



*Data-Driven Technologies in Directorate  
General of Treasury*

# The Implementation of Data Science in the Directorate General of Treasury

Directorate General of Treasury  
Jakarta, April 2024



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III. Projects

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# Introduction



DATA

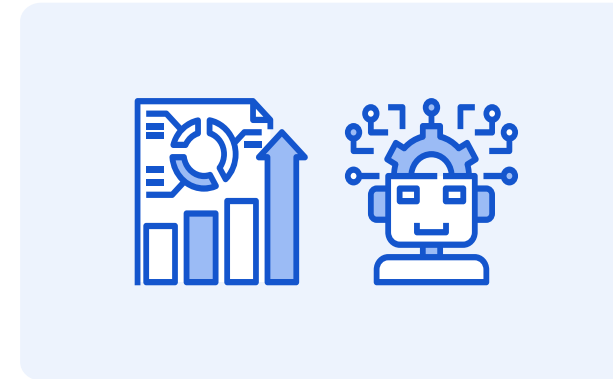
# Background

Within the context of the Directorate General of Treasury, Data Science and Artificial Intelligence are being leveraged to improve financial management, decision-making, and operational efficiency within the organization.

The implementation of data science using advanced analytics techniques to analyze financial data, identify patterns, forecast trends, optimize processes, and make data-driven decisions.



# Structure



## Data Source

INTERNAL	EKSTERNAL
<ul style="list-style-type: none"> <li>• SPAN</li> <li>• SAKTI</li> <li>• DIGIT</li> <li>• Data Survey Region Office/KPPN</li> <li>• Other Internal Data</li> </ul>	<ul style="list-style-type: none"> <li>• Statistical Bureau</li> <li>• Bloomberg Data</li> <li>• Other Source</li> </ul>

