

Orchestrating a Brighter World

- Creating Safer and Smarter Cities
by leveraging the power of ICT -

February 12, 2019

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NEC Corporation

Agenda

1. Global Mega Trend and DX

2. Our Focus

3. Case Study

- Law Enforcement ID, Citizen ID, OneID for Aviation & Immigration Control
- City Surveillance, Submarine Cables & Critical Infrastructure Management
- Co-Creation with UN & International Organizations
- Smart Transportation – Bus Rapid Transit

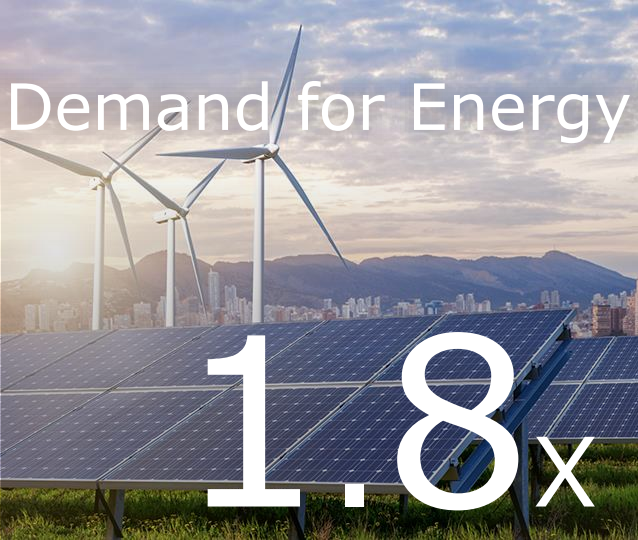
4. Proposal

The Earth in 2050



Increase in urban population

3.5 Bil → 6.3 Bil **1.8x**



Demand for Energy

1.8x



Demand for Water

1.6x



Demand for Food

1.7x

Japan in 2050

Decrease in population

127_{Mil} → 98_{Mil} 0.8_x



Decrease in
labor force



Sustain the social
infrastructure



Safety of citizens

3 attributes of ICT underpinning its value creation

Computing Power	Networks	Software and Digital Data
Real time	Promptness	to create values
Dynamic	Power to respond	to changes
Remote	Power to go beyond the limits of	space



Computing Power

Computing power of supercomputers

(1993 to 2018)

2,050,0000
-fold increase



Networks

Transmission rates of mobile networks

(2000 to 2020)

1,000,000-
fold increase

3 Core Assets of ICT



IoT

Amount of digital data that exists in the world

(2000 to 2025)

