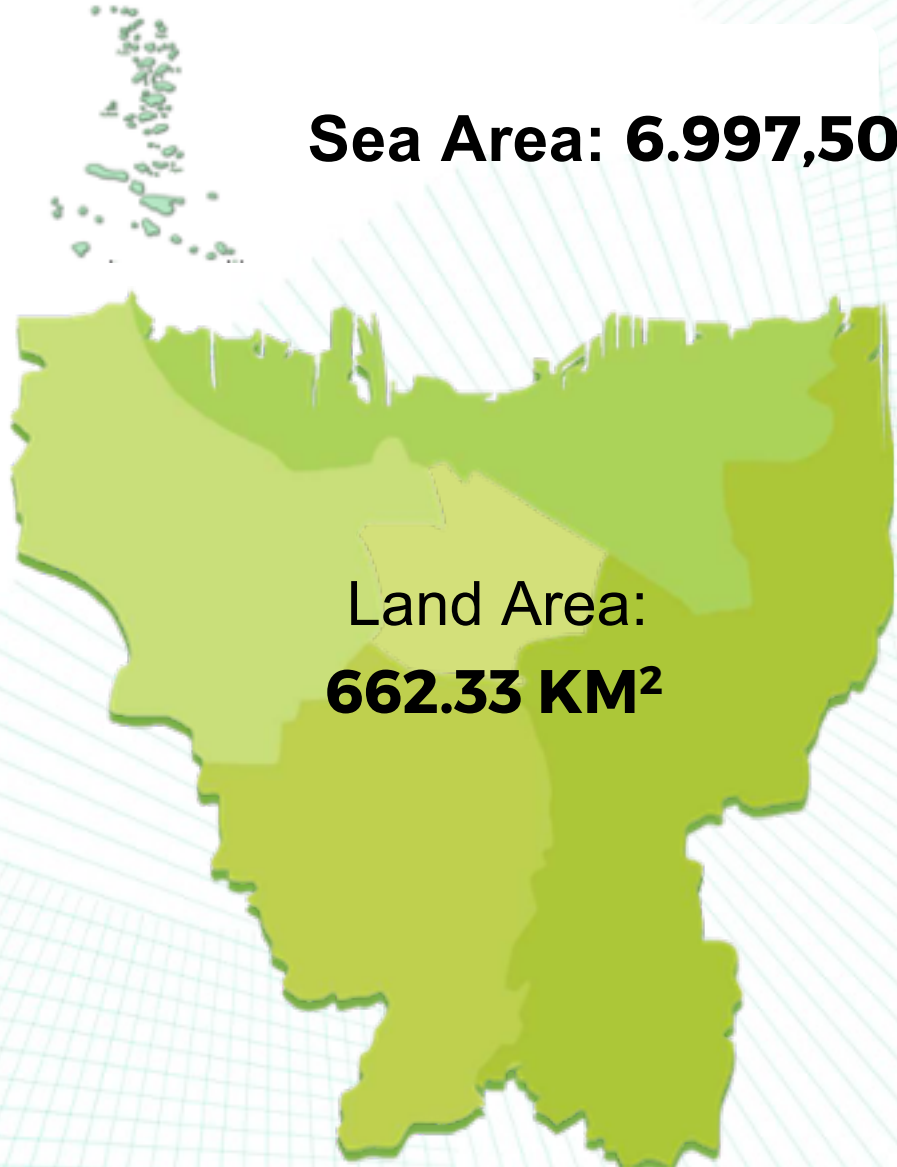


AI Solutions for Urban and Cybersecurity Challenges

A Case Study of Jakarta Smart City

Yudhistira Nugraha, D.Phil – Director at Jakarta Smart City



Sea Area: 6.997,50 KM²

Land Area:
662.33 KM²

JAKARTA

as the Capital City of the Republic Indonesia

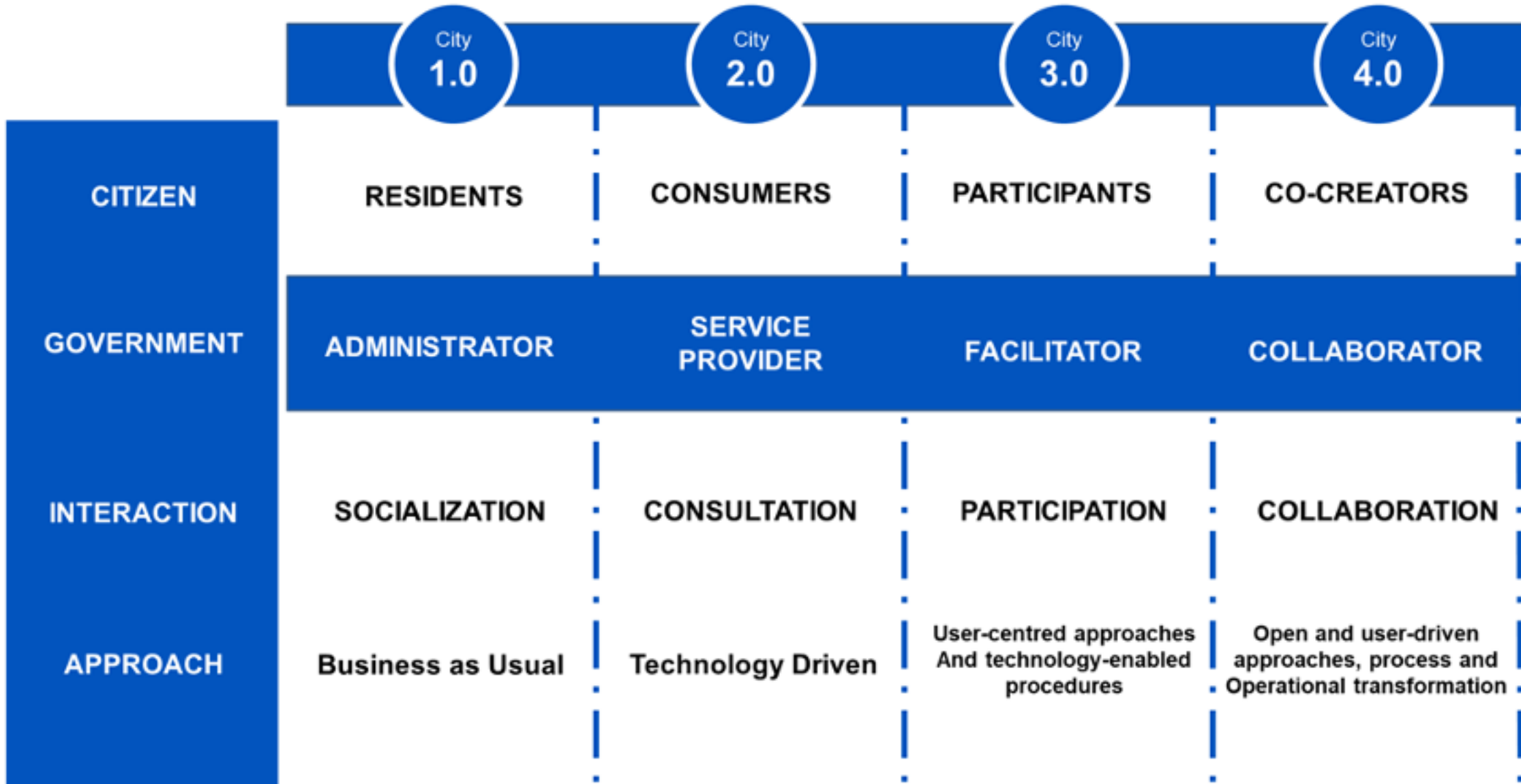
Population: ±10.3 Million people

Highest Density in Indonesia:
±15.633 people each km²

Waste production:
±7.100 tons per day

Number of vehicles:
±13.3 Million Motorcycles and ±3.5 Million Cars

City Evolution



What is smart city?