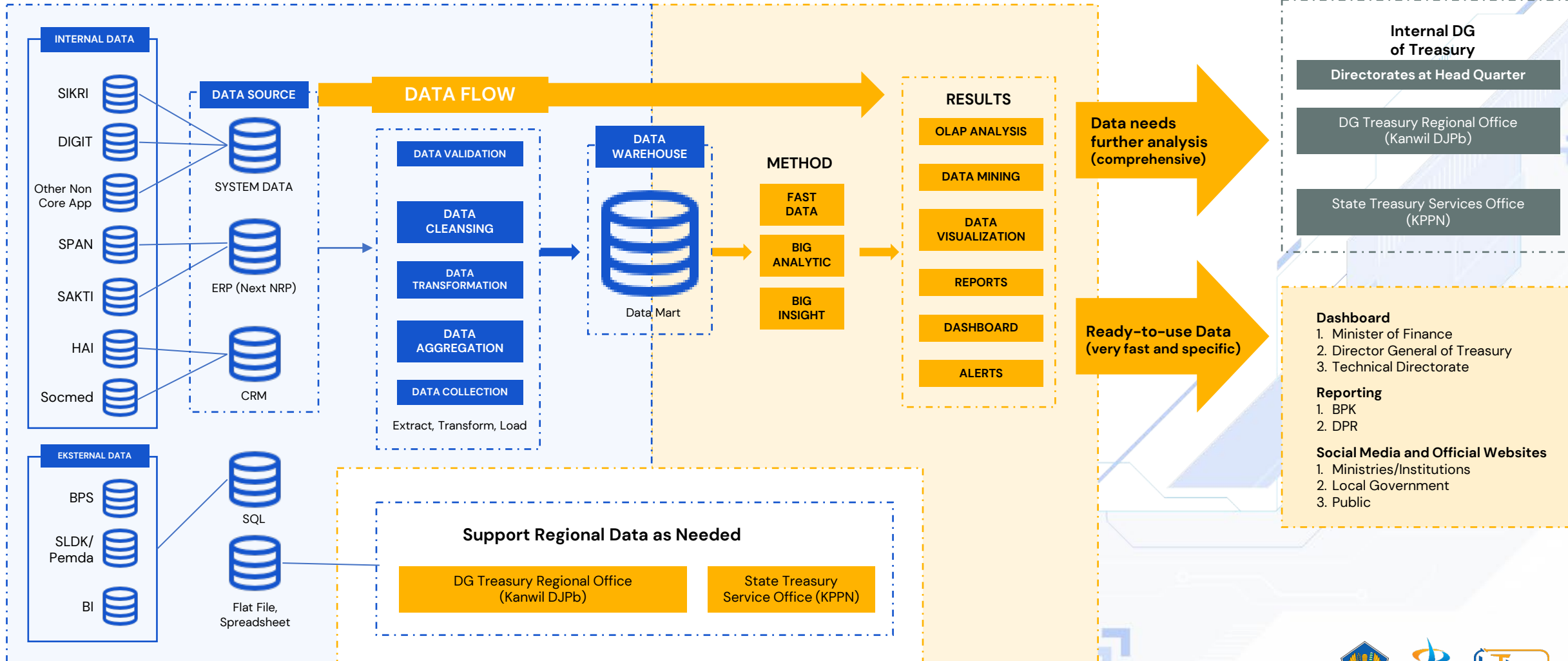
## Data Process



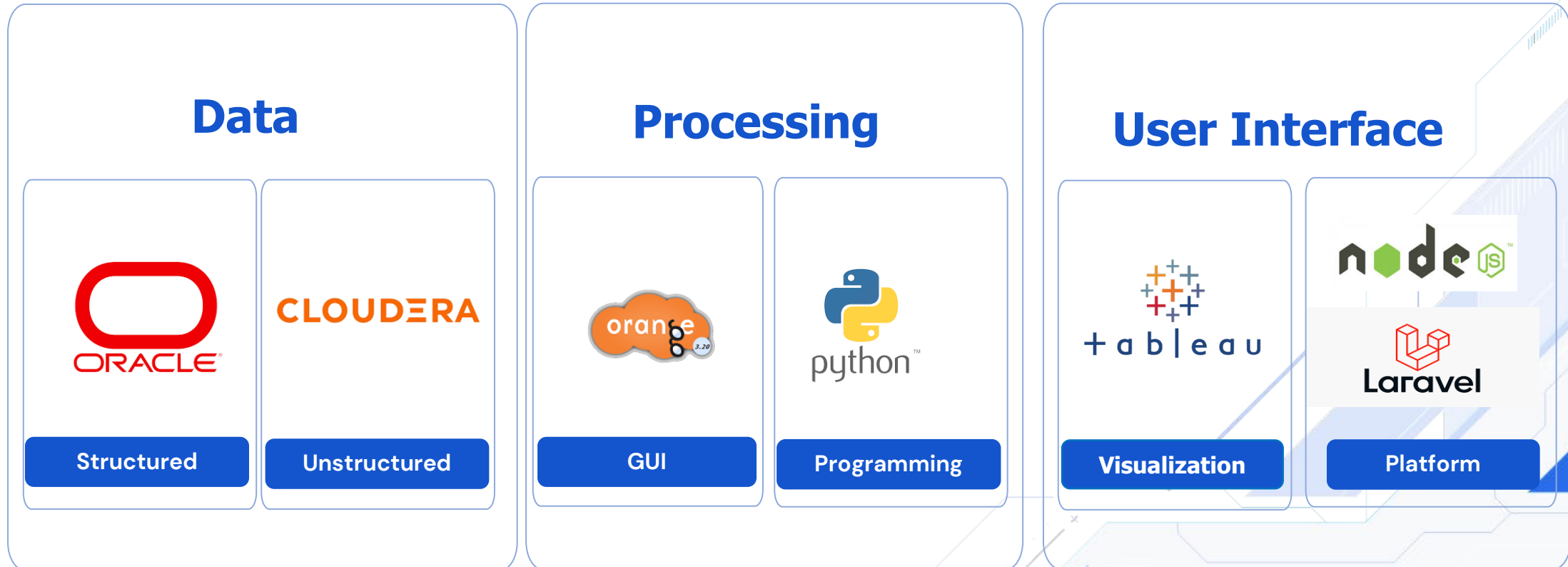
## Output



# Introduction



# Development Tools





# Case Development Approach





# Use Case ?

1. Request from business process owners;
2. Benchmarking from other Countries/ Agencies;
3. Obtained from data analytics competitions;
4. Workshop/ Focus Group Discussions.

