiple Stakeholders

NEC has announced the "NEC Group AI and Human Rights Principles" that will guide employees of the NEC Group to respect human rights as the highest priority in every stage of our business operations in relation to the social implementation of AI and utilization of biometrics and other data (hereinafter referred to as "AI utilization") and enable

them to take action accordingly.

The NEC Group will not ignore new social issues generated by future AI utilization, but rather face them head on by leveraging our technologies to realize advanced societies worldwide toward deepened mutual understanding and the fulfillment of human potential.

# Working Towards a Sustainable Future

NEC has devised the seven themes for social value creation for tackling global challenges. Based on these themes, NEC is further promoting business activities that address the roots of social issues. The themes are highly compatible with the Sustainable Development Goals (SDGs) and NEC is contributing to the achievement of all the SDGs.



## Case Forest Fire Monitoring and Management System

### Enhancing the monitoring and combating of forest fires

Indonesia experiences many forest fires and suffers major environmental, social and economic effects such as haze, which harms health and disrupts transport, and increased CO<sub>2</sub> emissions. To tackle this, NEC and Sumitomo Forestry Co., Ltd. assessed introducing an integrated forest fire monitoring and activity management system, aiming for full introduction and expansion in FY2020, under a Japan International Cooperation Agency program.

The system continuously monitors a wide area, rapidly detects fires even amid smoke via infrared cameras, and sends dispatch orders with a map to firefighting teams via tablets so they can reduce potential damage early. The system also shares other useful information to further aid effective firefighting, such as firefighting status.



## Case Gavi & Simprints



### Boosting immunization with scalable child fingerprint identification

Despite enormous progress in the past two decades, approximately 20 million children still do not receive a basic course of vaccines, leaving them exposed to deadly diseases. Gavi, NEC, and Simprints will deploy the world's first scalable fingerprint identification solution to give children aged 1-5 a digital ID linked to an accurate, complete medical record and boost immunization coverage.

The softness of young children's fingers often leads to blurred prints. This challenge was overcome by optimizing NEC's fingerprint authentication engine for infant fingerprints and using images taken with Simprints scanners, resulting in highly accurate authentication with a 99% certification rate.

This initiative contributes to Gavi's mission of promoting immunization, saving lives and protecting children's health. It also promotes the United Nations Sustainable Development Goals, particularly Goal 3 of ensuring healthy lives for all people of all ages and promoting welfare, including achieving universal health coverage.



*"This partnership is so exciting, bringing together cutting edge technology and Gavi's know-how [in vaccine immunization] to help protect children in developing countries from some of the world's deadliest diseases."\**

Ngozi Okonjo-Iweala, Board Chair, Gavi

\*Quoted from: <https://www.gavi.org/library/news/press-releases/2019/gavi-nec-and-simprints-to-deploy-world-s-first-scalable-child-fingerprint-identification-solution-to-boost-immunisation-in-developing-countries/>



# Where Ideas for the Future Are Born

NEC is working with customers and external partners worldwide to co-create a brighter future. These are some of our research laboratories and facilities for experiencing cutting-edge technologies and designing the future.

## NEC Laboratories America

Development of cutting-edge core technologies

## NEC Laboratories Europe

R&D through EU projects and standardization activities

## Israel Research Center

Promote marketing-type research

## NEC Laboratories India

Create core technologies to address the challenges of emerging countries

## NEC / Netcracker Innovation Center

The Innovation Center is a fully immersive, specially designed facility to help us foster personalized interactions with customers and partners, and promote co-creation. Here, partners and customers can experience in-depth demonstrations of our cutting-edge innovations in virtualization technologies, next-generation B/OSS and DX enablement capabilities, and together we can collaborate to develop customized solutions that meet their respective needs.



## NEC Future Creation Hub

NEC Future Creation Hub is where technology and business come together through interactive dialogue and directly experiencing cutting-edge technologies so as to co-create the future. Our experts work with global clients to tackle challenges head-on. Together, we develop initiatives that generate social value for the current and future generations.