26,000-fold
increase

Orchestrating a brighter world

Sustainable Earth

地球上の共生



Safer Cities & Public Services

安全・安心な都市・行政基盤



Infrastructure

なライフライン



Information

情報通信

Industry Eco-System

産業とICTの新結合

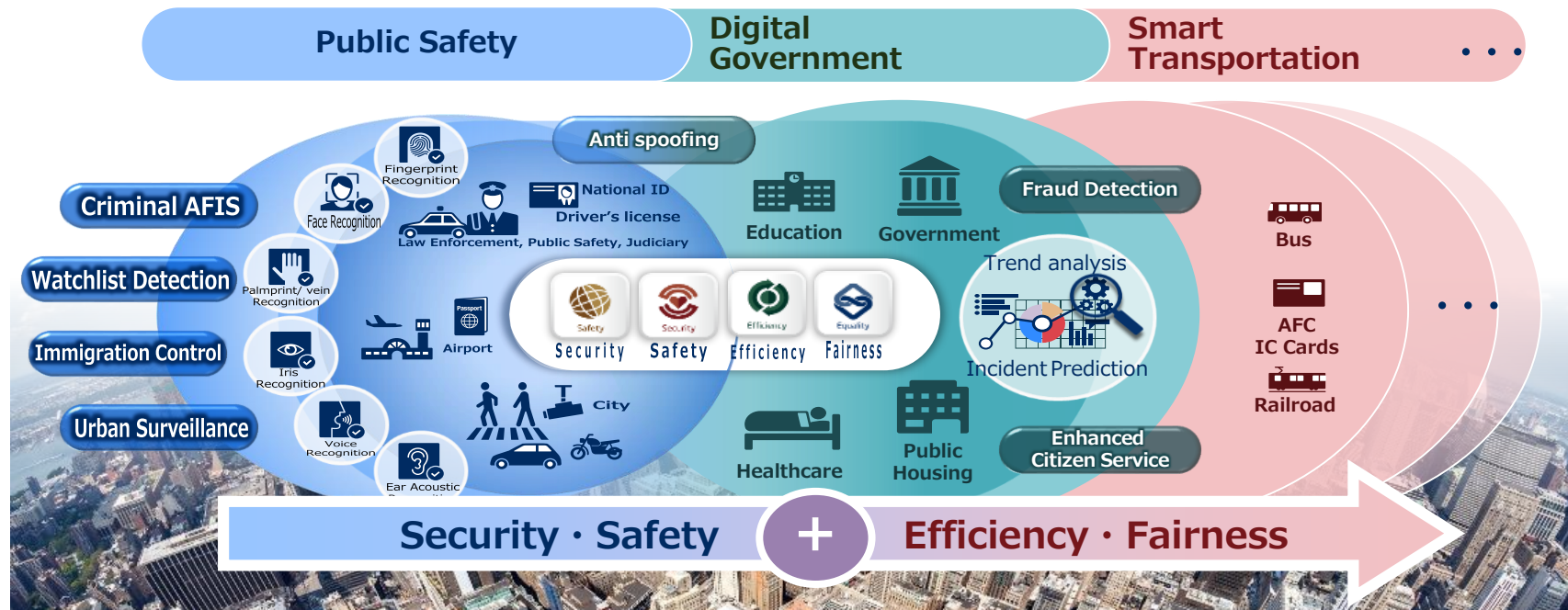
Quality
個々人が躍動する豊か

枠を

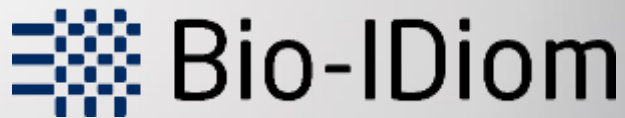
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Goal of Global Safety Business

Aim to realize **NEC Safer Cities:**
leveraging biometrics and AI technologies



NEC Biometric Authentication



Fingerprint Recognition

8 Consecutive wins
in NIST*1 Evaluation
(2003,2004,2007,2009,2012,2013,2016,2016)



Fingerprint
Palmprint



Finger vein

Face Recognition [images / videos]

4 Consecutive wins
in NIST*1 Evaluation
(2009,2010,2013,2017)



Face



Iris Recognition
Rank No.1 in
NIST*1 Evaluation
(2018)



Iris



Ear acoustics

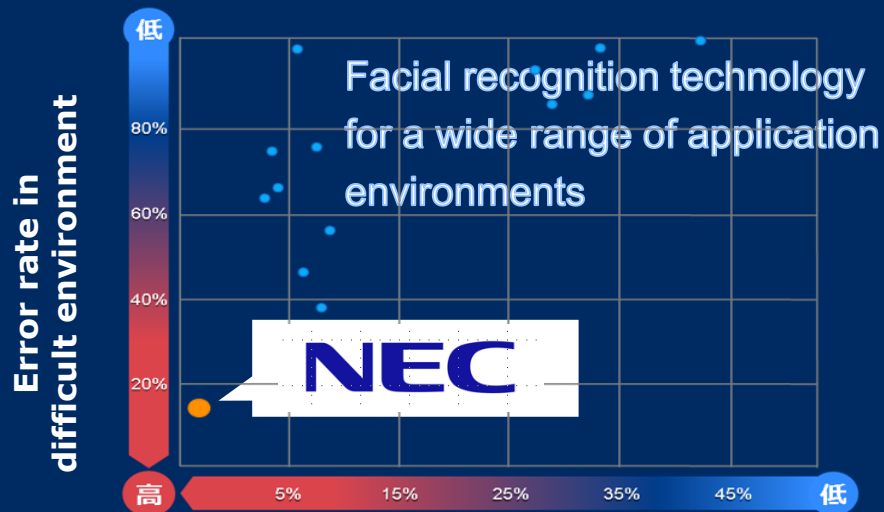
Voice



*1 US Institute of Standards and Technology

Face in Video Evaluation

- No. 1 in video benchmark test conducted by NIST in US



Matching
Accuracy

Error rate in
ideal environment

Only vendor delivering both high accuracy and speed.
99.2% matching accuracy

Results shown from the Face In Video Evaluation (FIVE) do not constitute endorsement of any particular product by the U.S. Government.
<https://www.nist.gov/programs-projects/face-video-evaluation-five>

NEC's Worldwide Supply Record of Biometrics Solutions

Supplied more than 700 systems to over 70 countries around the world



Social Value Creation

Law Enforcement ID, Citizen ID,
OneID for Aviation & Immigration Control



NEC Biometrics Identification System in over 1/3 of US State Polices and Law Enforcement Agencies





Los Angeles Sheriff's Department

- Fully operation since January 7, 2018
- Fingerprint, palm print, face and iris
- One of the largest criminal biometrics-based identification in the world

Uncovered 107 hits including two cold cases homicides in the first seven days of operation



News

Release

Press Release – Final

Orchestrating a brighter world **NEC**

Los Angeles County Sheriff's Department's New Multimodal Identification Biometric Solution Goes Live

Nation's Largest Sheriff's Department Discovers 107 Crime Leads in the First Week

Irving, Texas - March 15, 2018 - NEC Corporation of America (NEC) today announced that the Los Angeles County Sheriff's Department (LASD) has, as of January 7, 2018, completely switched over and is fully utilizing NEC's Integra-ID 5[®] Multimodal Identification Biometric Solution (MBIS).