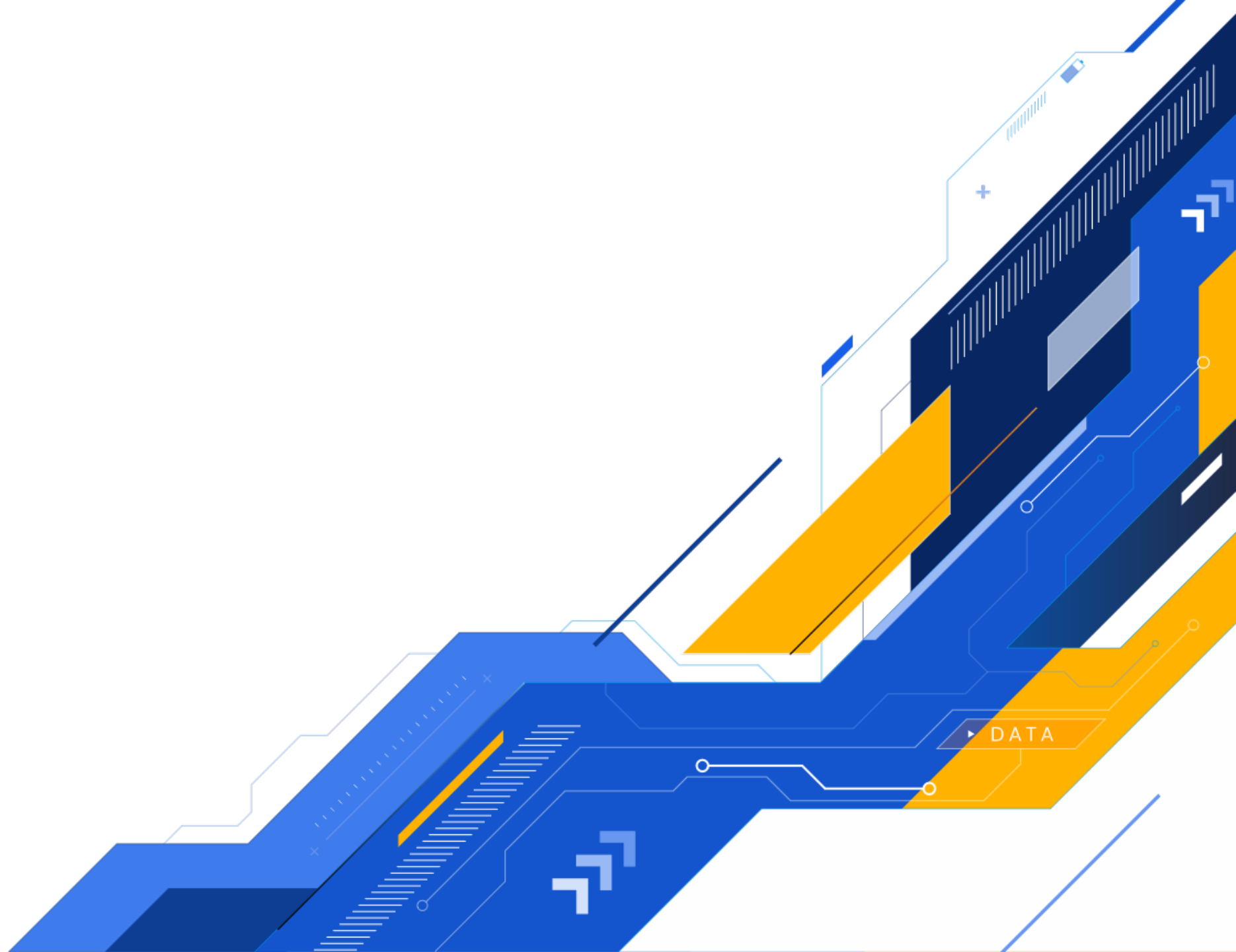


## Data Analytics Competitions

This Data Analytics Competition is aimed at adapting the skill sets possessed by the DG of Treasury Regional Office (Kanwil DJPb)/State Treasury Services Office (KPPN) employees to be able to complete several new tasks assigned to them.



# Projects



# Treasury Big Data (Products)



## Open Data

Download | Upload | Request



## Dynamic Dashboard

Descriptive, Predictive, and Prescriptive Analytics.