Innovative City and Happiness

Governor's Vision and Mission

Maju Kotanya, Bahagia Warganya

Smart City 4.0 Ecosystem Platform

Collaborator

Government

Co-Creators

Citizen

Academia

Media

Industry/Business/Investor

Other Governments

Vision and Mission
JAKARTA CITY 4.0

Technologies, Innovations and Collaborations

Cloud

Big Data

AI

IoT

Blockchain



Road Congestion



Medical Services



Parking space



Flooding



Waste Management and Recycling



Air Pollution



School education



Local government services



Public Transport



Drink Water



Unemployment



Green spaces

City's Problems

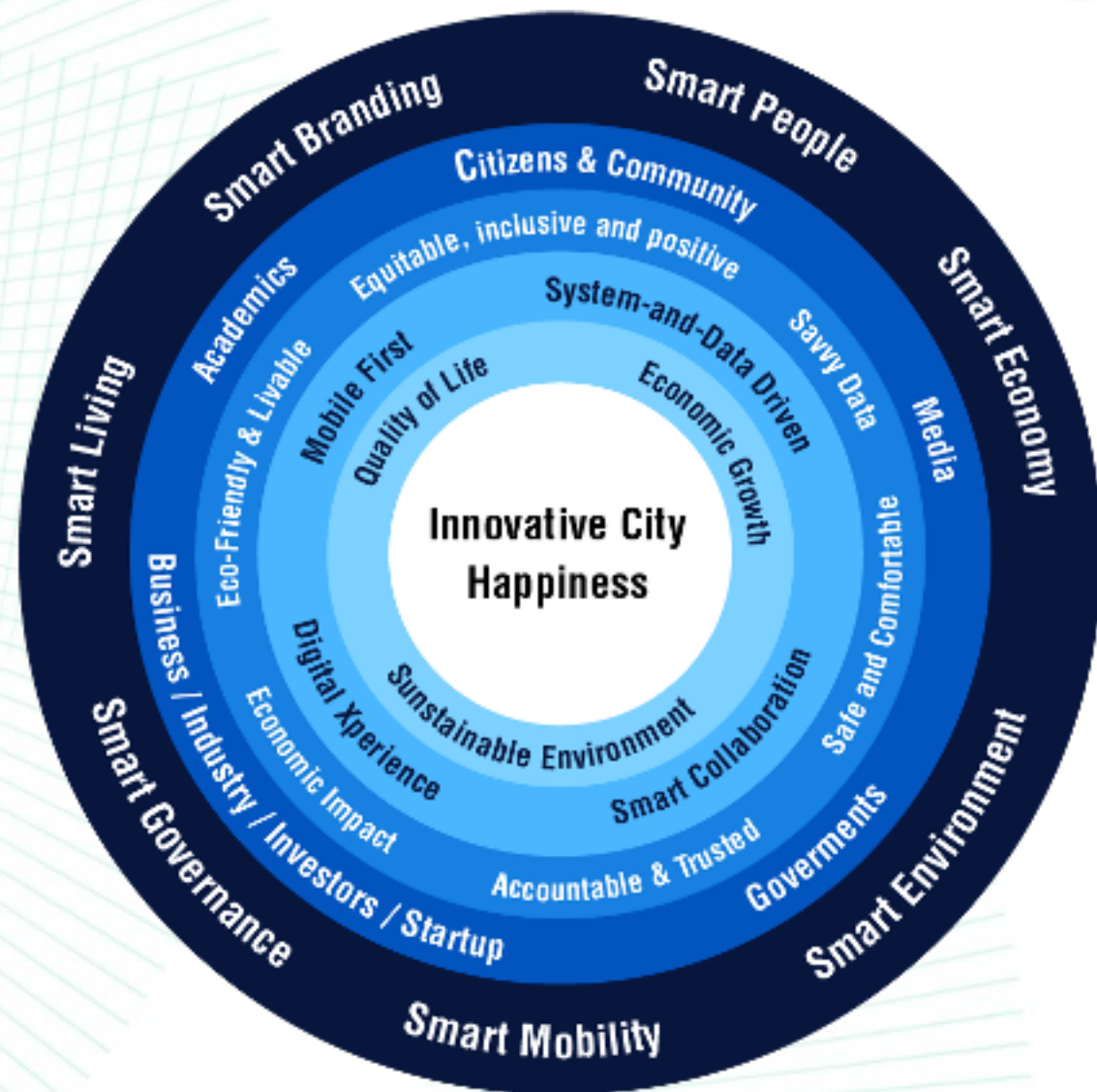
Citizen's Needs

Innovative City

Happy Citizens

Smart City 4.0 Framework

2 Aims	3 Value Objectives
4 Principles	5 Co-creators
6 Outcomes	7 Indicators



Smart Governance

- Integrated administration services
- Data Driven Policy
- Utilization of Big Data
- Online license services
- Online Complaint Channels
- Community Involvement
- One Data
- Access Budget Online
- Etc.

Smart People

- Citizen involvement in the process of determining services
- Community and Government Collaboration
- Online survey
- Public Dashboard
- A one-stop online job information system
- Etc.

Smart Mobility

- Online Transportation Ticket
- Bicycle hiring
- IoT-based electronic parking
- Ride-sharing Apps
- integrated transport system
- Parking space apps
- Etc.

Smart Environment

- Smart Waste Management
- Reducing carbon emissions
- Smart Energy
- Green building
- Sanitation Management
- Etc.

Smart Economy

- Food Security
- Utilization of E-Commerce
- Job creation
- One-stop payment integration
- Etc.

Smart Living

- Jakarta Safe City
- Smart Health
- Free Public Wifi
- Smart Tourism
- Online Travel Ticket
- Etc

Seven Smart City Indicators

Smart Branding

- City Branding (Plus Jakarta)

Milestone 2020 – 2022: Jakarta Smart City



Mobile First

6 Killer Apps for Public Services

50 Public Information and Services Features

JakID (Digital Identity and Citizens' Accounts)

JakPay (Digital Wallet)

System and Data Driven

Master Data Management (10 million records) of Jakarta Citizens

Data Hub Development via **api.Jakarta.go.id**

Live Dashboard for 6 (six) Basic Services

Citizen Services and Experiences Personalization

Digital Xperience

JSC Lab

JSC website Optimization

Digital Talent Training and Management

Design Thinking, System Thinking, and Computational Thinking

Smart Collaboration

Future City Hub and Living Lab

25 Start-ups in digital ecosystem
10 Universities in *Subject Matter Expert*

6 (six) schemes of Large-Scale Social Collaboration (KSBB)

Sandbox Ecosystem
+Jakarta

Roadmap of Service Digitization

Gov as a Data

Gov as a Service

Gov as a Platform

Regional Devices

Population

Health

Education

Transportation

Economy

Social

etc



Department of Communication, Information, and Statistics

Data and Sistem Integrators

Platform Provider

(API, DB link, web service, VPN, integrasi sistem)

(One-Stop-Service)

jaki

Citizen-designed-Services



Safe, stable, fast access of service

Safe, stable, fast data exchange

Evidence based policy, one stop service mobile app, API, micro-services, API, integrated payment

Creators of the platform's offerings
(Internal Gov agencies and co-creators)

Citizens
(Buyers or users of
the offerings)

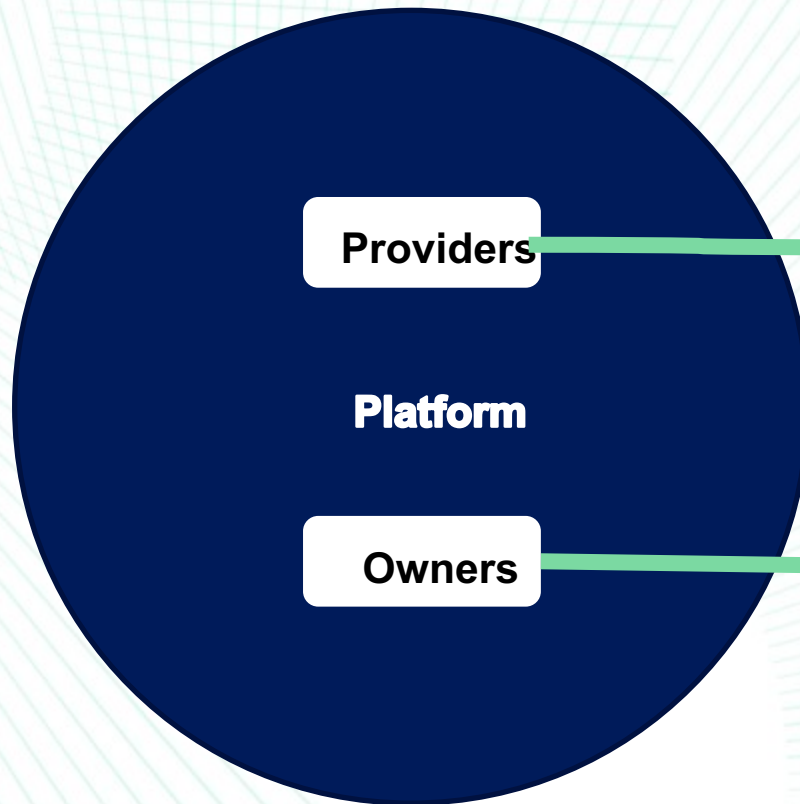
Producers

Consumers

**Value and data
Exchange and feedback**

The Players in a platform ecosystem

A Collaborative Ecosystem Platform



Providers

Interfaces for the platform
(Jakarta Smart City provides JAKI)

Platform

Owners

Controller of platform IP and arbiter of
who may participate and in what ways
(Pemprov DKI Jakarta owns JAKI)

Mobile First: We're doing it for our citizens—and only our citizens



- **Citizen-designed Services:** The majority of citizens are using their phones to find the content they need.
- **A Government Platform:** Jakarta provides a single sign-in, which allows a citizen to access all digital services, make payments, and update personal information
- **JAKI as the Jakarta Super-App platform** has integrated more than 15 features and 28 applications developed by agencies and the public.
- **Integrating Government Basic Services:** Education, health, public works and spatial planning, public housing and residential areas, public order and peace and community protection, and social affairs.

Mobile First

Various services to fulfill daily needs at your fingertips

JAKI has integrated various digital services and official information from the Jakarta Provincial Government, so that Jakarta residents only need to install 1 application

JakLapor

The official complaint channels of Jakarta Provincial Government that is based on geo-tagging

JakRespons

A list of problems that is currently being handled by the Jakarta Provincial Government

Vaksinasi Covid-19

Check and register yourself for vaccination program in Jakarta

Jejak

Check the capacity of buildings in Jakarta to prevent the Covid-19 transmission

JakPenda

Check motor vehicle tax and PBB in Jakarta

JakISPU

Find out the information about the Air Pollution Standard Index (ISPU) in Jakarta

JakPangan

The latest information on food prices throughout Pasar Raya Jakarta

JakSurvei

A survey to assess the performances and services provided by the Jakarta Provincial Government

Jakarta Tanggap Covid-19

Data information center and various Covid-19 control features in Jakarta

JakWIFI

Find the free WIFI access point from the Jakarta Provincial Government

JakWarta

The official and up-to-date information center from Jakarta Provincial Government

JakPantau

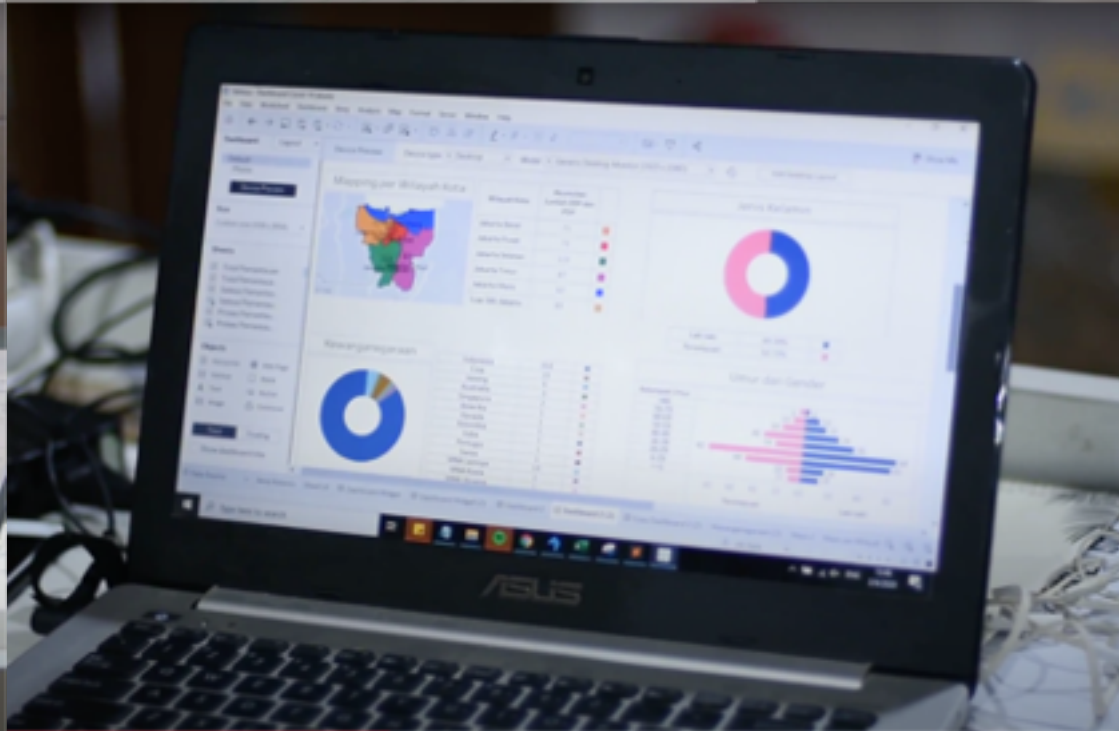
Find out the locations of flood points and levels in various river flows in Jakarta