Managed by the Los Angeles County Regional Identification System (LACRIS) Unit, the new NEC MBIS serves criminal identification needs for the largest Sheriff's Department in the world, the County of Los Angeles, the third-largest police agency in the United States, the Los Angeles Police Department, and 45 additional police departments in the County of Los Angeles. LACRIS integrates 164 remote LiveScan systems and 78 digital latent workstations into MBIS. LACRIS' use of NEC's Integra ID 5[®] MBIS is one of the largest criminal biometric identification implementations in the world, interfacing to numerous state and federal databases, including California Department of Justice and the FBI's Next Generation Identification system.

NEC Integra ID 5 supports fingerprint, palm print, face and iris biometrics modalities while its Services Oriented Architecture (SOA) is capable of modalities including voice, though not all capabilities are currently used by LACRIS. The digital latent workstations allow unique workflows for multiple agencies and maintains agency accreditation.

Since the switchover to the NEC Integra ID 5[®] MBIS, the Los Angeles County Sheriff's and participating law enforcement staff have successfully processed thousands of transactions, including searches of previously unsolved latent fingerprints (those left at the scene of the crime) against the newly migrated database. In the first seven days of operation, the new NEC MBIS has processed over 100,000 transactions, including 107 hits of open cases with known offenders), including two cold case homicides, all of which have the potential to lead to suspect arrests and case closure.

Orchestrating a brighter world **NEC**



Deployment of **NEC's Facial Recognition Solution** for **Immigration Clearance at John F. Kennedy** International Airport in New York, USA

High accuracy matching of facial data scanned from e-Passports against **live capture images** at the automated immigration clearance gate to confirm this is the same person

Deployed through Unisys, **live since January 2016** **Faster and Securer Immigration Control with Facial Recognition**





■ NEC tests facial recognition with U.S. Customs and Border Protection (CBP)

- **A fast-photo match at the gate** will help **expedite boarding experience** while providing biometrics-based exit verification.
- Contributes to secure and **efficient border management**



Deployed at 17 U.S. Airports

- Washington Dulles, Virginia
- Houston, George Bush (UA to NRT)
- Chicago, O'hare (AA to LHR)
- Las Vegas (to Guadalajara, Mexico)
- Houston, William P. Hobby (Southwest) and 12 other U.S. Airports...

Washington-Dulles Airport

(Identification of passengers as they board the plane)

Exit Control Terminal

(NeoFace Express)

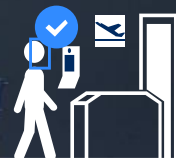
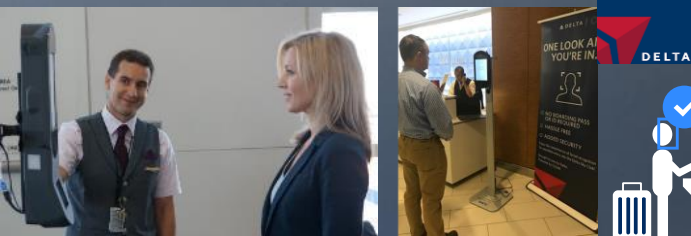


Frictionless exit control system using face recognition

<https://www.cbp.gov/travel/biometrics>

<https://www.nbcnews.com/widget/video-embed/996414019997>

SKY CLUB ACCESS



Check-in Kiosks

Check-in Counters

Security Checkpoints

Boarding Gates

One ID



LOUNGE



Delta Air Lines has launched a US first seamless travel experience throughout the airport using NEC facial recognition. Delta considers this a “game changer” for the airline industry.

Enhanced Immigration Automated Clearance System (E-IACS)

- An extension of IACS, enhanced IACS allows Singaporean to use their biometric or machine readable passport to clear immigration.



1. The first IACS project was awarded in 1996.
2. Total no. of lanes to-date is 140+
3. Daily transaction volume is in excess of 70,000.
4. Clearance time is averaged 8 seconds.





Enhance Airport Experience and Security thorough Biometrics

Customer: **Hong Kong International Airport (HKIA)**



Project Overview:

- Using biometrics technology to reduce queuing time
- Speed up and enhance the accuracy of the document checking process
- 44 e-Security Gates will be installed by the first quarter of 2019





■ NEC to provide facial recognition systems for 14 international airports in Brazil

- **Customer:** Ministério da Fazenda - Receita Federal do Brasil (Brazilian National Tax Collection Agency)
- **Project Overview:**
 1. **Enhance efficiency** and effectiveness of customs operations in 14 international airports in Brazil.
 2. Facilitate the identification of passengers who have been registered for suspect activity by the agency, contributing to the **improvement of the country's border controls**.
 3. Contributing to **prevent traffic and smuggling activities**.



Cameras connected to a computer

India: Aadhaar (Unique Identification Numbers) Program



ID theft prevention Enhanced Citizen Services

Challenges

Equal services for its 1.3 billion citizens.

Solution

Multi-modal biometric authentication system.