German Chancellor Angela Merkel making a visit in February 2019

## NEC Laboratories Japan

Takes the central role in NEC R&D, focusing on AI (recognition, analysis), security, ICT platform, quantum computing

## NEC Laboratories China

Development of core technologies in AI and network

## NEC Laboratories Singapore

Co-creation of innovative solutions with customers and partners, mainly for developed countries

## NEC Open Innovation Centre

NEC Open Innovation Centre is a business-driven showcase where visitors can experience NEC's trusted Digital ID to access government and commercial services. The Centre offers public safety solutions based on biometrics and artificial intelligence, providing unparalleled safety, security and seamlessness within the context of daily life. We are ready to conduct proof of concept demonstrations of these solutions with our partners and customers.





# NEC at a Glance

## Establishment

Established

1899

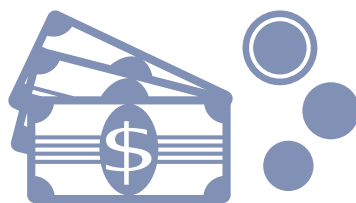


## Sales

Over

US\$26B

in annual revenue (FY2018)<sup>\*1</sup>



## Tech Leadership

World

No.

1

Face  
Recognition



Iris  
Recognition



Fingerprint  
Recognition



<sup>\*2</sup>

## Global Networks

327

group companies,

169

countries & regions

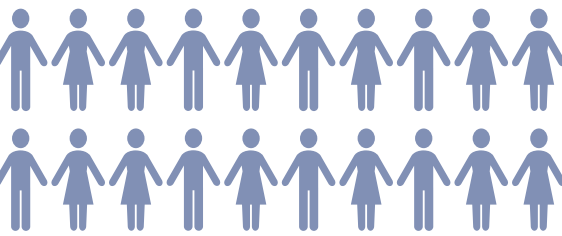


## Employees

Over

110,000

employees



## Patents

Approximately

49,000<sup>\*3</sup>



## AI Researchers

500

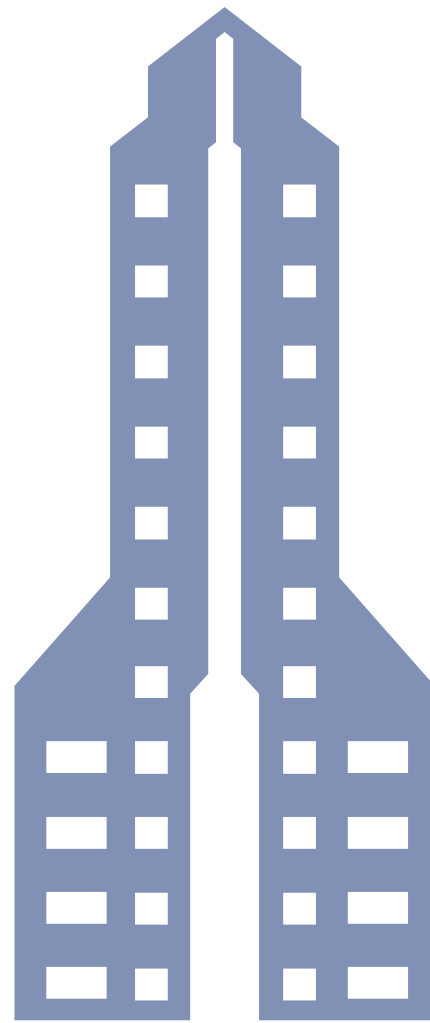


## Anniversary

120

years

Thank you for all your support.  
NEC is committed to being  
a great partner and corporate citizen  
for another 120 years to come.



<sup>\*1</sup> USD yen equivalent calculated at USD1=110.99 yen    <sup>\*2</sup> According to tests performed by the U.S. National Institute of Standards and Technology

<sup>\*3</sup> Cumulative total, as of March 31, 2019