JakSiaga

Access various important and emergency numbers in Jakarta

JakApps

Find Jakarta Provincial Government public services that have gone digital



- **Data-driven Cities:** Jakarta has better responses to the COVID-19 pandemic due to smart infrastructure and data analytics and predictive modelling
- **Data infrastructure, APIs and Open Standards:** Building government as a platform is transforming government into a public API where city co-creators can build, connect and interact.
- **Personalised Citizen Services:** Personalised public services can be developed and adapted to individual circumstances using a Digital ID for Jakarta residents, so that various services and data for Jakarta residents can be integrated and customised

Yudhistira Nugraha

yudh004@gmail.com

jaki

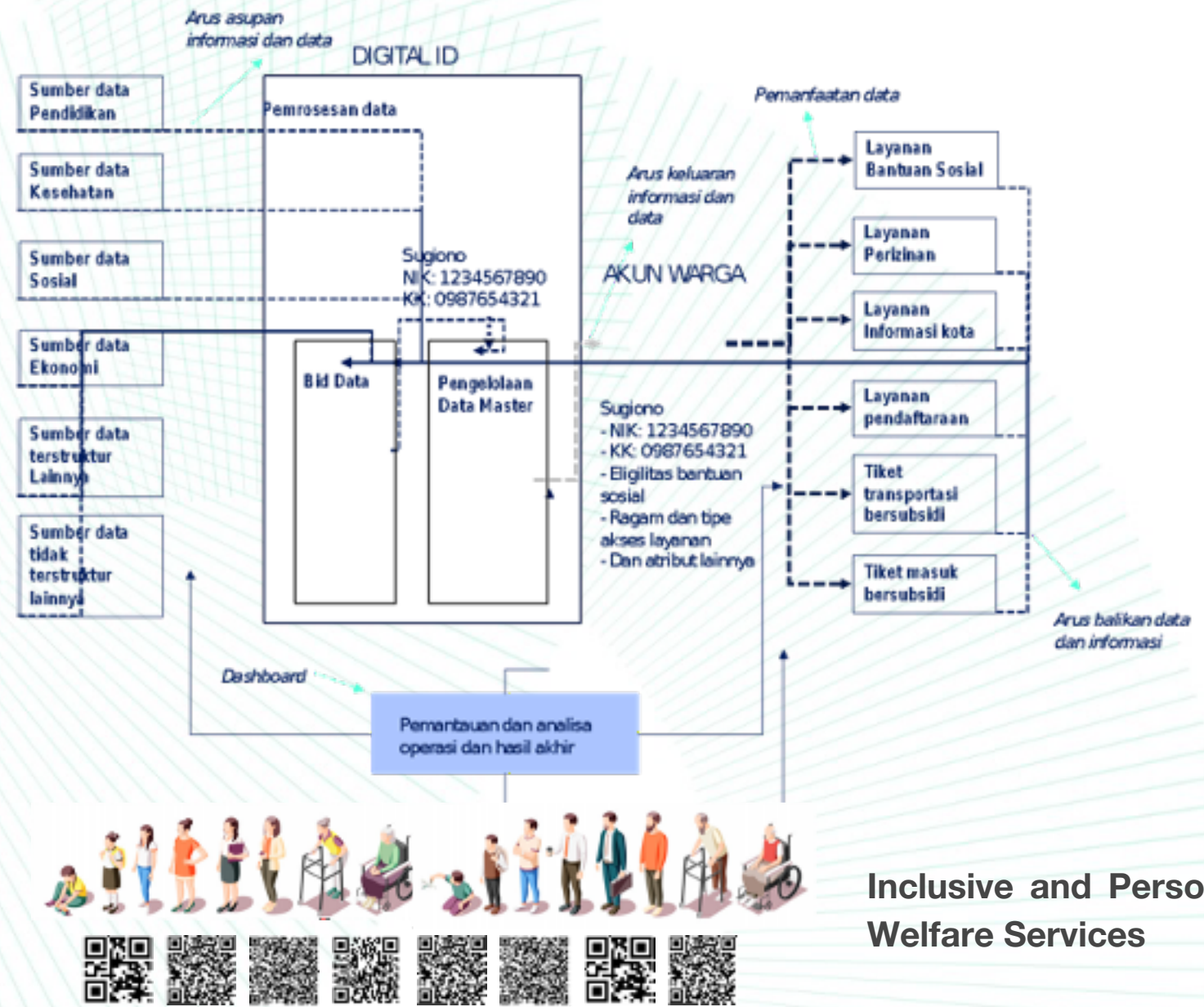
KODE QR



Tutup

Beranda Aktivitas Laporan Notifikasi Profil

A single sign in (**Digital ID**) connected to all government services.



Inclusive and Personalized Welfare Services



JSC Talks
vol. 12

Pembicara: Fauzan Zam'an
Sales and Marketing Manager Molecool

Moderator: Miko
System Analyst Jakarta Smart City

Jumat, 13 November 2020
Pukul 15.30 - 16.30 WIB
via Zoom
terbatas untuk 100 orang pertama.

Topik pertemuan:
Pantau Live Traffic Jakarta melalui CCTV Molecool di Aplikasi JAKI

Registrasi melalui: bit.ly/jactalksvol12
Live streaming YouTube: Jakarta Smart City

Smart Change Online Conference 2020 - Urban Data

Smart Change Conference 2020 - Urban Data
PART I - Jakarta Smart City Strategy - Achievements and Work Plan

Host: Mira Zakaria
Host, Smart Change Jakarta
Jakarta, Indonesia

Live 01:10 56

- **Design Thinking – for Cities, Systems, Products and Services:** Understanding the needs and realities of citizens, and using technology, innovation, or other tools to build genuinely life-changing and life-improving solutions to the most important challenges
- **System Thinking – ICT Integration into the City:** Smart City as Systems of Systems that can be helpful to integrate both public and private heterogeneous, independent systems across different domains (Digital/Physical/Human Interaction)
- **Computational Thinking – ICT, Awareness and Competence:** Understanding of human behavior with the help of computer science to find solutions to complex problems (problem solving) within a city



OPEN DATA



BUS DIGITAL MONITORING



WAZE DATA



TAXES PAYMENT



ONLINE LICENSING SERVICE



PPID



DIGITAL LIBRARY



JSC MAP



E-MUSRENBANG



DATA DRIVEN POLICY



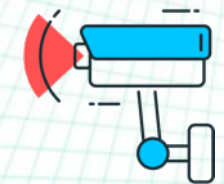
CITIZENS REPORT COORDINATION



ACCESS TO ONLINE LEGAL DOCUMENTATION & INFORMATION



ACCESS TO JAKARTA SATU MAP



Survei Kepuasan Masyarakat Online

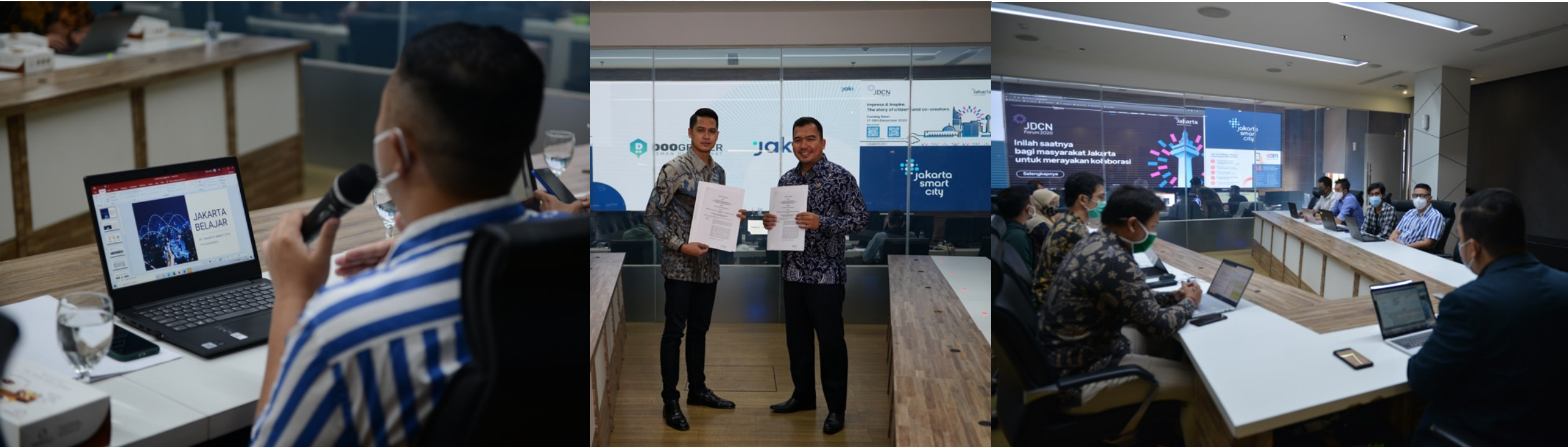


Laporan Permasalahan Kota Online

DIGITAL SERVICES ON JAKI

JAKI's various abilities to improve digital literacy for residents and officers in Jakarta

Smart Collaboration: Collaborating with Co-Creators to Provide Various Solutions



- **Future City Hub Jakarta:** Understanding the local culture, innovation ecosystem and language, Innovation Hub is well positioned to act as multipliers and help test innovative digital technologies
- **Playground:** Jakarta gives an access to API and Open Data to city co-creators
- **Co-Develop:** Jakarta shows city's problems and start-ups help to resolve problems
- **Consumer:** For the proven concept, Jakarta can become their consumer
- **Collaborative Sandbox:** A space for discussion between the government and technology companies to provide innovation to solve various city problems.

Smart Collaboration



JAKI X NoceFax
Layanan kota berbasis kecerdasan buatan



JAKI X DuThape
Distribusi bantuan lebih cepat, tepat, dan efektif



JAKI X Boska
Asisten virtual yang siap membantumu



JAKI X Bukalapak
Digitalisasi UMKM di Jakarta bersama Bukalapak



JAKI X Gejek
Mendorong mobilitas berkelanjutan di Jakarta

Layanan Pemrov DKI Jakarta

[Lihat Semua](#)

Berbagai aplikasi resmi milik pemprov DKI yang kamu butuhkan



JakEvo
Urus perizinan di Jakarta lebih mudah



JakSiapa
Temukan titik-titik parkir resmi di Jakarta



IJakarta
Baca buku dari gawaimu



Tijeku
Rute dan lokasi bus Transjakarta

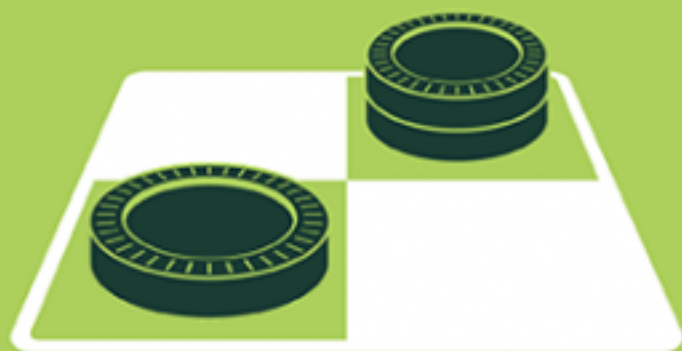


AI Use Cases in Jakarta

- License Plate Recognition for Tax Initiatives
- Corona Likelihood Metric (CLM)
- Face Mask Detection
- Social Distance Monitoring
- Utilizing IoT: The Role of AI
- Cyber Security Challenges

ARTIFICIAL INTELLIGENCE

Early artificial intelligence stirs excitement.