Results

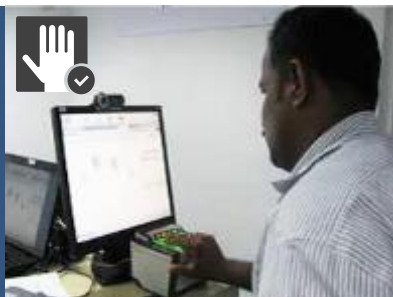
Accurate citizen data registered with the government.
Equal and efficient social services for citizens.



Unique Identification Authority of India
Planning Commission, Government of India



- Multi-modal system combining face, fingerprint and iris recognition to identify individuals.
- Prevent duplicate registrations and ensure all citizens have equal access to services such as food supply, employment and tax payment.



Fingerprints capture (Right Hand)



Capture of face photograph



Iris capture

Social services for 1.3 billion with multi-modal biometrics



Fingerprint
Recognition



Face
Recognition



Iris
Recognition



1
NO
POVERTY



5
GENDER
EQUALITY



9
INDUSTRY, INNOVATION
AND INFRASTRUCTURE



10
REDUCED
INEQUALITIES



11
SUSTAINABLE CITIES
AND COMMUNITIES

Home Affairs National ID System (HANIS)

- Fingerprint based National ID system to identify South African nationals for the below purposes
 - 1) Immigration Control
 - 2) Positive Identification
 - 3) Passport Service
 - 4) Registration for Election
 - 5) Pension Payment Service
- Management of a large scale database of over 50 Million fingerprint data



Fingerprint
Recognition

Considering students' privacy protection is critically important.

Nation-wide Meal Delivery Project, Chile - AFIS

- JUNAEB (Junta Nacional de Auxillio Escolar y Becas) delivers proper meals to improve student's health status for all Chile's 8,000 public schools with 160 million students.
- NEC Chile provides solution with AFIS which issues voucher to exchange with proper amount meals.
- The devices are locally developed by NEC Chile considering the voices from the meal deliverers.



Social Value Creation

City Surveillance, Submarine Cables & Critical
Infrastructure Management





Cities

Argentina Tigre

Tigre Operations Center
(COT)



Vehicle thefts decreased by

80% ↓



Increase in tourist income

300% ↑

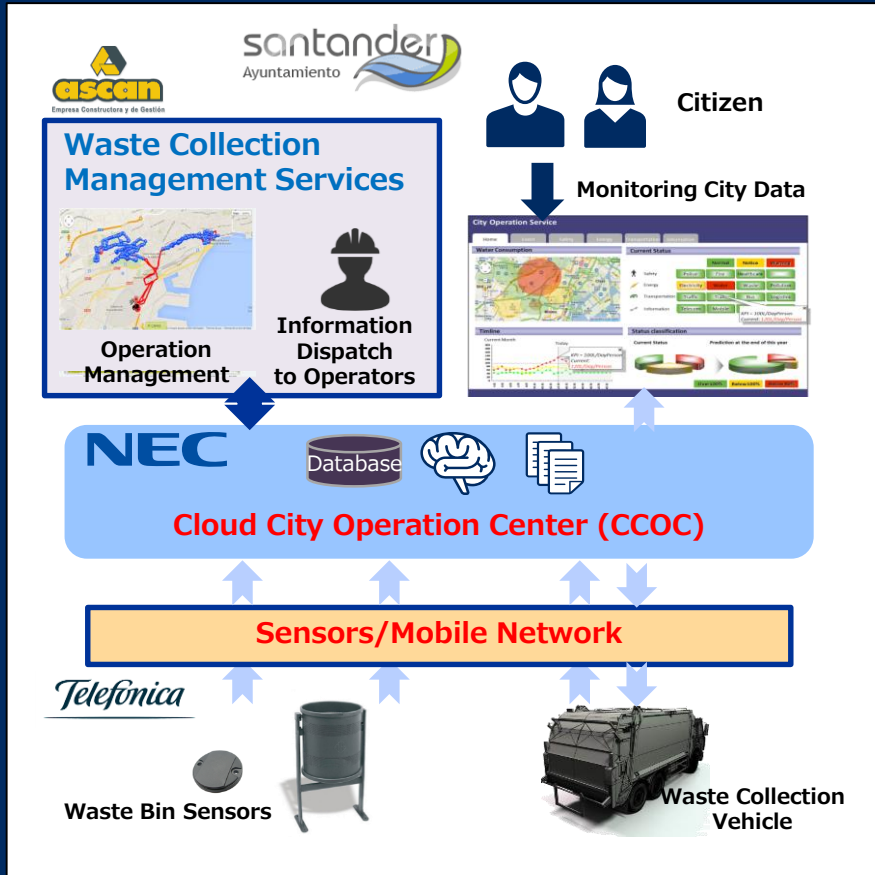
Economic Value

Spain: Digital Government in Santander ~ Advanced City w/IoT



■ NEC's CCOC (Cloud City Operation Centre)