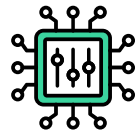
## Artificial Intelligence

Natural Language Processing;  
Digital Assistance (BOT);  
Detection and Recognition.



## Data Analytics

Government Expenditure;  
Cash Management;  
Government Investment.



## Machine Learning

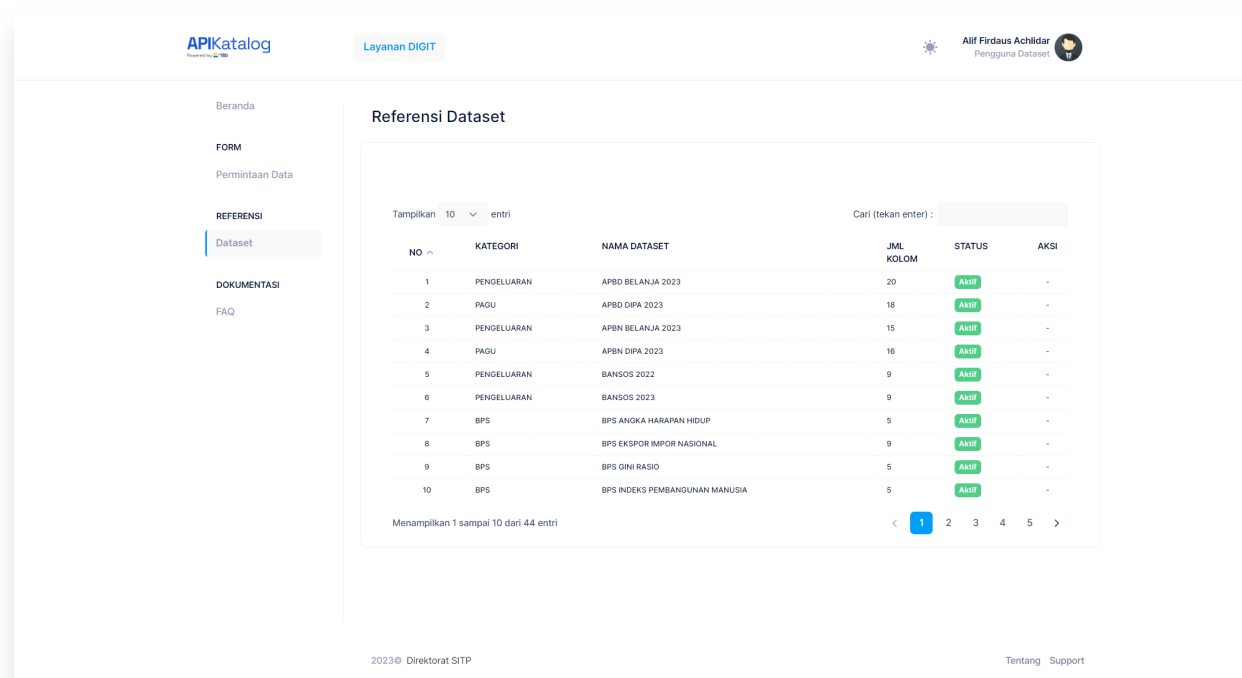
Revenue Trajectory;  
Optimum Cash Buffer (on progress);  
Data Labelling on Payments (on progress).



# Open Data

## Development Background

1. Data needs by stakeholders (Kanwil DJPb & KPPN)
2. The role of Kanwil DJPb as Regional Chief Economist and Financial Advisor
3. Data is scattered from various sources (OM SPAN, MONSAKTI, BPS, Simtrada/SIKD, SIKRI, BI, Regional Government, SIKP, MPN, etc.)
4. Routine data requirements (weekly/monthly), short data preparation time
5. The need for data access both via the internet and intranet



The screenshot shows the APIkatalog website interface. At the top, there is a navigation bar with the APIkatalog logo, a 'Layanan DIGIT' button, and a user profile for 'Alif Firdaus Achldiar' with the role 'Pengguna Dataset'. The main content area is titled 'Referensi Dataset' and features a search bar and a table of datasets. The table has columns for 'NO', 'KATEGORI', 'NAMA DATASET', 'JML KOLOM', 'STATUS', and 'AKSI'. The table lists 10 datasets, all with a status of 'Aktif'. Below the table, there is a pagination control showing 'Menampilkan 1 sampai 10 dari 44 entri' and a page number '1'.