MACHINE LEARNING

Machine learning begins to flourish.



DEEP LEARNING

Deep learning breakthroughs drive AI boom.



1950's

1960's

1970's

1980's

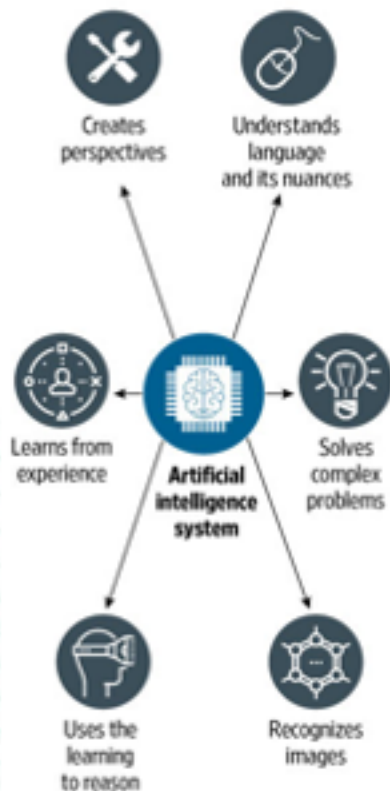
1990's

2000's

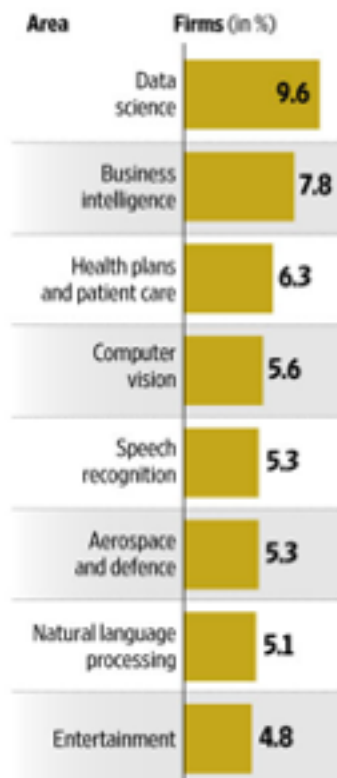
2010's

ARTIFICIAL INTELLIGENCE AND OPPORTUNITIES

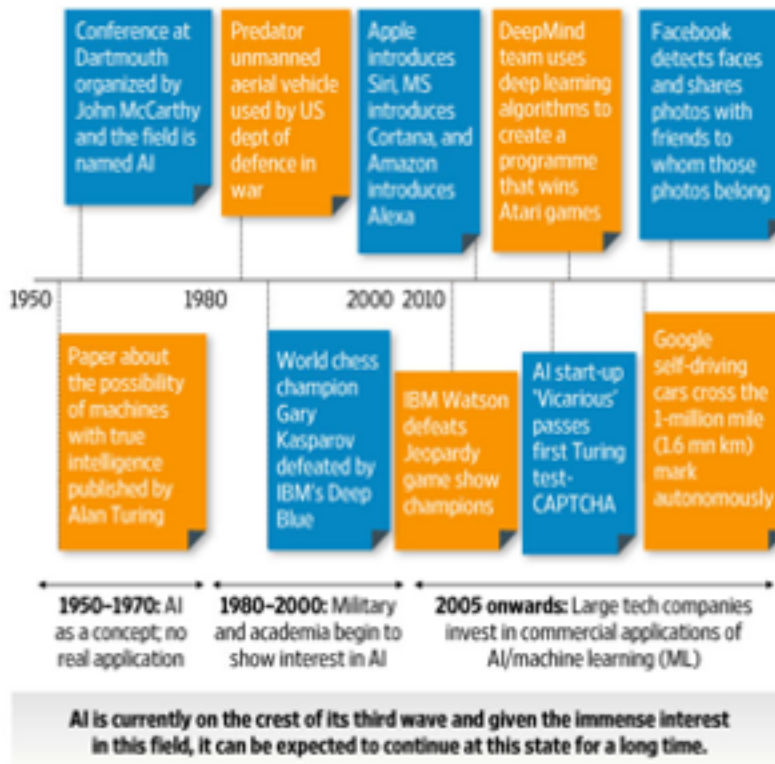
How AI works



Areas of focus for firms looking to exploit AI opportunities



Evolution of AI



Artificial Intelligence Opportunities

26-12-2018 18:20:52 Ballitower Lane2-Depan

ID TRACK : 20788
LABEL : SMALL
MOVING : MOVE
NUM TRACK : 7

AREA :0
LANE :0

B 1728 PFI

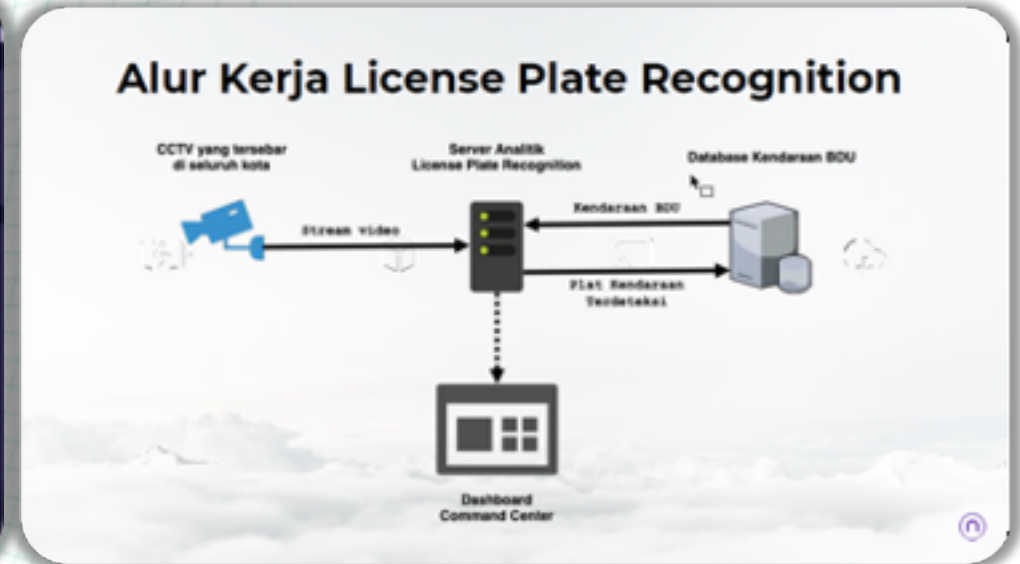
nodeflux

Detection Vehicle & Lisence Plate - Today

		small B2128PFI 06:28 pm
		small B1894BUA 06:28 pm
		small B2848PFC

License Plate Recognition for Tax Initiatives

License Plate Recognition for Tax Initiatives Collaboration with Nodeflux



Corona Likelihood Metric (CLM)

What is CLM?

Corona Likelihood Metric (CLM) is a self-screening application powered by machine learning technology. CLM will assist you in measuring the risk of the possibility of Covid-19 and recommend what you need to do



Corona Likelihood Metric

Home Tentang Kami Kebijakan Privasi

Corona Likelihood Metric

Aplikasi uji risiko mandiri gejala Covid-19 sebagai upaya menekan penyebaran Covid-19 di Provinsi DKI Jakarta berteknologi machine learning

[Ikuti Tes](#) Pelajari Selengkapnya

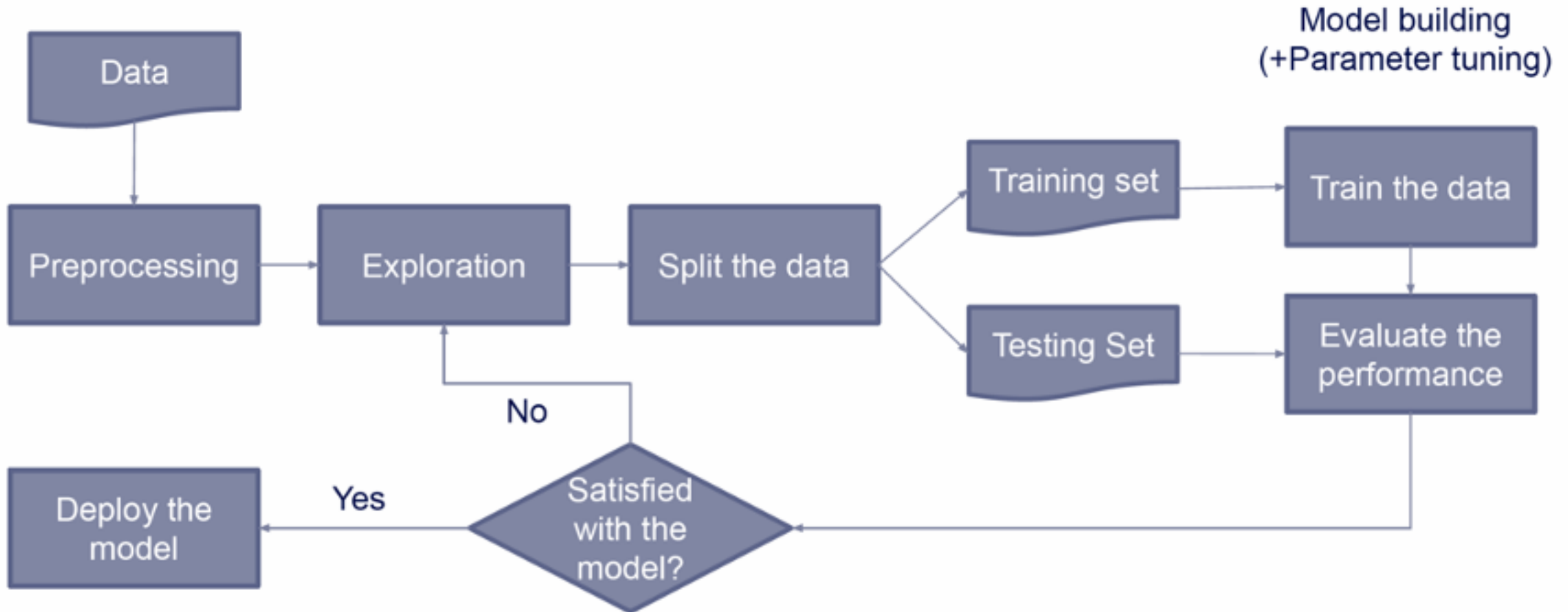
Uji Risiko Kemungkinan Covid-19 Anda

Cari tahu kondisi kesehatan Anda berdasarkan gejala yang Anda alami menggunakan Corona Likelihood Metric (CLM)

- 1 Mulai Tes
- 2 Isi data diri dengan jujur dan benar
- 3 Isi pertanyaan dengan jujur dan benar
- 4 Jika Anda dinyatakan berisiko tinggi, maka Anda akan direkomendasikan untuk tes PCR

How do we build COVID-19 Likelihood Metric (CLM)

Basic Flow of ML Model Building



Variables Used in CLM

- Age
- Gender
- Region*
- Symptoms (12 variables)
- Historical Info (travel, contact, health facility visit)
- Risky occupation (i.e. health worker)

Risk Assessment in CLM

Three types of data are used as the reference for calculating CLM



Demographic conditions

(age, sex)



History of Covid-19 symptoms

(in the last 14 days)



Patient history

(travel, contacts, health facilities visitation, and if someone is a health worker)

What Your Result Means?