- NEC built IoT Platform to Integrate Data from 12,000 Sensors
 - **City Management Visualization with IoT Technology**
- ## ■ Smart Waste Bin
- Real-time Info Collection such as Waste Volume inside Bin Detected by Sensors as well as Location
 - Most Suitable Collection Route/Timing Information on the Mounted Display Analyzed by City Management Center → **Optimization of Waste Collection**





<Indonesia> Asian Game Main Stadium



Indonesia stadium: 18th Asian Games 2018

NEC provide Safety and Security
for huge Stadium

Integrated Monitoring and
Control

1. Face Recognition

- Real-time search and Posterior search around the Gate
- 55 Cameras

2. Behavior Detection

- Detection Left object and Detection Loitering around the VIP Lounge
- 5 Cameras

3. Live Image Monitoring

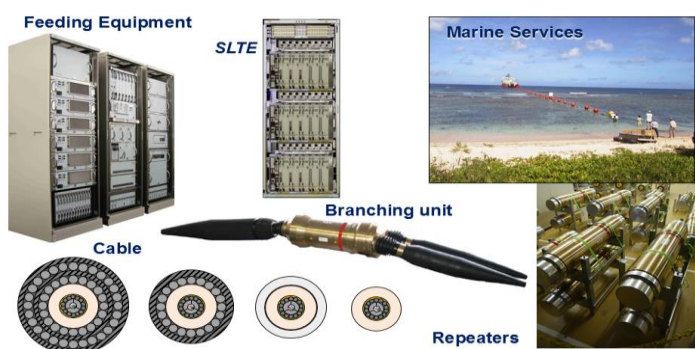
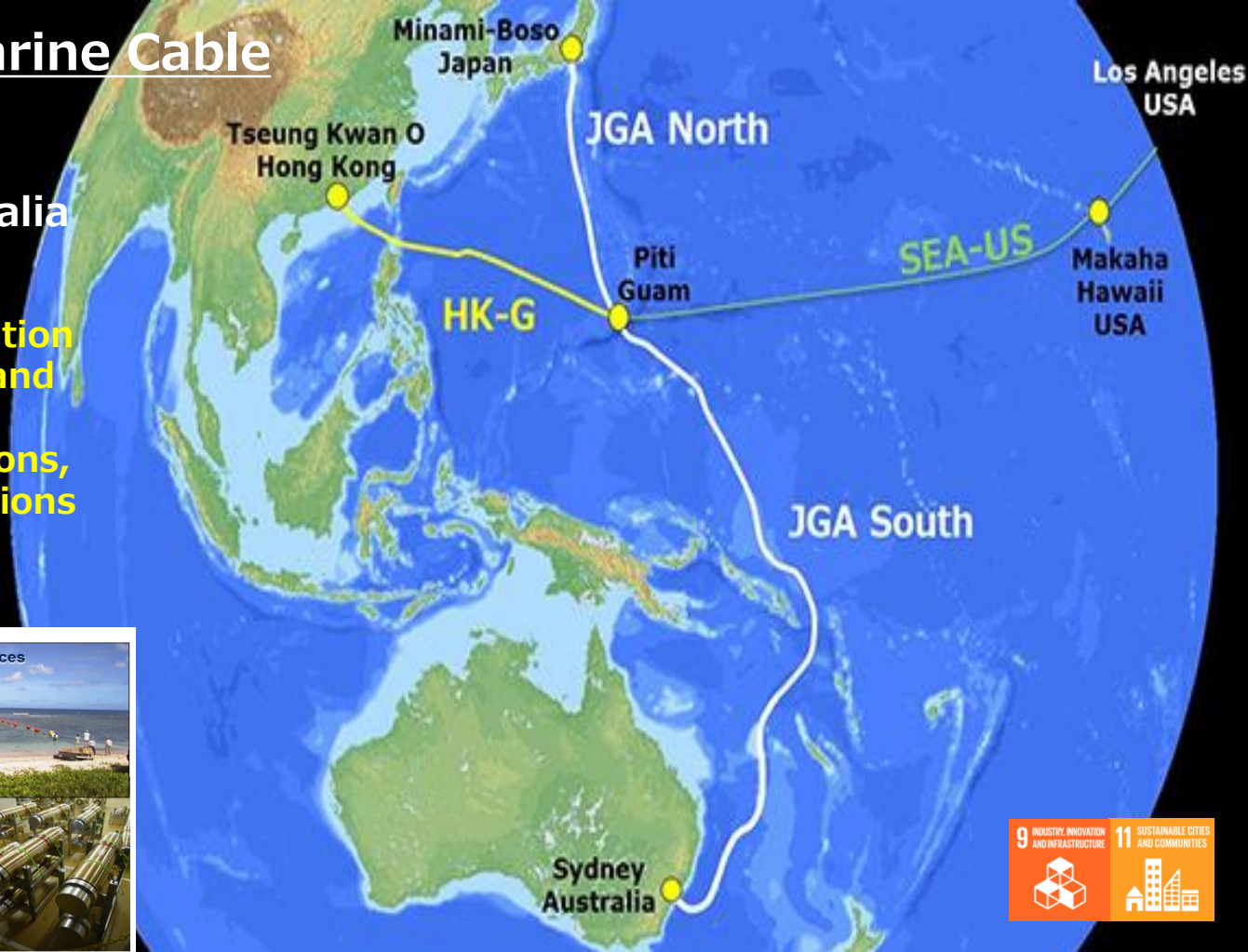
- 12 Cameras