NO	KATEGORI	NAMA DATASET	JML KOLOM	STATUS	AKSI
1	PENGELUARAN	APBD BELANJA 2023	20	Aktif	-
2	PAGU	APBD DIPA 2023	18	Aktif	-
3	PENGELUARAN	APBN BELANJA 2023	15	Aktif	-
4	PAGU	APBN DIPA 2023	16	Aktif	-
5	PENGELUARAN	BANSOS 2022	9	Aktif	-
6	PENGELUARAN	BANSOS 2023	9	Aktif	-
7	BPS	BPS ANGKA HARAPAN HIDUP	5	Aktif	-
8	BPS	BPS EKSPOR IMPOR NASIONAL	9	Aktif	-
9	BPS	BPS GINI RASIO	5	Aktif	-
10	BPS	BPS INDEKS PEMBANGUNAN MANUSIA	5	Aktif	-



# Open Data

## Concept

1. Programming interface for data sharing that uses data on Treasury Big Data.
2. Users can choose the required data themselves.
3. The output can be an API link or a CSV/XLS file.
4. Data can be streamed to the system or humans.
5. Can be accessed via the internet or intranet.

## Benefit

Supporting data needs quickly and independently for both internal Ministry of Finance (KPPN, Kanwil DJPb, other Directorates, and Echelon 1) and external to the Ministry of Finance.\*

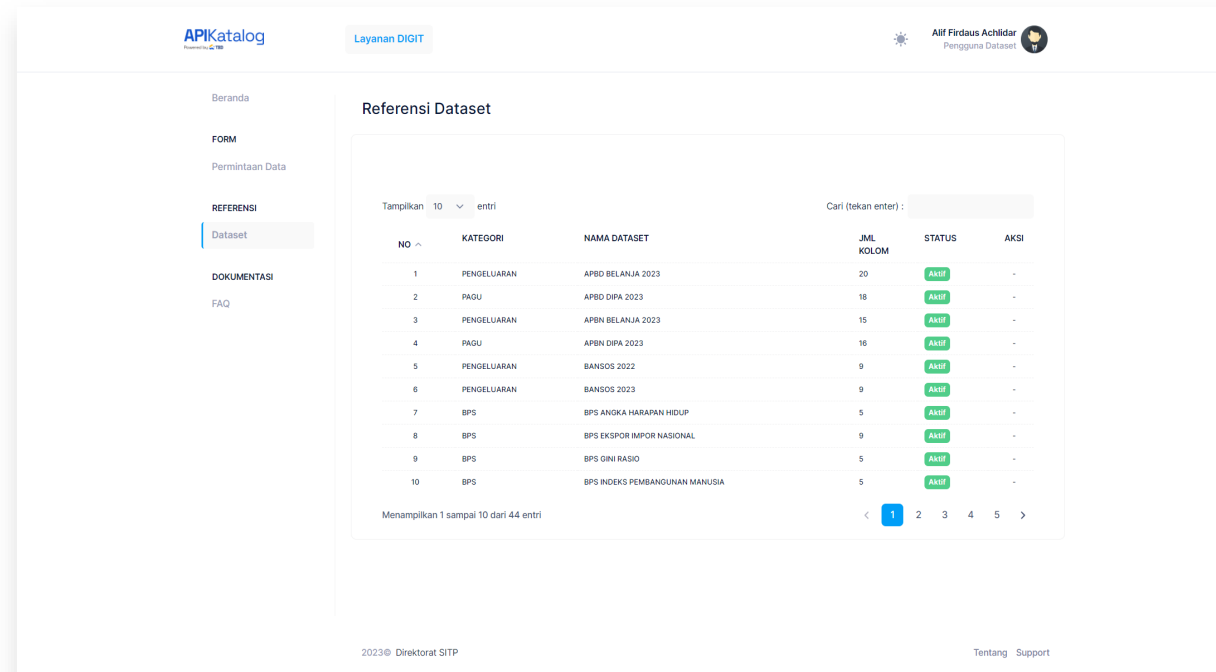
\*Adapts to Ministry of Finance regulations

## Features

Download Data

Upload Data

Request Data



The screenshot shows the APIKatalog web application interface. The header includes the logo 'APIKatalog' and the user profile 'Alif Firdaus Achidar, Pengguna Dataset'. The main content area is titled 'Referensi Dataset' and displays a table of datasets. The table has columns for 'NO', 'KATEGORI', 'NAMA DATASET', 'JML KOLOM', 'STATUS', and 'AKSI'. The table lists 10 datasets, all with a status of 'Aktif'. The footer of the page includes '2023© Direktorat SITP' and 'Tentang Support'.