Level 1
Low Risk



Level 2
Medium Risk



Level 3
High Risk

*We tried 3 approaches: not using anything, using 'kecamatan', or using 'kabupaten'. After further evaluation, including 'kecamatan' or 'kabupaten' seems to increase the complexity of the model significantly, hence causing overfitting issues. For this reason, we decided to exclude regions (kecamatan and kabupaten) when building the model.

CCTV Integration

Currently there are
7.751 CCTVs
integrated in Jakarta
Smart City Portal

*data on Feb 2021

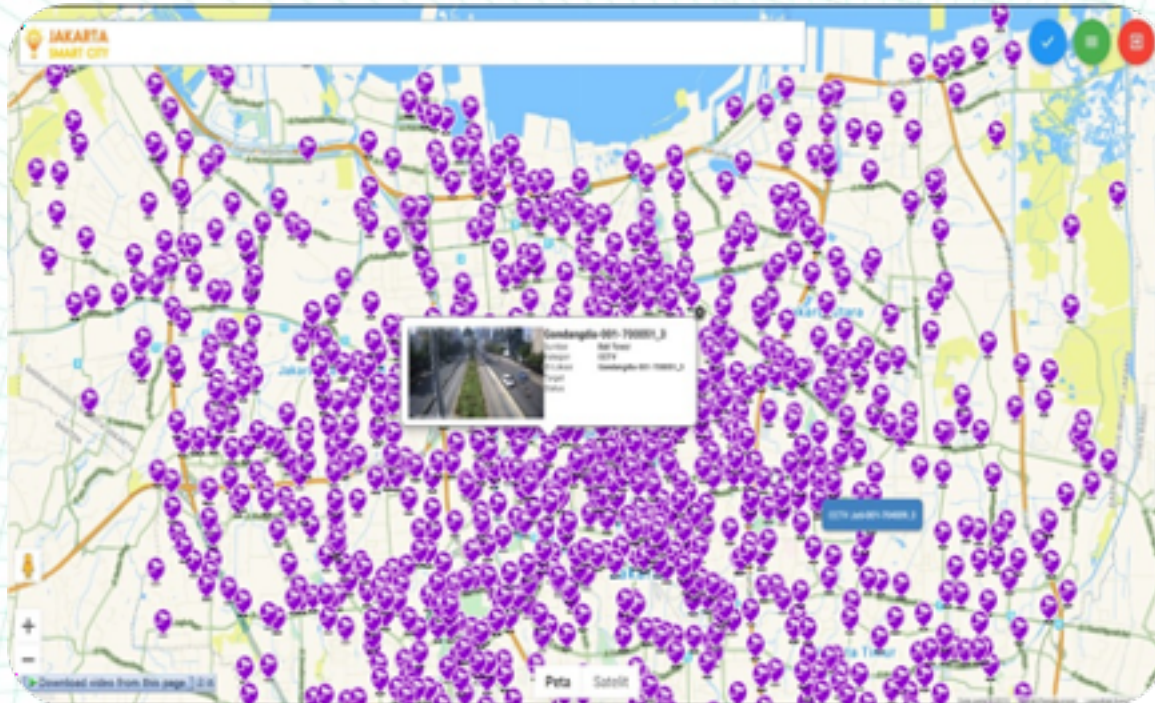


Image Recognition & Video Analytics



Figure 1: On the left, detection/classification with YOLOv3. On the right, motion detection with Lucas-Kanade Optical Flow.

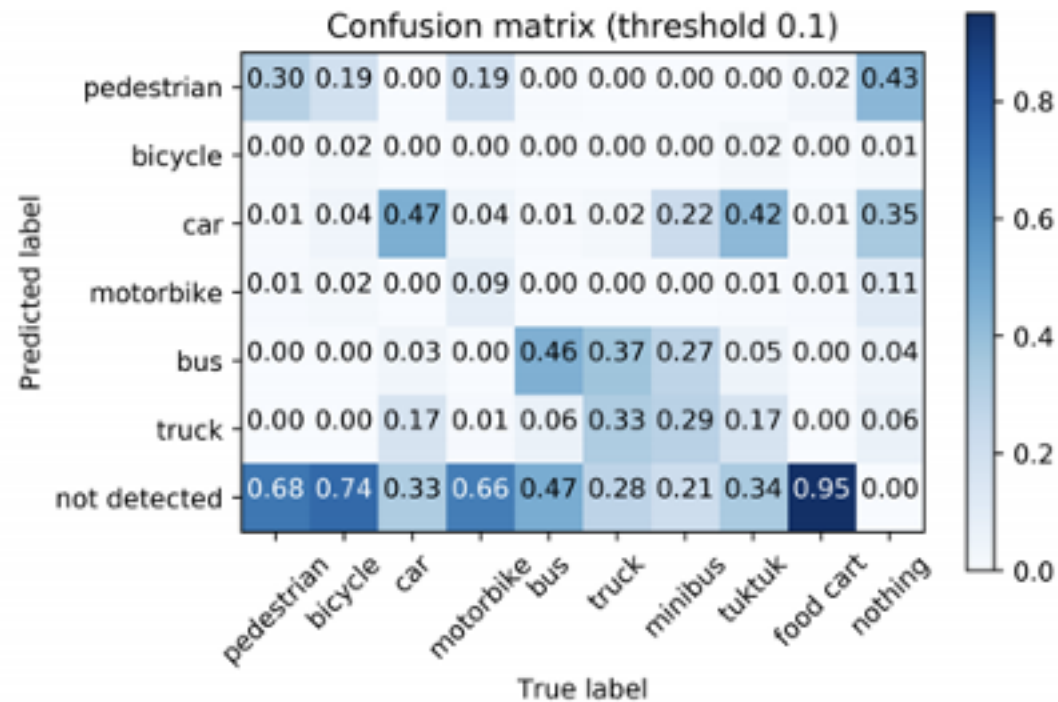
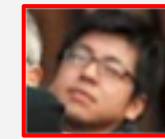


Figure 2: A scene pre- and post-segmentation.

Face Mask Detection

From this automatic and comprehensive monitoring, some follow-up actions can be carried out, such as:

- Separation from the crowd
- Prohibition of entering the train stations or other public areas
- Provision of masks for immediate use



Obj_id: 0003
Cam_id: Pintu-A



Obj_id: 0005
Cam_id: Pintu-A



Obj_id: 0004
Cam_id: Pintu-A

[Click for video](#)



Obj_id:
Cam_id:



Obj_id:
Cam_id:

Illustration

with mask on

Monitoring can be initiated from the main public mobility area; MRT, LRT, terminals, airport stations, to schools and markets. From the capital city of Jakarta to Bandung, Surabaya, to other regencies in the country.

image is not property of Nodeflux and used for visual aid only

nodeflux



JPO-POLDA-507385_1



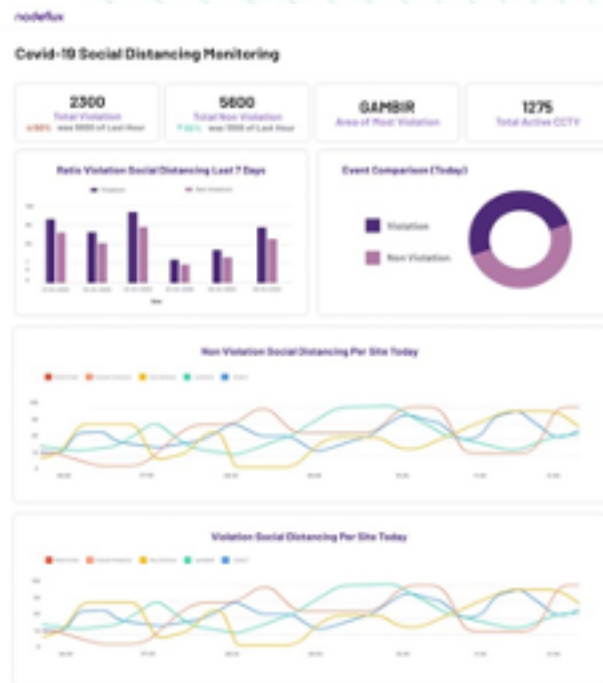
Polda cam 7



Social Distance Monitoring

Continuous public monitoring is important in public areas such as markets, malls and stations.

Such monitoring can also be implemented in office areas, educational complexes, and other places where the general public is passing by.



▼ PD Pasar Jaya Senen

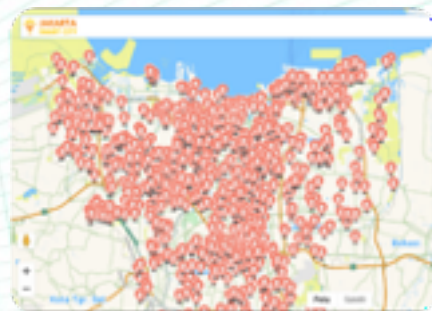


Hijau : menunjukkan jarak aman, diatas 1 meter
Merah : menunjukkan jarak dibawah 1 meter

[Click for video](#)

Utilizing IoT in Jakarta

IoT uses internet connection to connect devices in order to monitor and control.