HK-G, JGA Submarine Cable

- Hong Kong - Guam Submarine Cable
- Japan - Guam - Australia Submarine Cable

Facilitated Capital participation of JICT (Japan ICT Fund), and syndicated loans from Japanese financial institutions, including NEC Capital Solutions Limited



The South Atlantic Cable System (SACS) ready for service



Fortaleza, Brasil



Sangano, Angola

- In January 2016, an export credit line agreement between JBIC/SMBC and Banco de Desenvolvimento de Angola (BDA), a state-owned bank in Angola was signed.

- This loan provides funds through BDA for Angola Cables in order to construct a complete optical submarine cable system, which will connect Luanda, Angola and Fortaleza, Brazil, directly linking the African continent to Latin America for the first time.



Buyer: Angola Cables, SA

Exporter: NEC (Japan)

Products: Submarine Cable System

Finance : JBIC/NEXI Buyer's Credit (2step-loan)

Loan amount: US\$ 109.7M

Borrower: Banco de Desenvolvimento de Angola (BDA)

**Sep.,2018: Go-live
(in commercial service)**



DMICDC Logistic
Data Services Ltd



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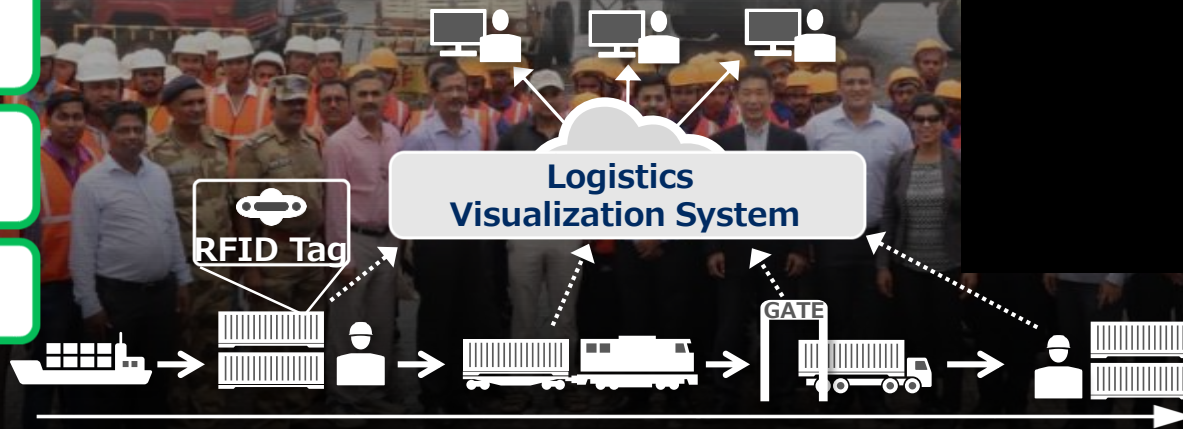
Logistics Visualization System

Sharing the tracking information

Upgrading
the Precise
Production

Reduction of
Lead Time

Inventory
Reduction



Real Time Tracking





Project:

The Project for Improvement of Equipment for Disaster Risk Management

Customer:

BMKG (Indonesian Agency for Meteorological, Climatological and Geophysics)

Signed & Schedule:

March 30, 2017 / March 2018 Completion

Contractual Amount:

Approx. US\$10M under Japanese MoFA ODA

Project Overview:

Supply and Set up Sismograph (Earthquake Recorder) at 93 Locations in Indonesia to Strengthen earthquake prediction and preparedness

Background:

Improvement of Disaster Prevention against Earthquake through Information Collection and Observation to Ensure Sharing Information Quickly with Public → Japan will also get benefit

Future:

Migration to Upper Stream Simulation System for Emergency Earthquake Alert and Tsunami Impact