NO	KATEGORI	NAMA DATASET	JML KOLOM	STATUS	AKSI
1	PENGELUARAN	APBD BELANJA 2023	20	Aktif	-
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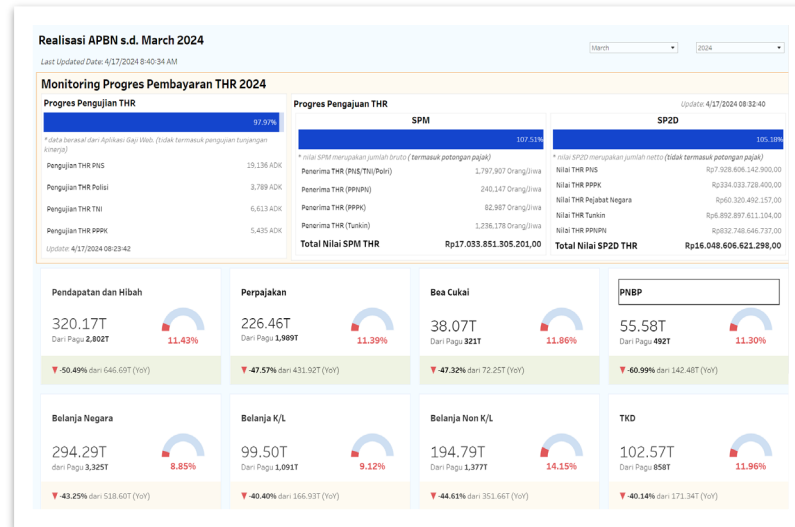
# Dynamic Dashboard

## Description

Dynamic dashboard used by leaders to monitor the latest business process developments and used by leaders for decision-making.

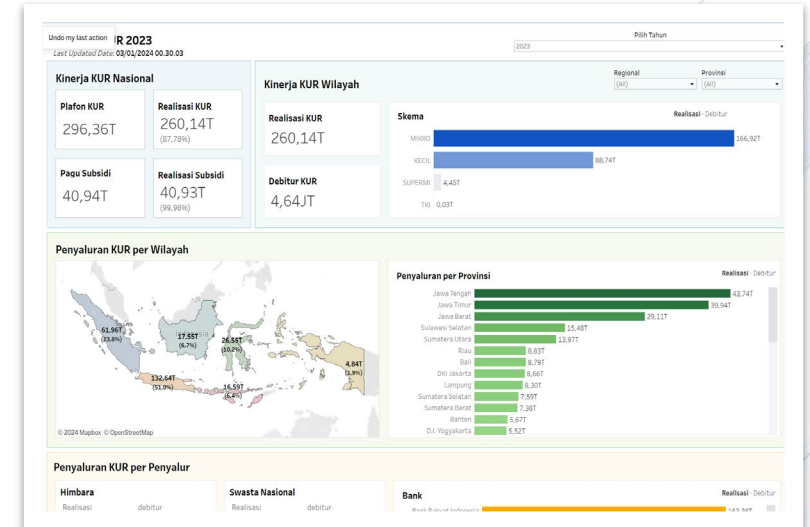
## Objectives

The objectives of this dynamic dashboard are to help leaders monitor business process activities and help leaders make more accurate decisions



## Leadership Dashboard - APBN realization

Dashboard used by the Director General of Treasury to monitor the realization that has occurred in the year concerned



## Government Subsidy

Dashboard used by leaders at the Directorate General of Treasury to see the realization of Government subsidies distribution in the current year on a national and regional scale.