Garbage Truck Tracking

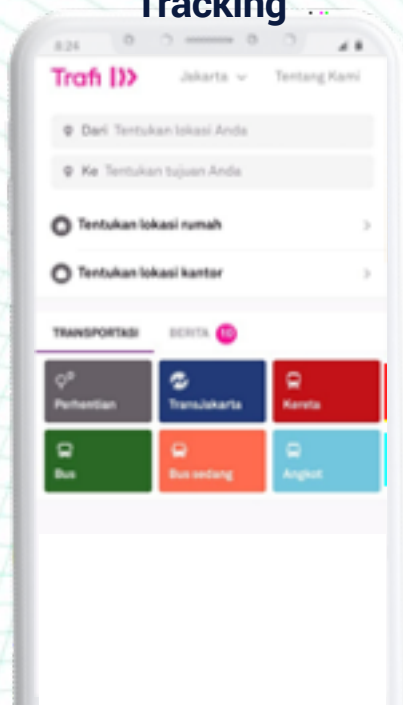


Smart Street Light



Ambulance Tracking

Transjakarta Bus Tracking



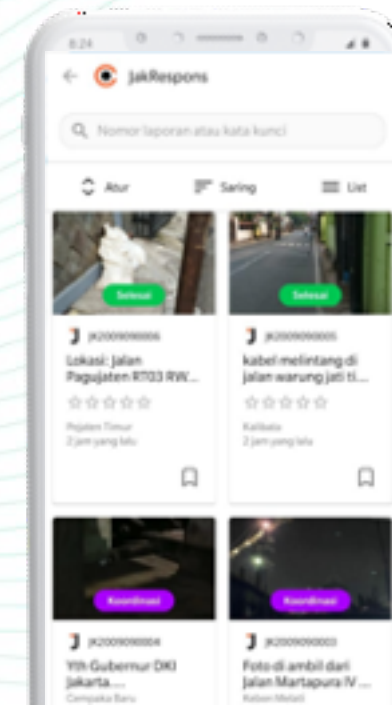
Monitor Jakarta Air Pollution Standards Index



Monitor the operation of Water Pump Machine



Geotagging-based Reporting Channel

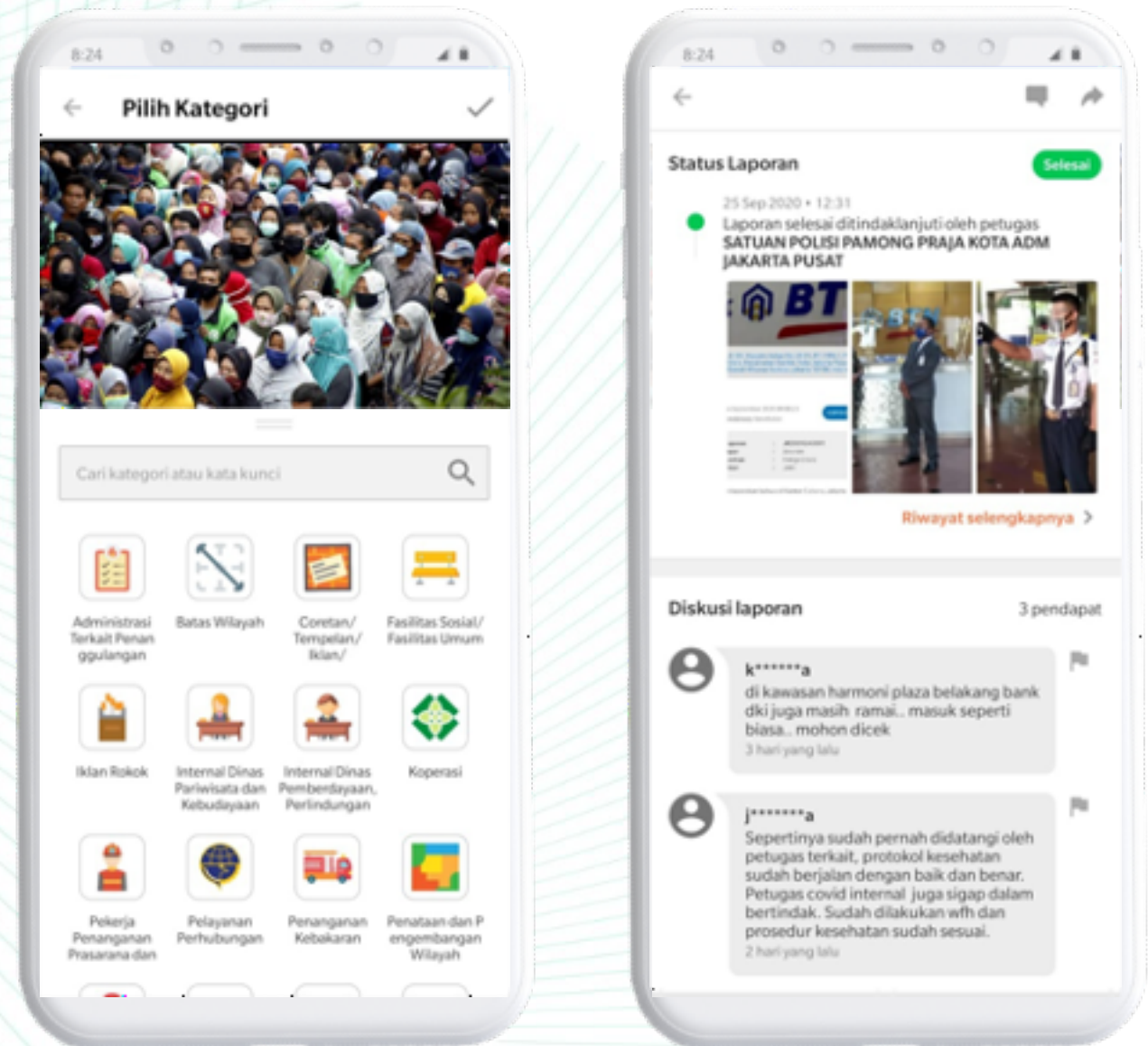


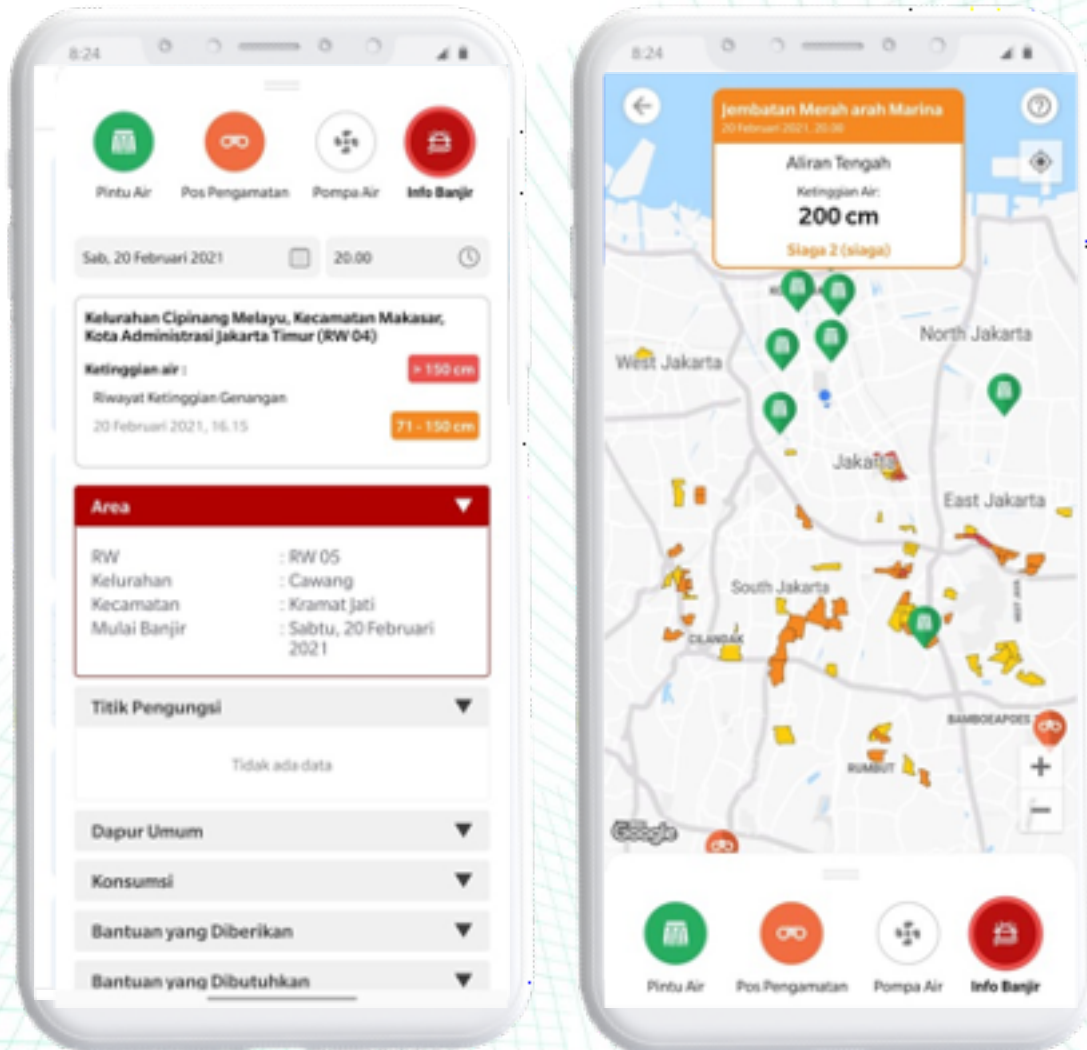
Fitur JakLapor

The Official Complaints Channel from the DKI Jakarta Provincial Government to report various city problems based on Geo Tagging.

Users only need to take a photo, select a category, create a description and then send it, you can report city problems through the palm of your hand.

All reports that have been submitted through JakLapor have utilized GPS tracking to speed up tracking and completion of citizen reports.





Fitur JakPantau

DKI Jakarta Provincial Government has used water level sensors in several rivers in Jakarta to assist decision making in flood control in Jakarta.