Social Value Creation

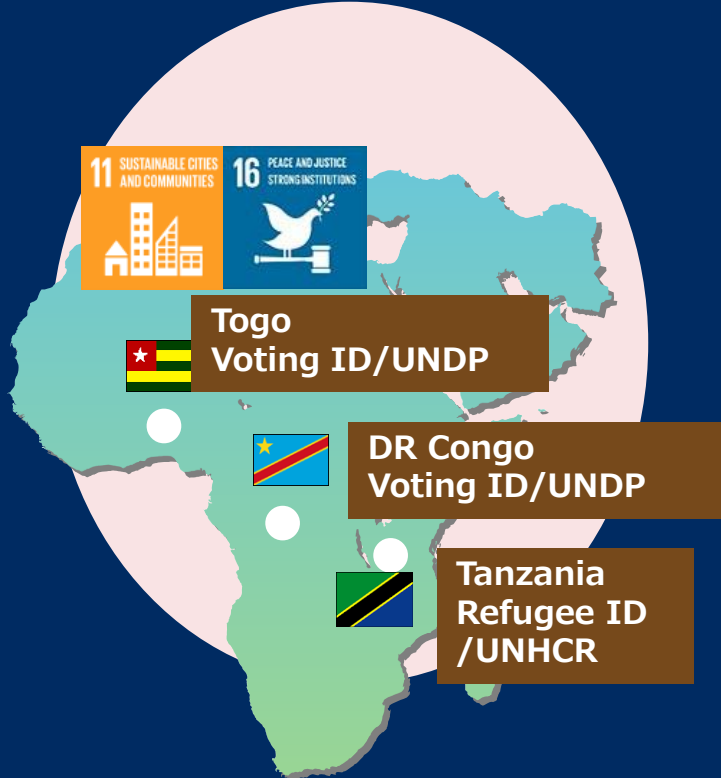
Co-Creation with UN & International
Organizations



ICT Solutions for the UN Organizations



➤ Voting ID (Biometrics)/ UNDP, UNHCR



➤ Thermography Camera /WHO



➤ Financial Inclusion /FAO



<IOM Kenya>

Security Border Control with Biometrics @ JKIA



**1st IOM
Partnering Project**

**Funded by Japan
Supplementary
Budget**

**Real-Time
Security
Management**



Innovative supply chain information platform for pandemics (WFP)



- ✓ To provide **end-to-end visibility of supply chain for pandemic interventions**
- ✓ The Government of Japan provided Special Fund for the PSC Network.
- ✓ NEC was the **first Asian company to join** the PSC Network Initiative and remains the only ICT company in the network.



March 9, 2017
Ms. Cousin, ex-Executive
Director of WFP
Dr. Endo, Chairman of the
Board, NEC



"It is widely recognized that the global health architecture could be reinforced with improved supply chain platform **to enable better preparation and faster response time for pandemics**. The Japanese Government welcomes and is proud to support the PSC Network which also **involves Japanese IT technology**. We look forward to monitoring its progress in designing this innovative tool."

- Mr. Hideaki Chotoku, Director of Humanitarian Assistance and Emergency Relief Division, Ministry of Foreign Affairs of Japan

Mozambique: e-Vouchers for small-scale farmers (FAO)

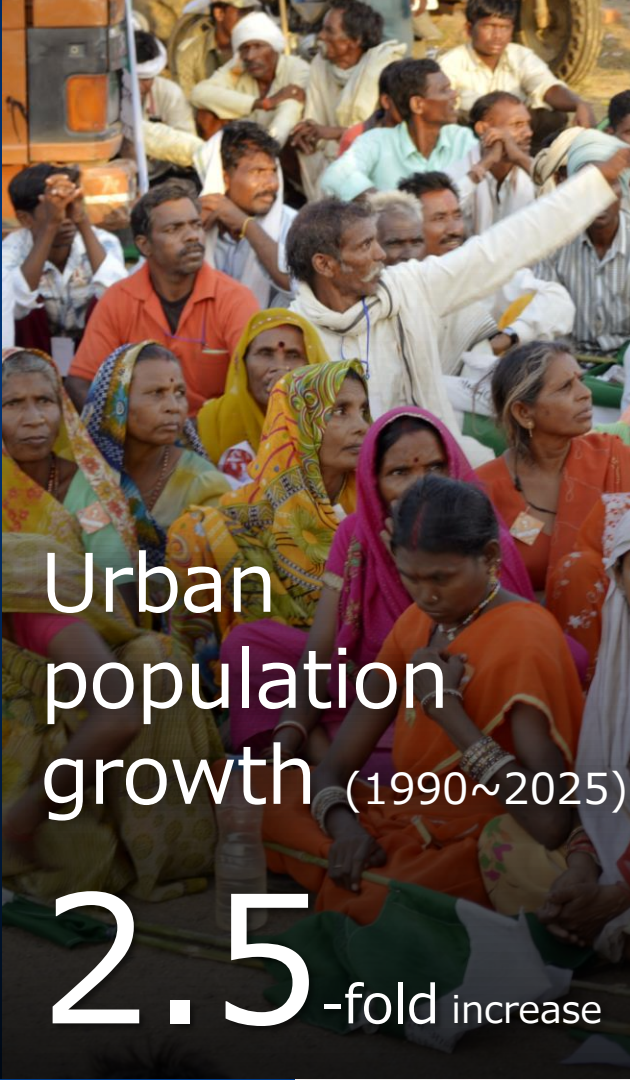


- **Agriculture is one of main economic activities** in Mozambique. NEC is working with the Food and Agriculture Organization to **improve agricultural productivity**.
- Paper vouchers were distributed to small-scale farmers to give them greater market access. However, the system faced problems in terms of **security, traceability, and convenience**. NEC built an **e-voucher system with mobile technology to solve this issue**.