# Artificial Intelligence

## Development Background

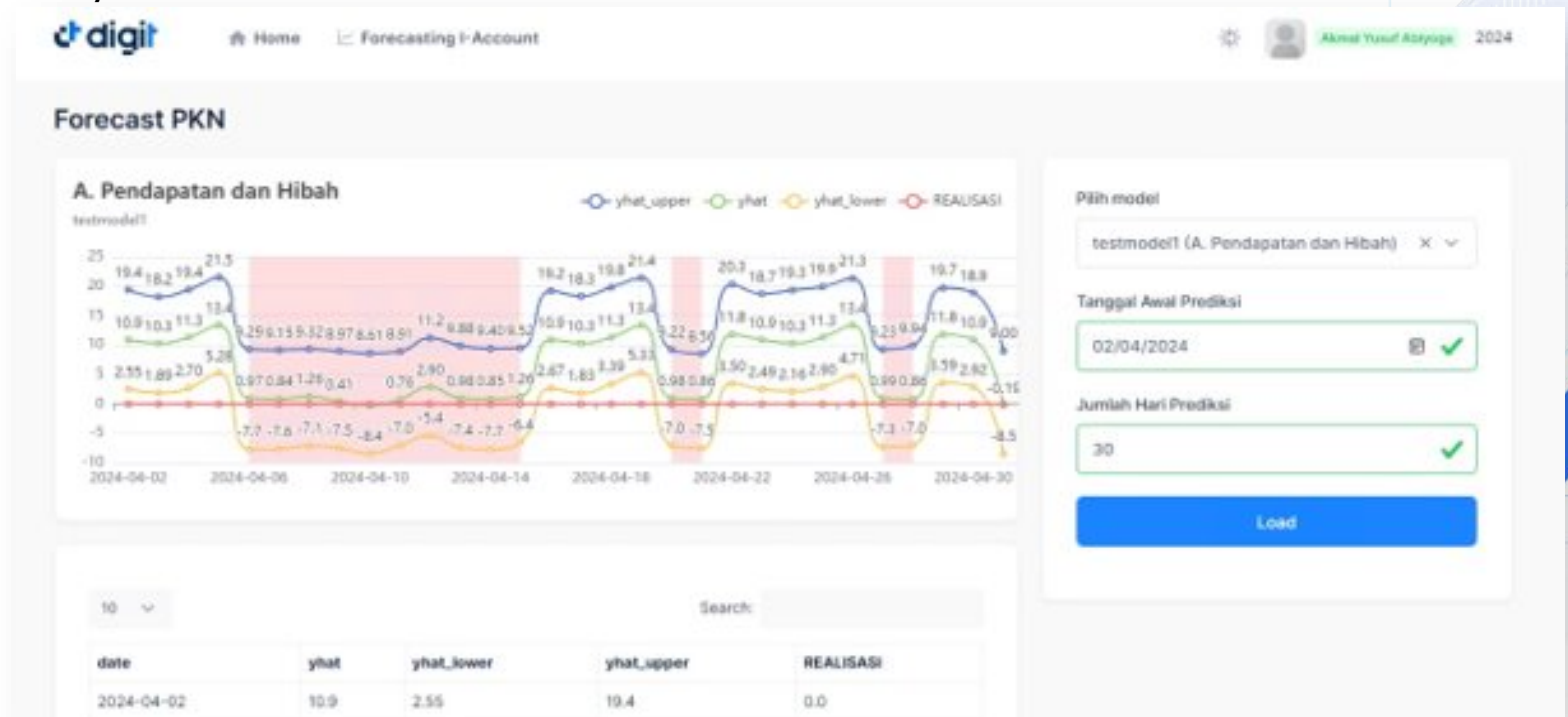
The Ministry of Finance is facing challenges in managing government cash due to the complexity of its duties and the abundance of financial data. With manual analysis becoming more difficult, decision-making is impacted, and it's leading to increased uncertainty and risk. Timely and accurate decisions are vital for financial stability and efficient public services, considering economic changes and political dynamics.

## Description

A simulation system that can produce projections of APBN realization based on predetermined scenarios. This includes projections of income, expenditure and other main items in the APBN

## Objective

Implementing an IT-based treasury system for APBN simulation, facilitating rapid financial data processing and strategic decision support to maximize government cash management efficiency.