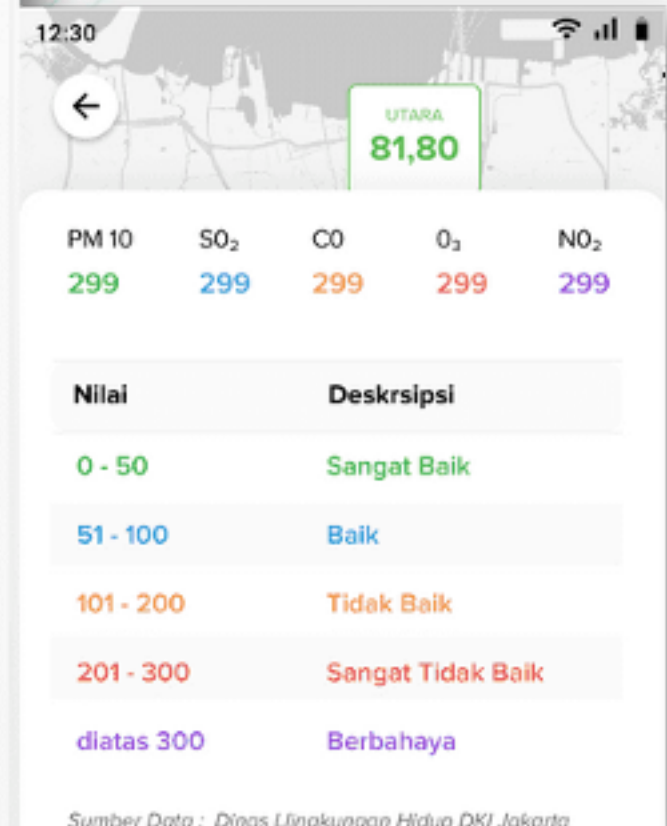
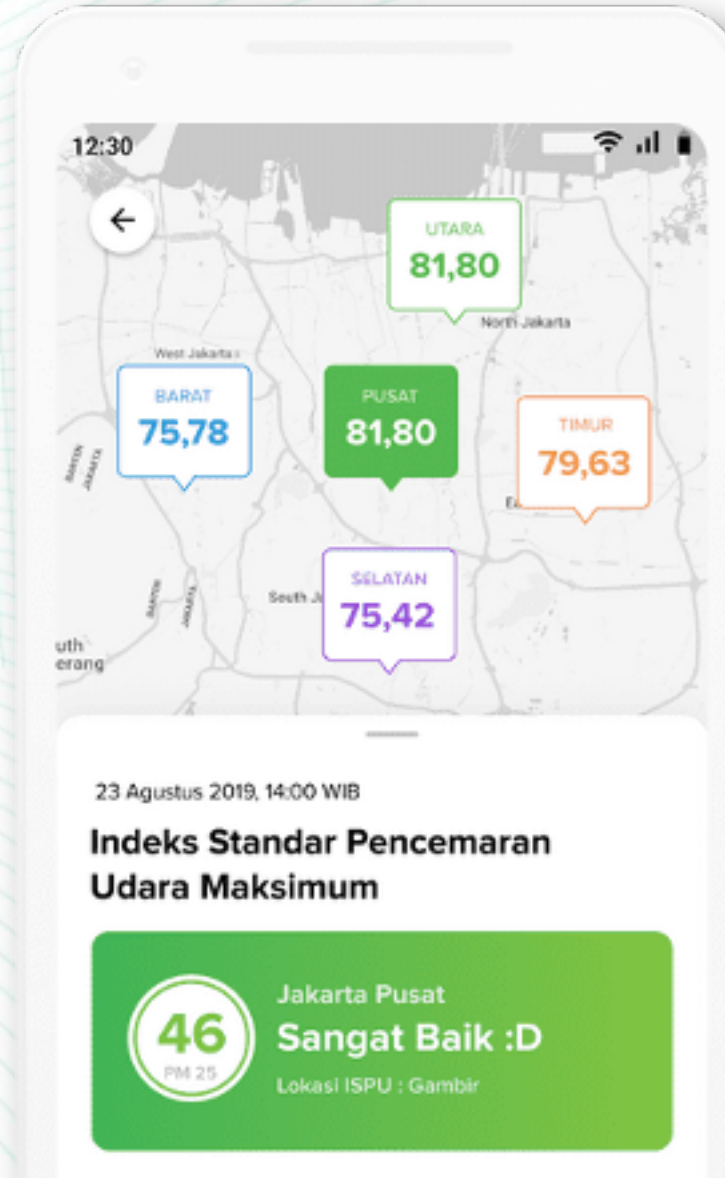
Currently, there are 21 sensors installed in 13 rivers in Jakarta. We display the water level data in the JAKI application in the JakPantau feature, and we analyze it to become a flood control dashboard in Jakarta.

Apart from that, we also conducted flood point mapping based on the residents' flood reports submitted in JakLapor under the flood category. These flood spots can help residents mitigate flooding.

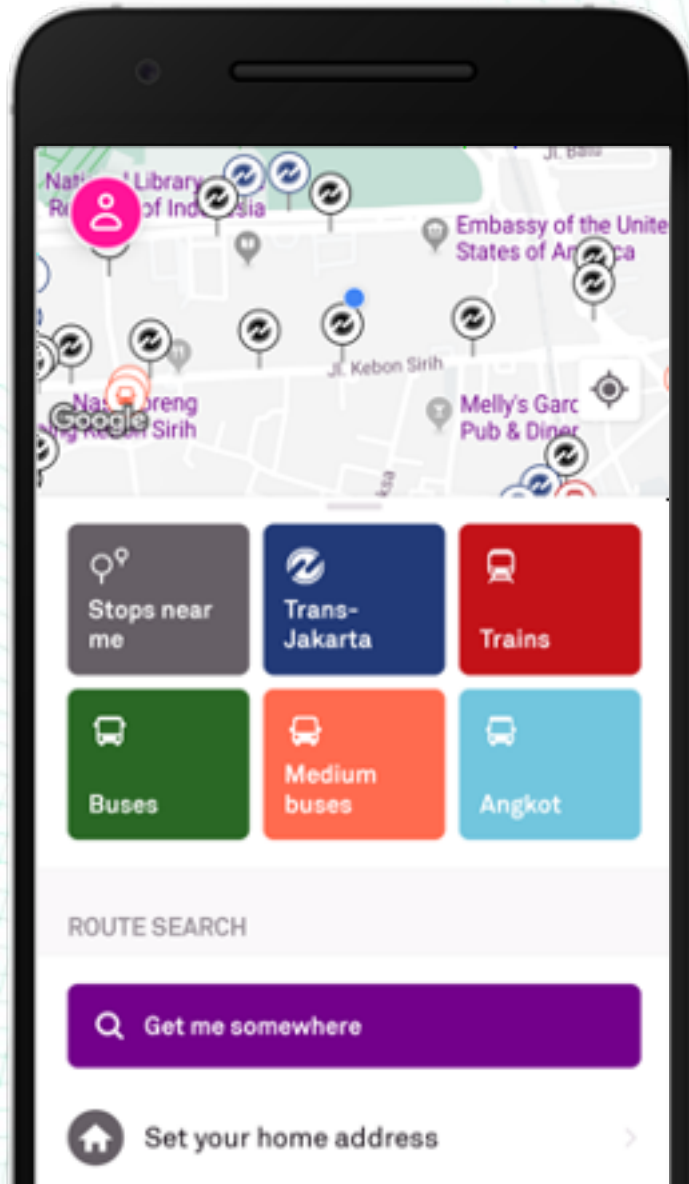
Monitor Jakarta Air Pollution Standards Index

Jakarta Smart City collaborates with the Provincial Environmental Office DKI Jakarta provides the Jakarta Air Pollution Standard Index Information feature in real-time.

DKI Jakarta Provincial Government has installed around five air quality sensors equipped with the Internet of Things (IoT) to get data in real-time.



Trafi | >>



Track Transjakarta Buses

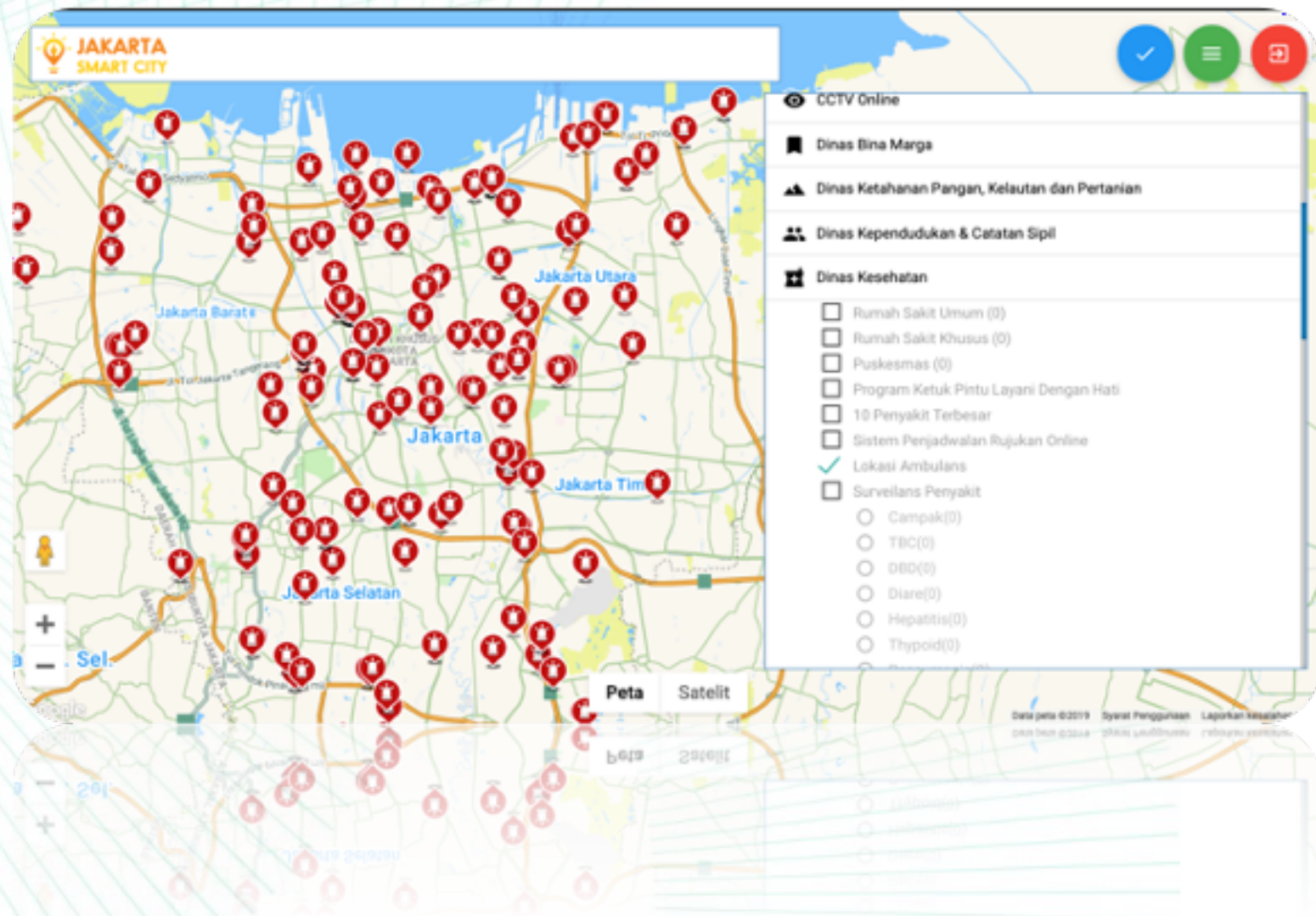
Jakarta Provincial Government collaborates with the Trafi Application to integrate the Transjakarta bus Tracking API as well as information on public transportation in Jakarta so that people can find out the location of Transjakarta buses in real-time.

Also, through this application, the public can find out various route recommendations based on cost, time, and other options.