Social Value Creation

Smart Transportation – Bus Rapid Transit





Urban
population
growth (1990~2025)

2.5-fold increase



Road freight
transport (2009-2018)

2.0-fold increase



Vehicle
production (2014~2020)

1.6-fold increase

Public Bus Transit in India is never at primitive stage

India Bus Transit Statistics

No of PTA	97
No of Public Buses	150,000
Daily Bus Ridership	90,000,000
No of BRT	7
BRT Ridership	340,000
Corridor Length	174km
Planned New BRT	12 cities



Ahmedabad BRT 2009~



Luxury Bus Services



Pune BRT with Real Time Passenger Information (ETA)



Contributions through ITMS

Improvements



User Exp. Enhancement

10% Increase Ridership

Schedule Optimization

5-10% Increase Earning / KM

Fare Revenue Increase

20~50% Revenue Increase

KPI / SLA Visualization

Penalty Enhancement /
Reduce Cost / KM

Intelligent Transit Management Platform

Analytic



**Data
Collection**



Business Intelligence



Fare Collection



**Fleet
Management**



**Incident
Management**



**Planning &
Scheduling**

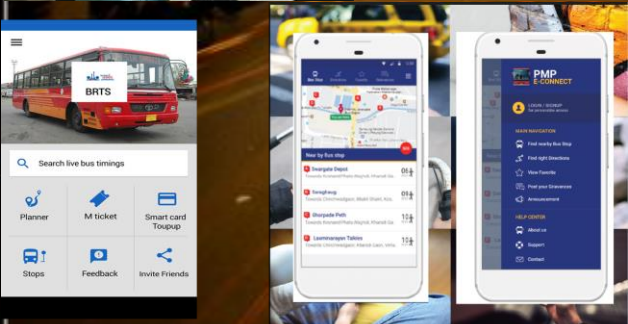


**Passenger
Information**



**Depot
Management**

Awarded Bus Rapid Transport Projects in India



Ahmedabad

Surat

Pune

Hubli



System Integration Project to provide following to local government in India

- **Automatic Fare Collection System**
- **Automatic Vehicle Location System**
- **Vehicle Planning Scheduling Dispatch System**
- **Depot Management System, etc...**

Proposal

1. 「Society 5.0」の実現を目指していく中で、日本国内とグローバル市場の違いを認識しながら、最適なソリューションの整備と提供を実現

- ・グローバル市場では国毎に微調整し適応させていくことが必要
共通のプラットフォームはあるにしても社会・制度・文化に至るまで実用に際してはアジャストしていかないと耐えられないのが現場の実態
そういった視点でSociety 5.0を実現する先進ICT技術は、市場毎フィールドでの実証が必須
- ・日本とは異なるLeap Frog的な市場への対応
- ・グローバル市場ニーズに受け入れられる競争優位性の確保

2. 「質の高いインフラ」輸出型から、PPPなども含めた多様化するグローバルニーズへの対応

- ・ハードウェア・ソフトウェア → サービス型へ
(物からコトへのニーズ変化)
- ・ODAをはじめとした経済協力協力ファンドについても、事業パタンの変化や難易度に応じた競争力ある仕組みづくりと運用
- ・今後益々需要が高まるスマートシティ案件などでは、ICTはインフラ事業の一部であり、基盤インフラがメインとなっているため、リード役としての役割を取りにくいいため、何等かの仕組みを期待
- ・プロジェクト組成と推進における長期プロセスを支える民間支援ファンドなど

3. 官民連携の加速

- ・GDPRなどセキュリティ網のルール化が行われている中で、自由かつセキュアなデータフローを実現するルールづくり
- ・デジタルガバメントなど、OneIDといった仕組みからマルチな政府機関横断フレームワークづくりなど
- ・官民一体となった日本の優位性やセキュリティ技術の提供により、UHC(保健)や教育、税制などを支援
- ・発展途上国支援において、PPPやレバニューシェア型事業などを推進する中で、相手国側が優位性を感じるための官民連携を基盤とした政府支援

4. プラットフォームづくりに向けた取り組み

- ・日頃オペレーション上で感じる難しさとして、様々な政府機関において、ファンドのAvailabilityが広がりを見せているのは非常に良いことであり、大いに評価されるべきこと。
現状は、額が限定的(1~3千万円程度)、実証実験をするにしてもかなり限られた規模の試みとなるケースが多いのが実態と考える。
場合によっては、事前調査等のみとなってしまう、実際に顧客がその機能を経験する・評価するレベルのものになることが難しい状況があると思料する。
- ・プラットフォームとなると、益々机上のイメージだけではなく、実際に小型のパイロットプロジェクトのような、実市場にカスタマイズした経験を得て頂くことが、より有効性が高いと考えている。
従い、e-GovernmentにせよSmart City(例: 交通関連トランスポート)にせよ、ICT日本勢が戦略的、中長期的に活動できるように、もう少し規模を拡大した取り組みが出来るファンド創出、顧客-日本政府連携など、導入ステージで整備されると有効ではないかと考える。

\Orchestrating a brighter world

世界の想いを、未来へつなげる。