Tracking Ambulance

S

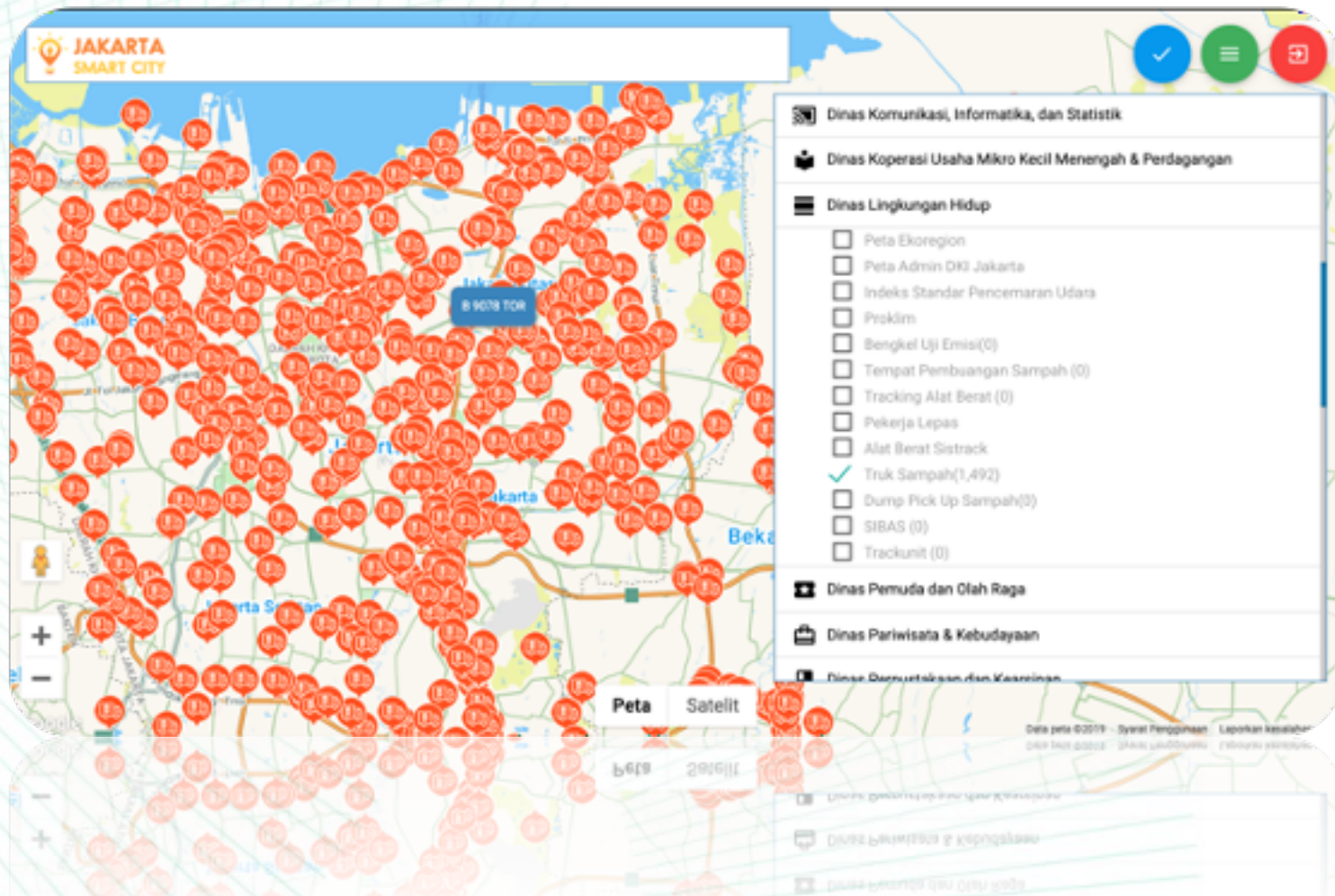
DKI Jakarta Provincial Government has installed Global Positioning System (GPS) tool for more than 80 ambulances owned by the DKI Jakarta Health Office. This GPS can help the government to monitor the location of the ambulance in real-time so that it can coordinate with the ambulance officers more effectively and efficiently.



Tracking Garbage Trucks

There are more than 1,200 garbage trucks in Jakarta that have been installed with Global Positioning System (GPS) equipment by the Jakarta Environment Agency. This policy is carried out to monitor the location and route that every garbage truck operates, so as to avoid misuse of the garbage truck.

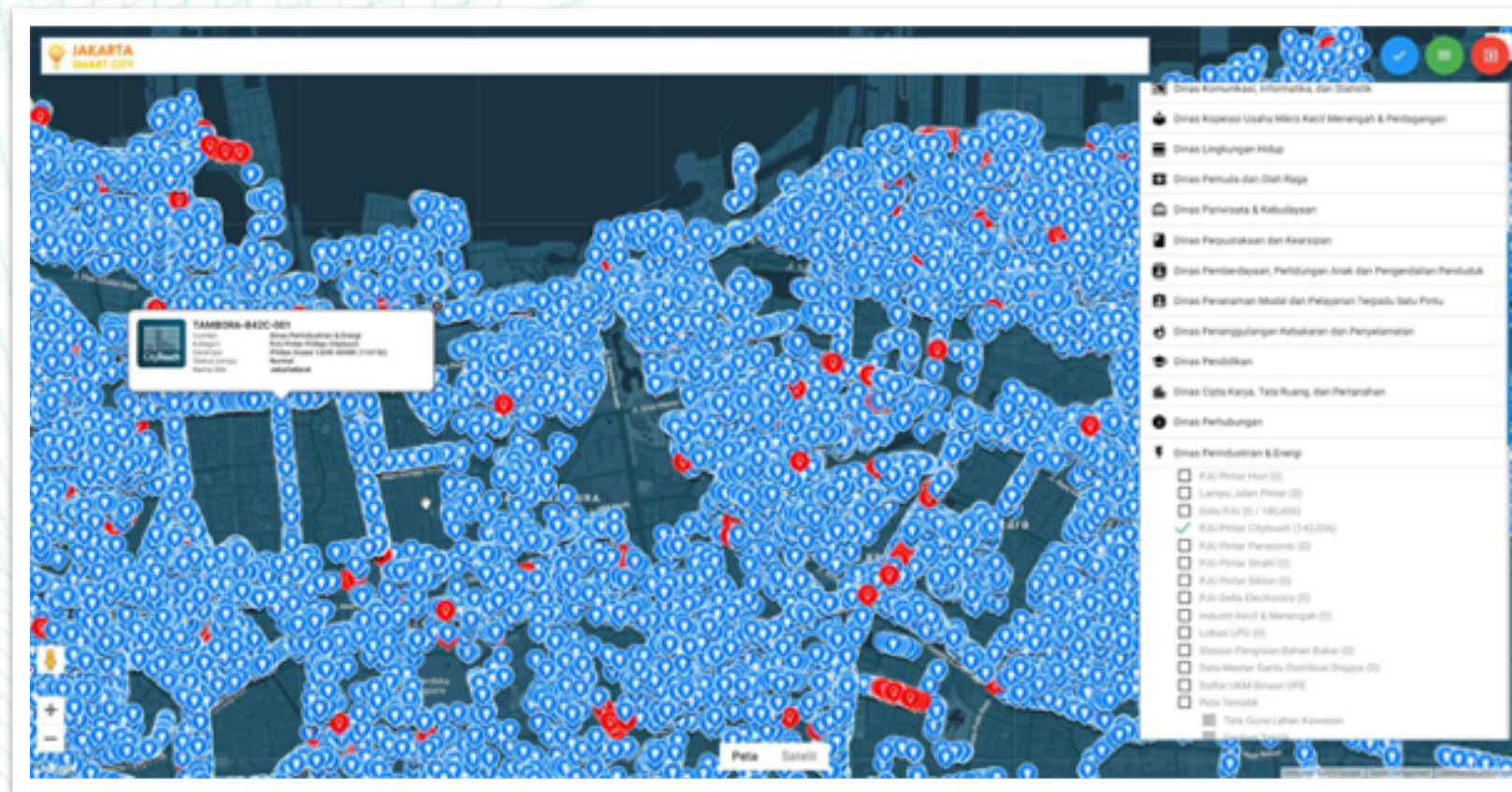
Besides that, the data of waste transportation routes is also analyzed to improve the management of waste transportation routes to be more efficient.



Smart Street Light

DKI Jakarta Provincial Government through the Department of Industry and Energy has installed more than 200.000 public street lighting in Jakarta. All of these street lights have been integrated with the Jakarta Smart City map website and the Industry & Energy Department Command Center.

The integration makes the DKI Jakarta Provincial Government be able to control all of the lights automatically and detect various problem lights in Jakarta.



Cyber Security Challenges

Personal data privacy is key

Cities infrastructure must be secure

Secure from design makes a difference



thehackernews.com

Security by Default/Design

“The idea is to build in **security**, rather than asking users to opt in”

Self-Defending Apps

Using proactive security such as **Encryption Services** and **Two-Factor Authentication**

Defense-in-Concert

Layers are aware of everything that's happening in the environment (e.g. Phishing Email notification)

Discussion

Applications of AI in Smart Cities

- Advance security camera and surveillance system
- Vehicle parking and traffic management system
- Face detection cameras and movement for public safety
- Smart waste and disposal management system
- Flood monitoring system
- etc.

AI Smart City Challenge

- Infrastructure and costing
- Security and privacy concerns
- etc.

AI opens new avenues for smart cities

- A data-driven 'smart city' (city brain)
- Public-private partnerships
- Open innovation areas or sandboxes
- etc.

Business Model

Smart City as a Data

City data is recognized as a significant asset for the deployment of SC where SC data impact multiple services in various inter-disciplinary domains

Smart City as a Service

Providing secure, reliable, and fast integration based on API (Application Program Interface) public services to citizens

Smart City as a Platform

Jakarta has created digital platform that are ready to be used for city Co-creators (e.g. communities, industries and start-ups)

Smart City as a Hub

Integration of various data platforms from different services

Smart City as an Ecosystem

Building new business models for AI ecosystems instead of depending on financial restrictions (e.g. APBN/APBD)

Thank You

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Yudhistira Nugraha is a senior member of the Indonesian Government, currently assigned to Director of Jakarta Smart City - the Provincial Government of Jakarta. He had been working for more than 13 years at the Ministry of Communications and Informatics. His last assignment at the Ministry was the Deputy Director for E-Government Services in Economic Affairs.

Yudhistira holds a D.Phil. in Cyber Security from the University of Oxford. He is also a Data Protection Officer (ECPC-B DPO) certified by the European Centre of Privacy and Cybersecurity (ECPC) of Maastricht University, The Netherlands. Also, Yudhistira is a professional lecturer and research associate at Telkom University in the field of privacy, security, smart city, and health Informatics.