# Data Analytics

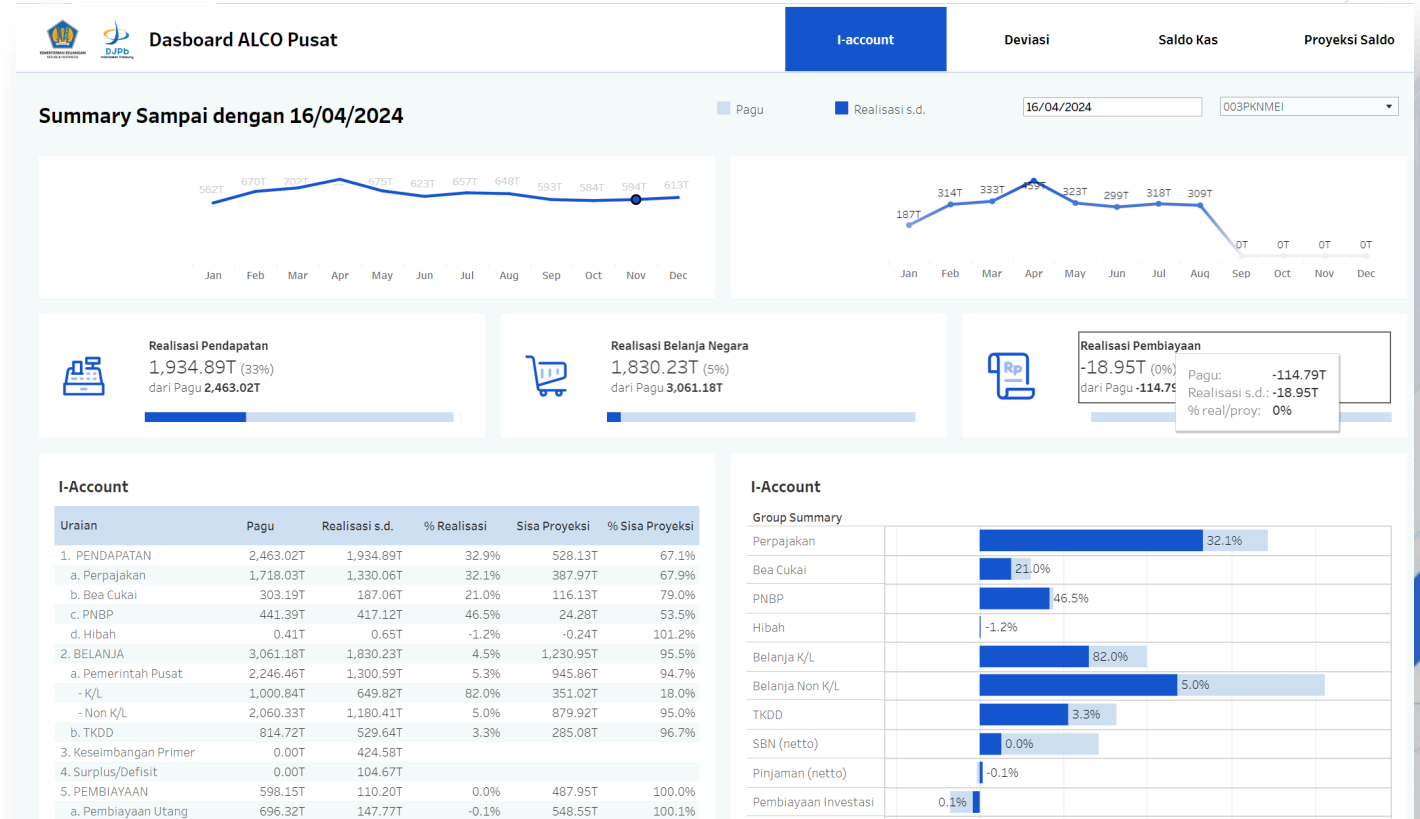
## Asset Liability Committee's Dashboard

### Development Background

1. Data presentation is still static and does not answer decision-making needs.
2. Preparation of reports to support decision-making is still manual (using Microsoft Excel)
3. There are no projections yet prepared using a Machine Learning (ML) approach

### Objective

Providing devices (systems) that provide flexibility in presenting actual and projected data and producing projections using a Machine Learning approach so that they are able to provide input in decision making





# Machine Learning

digil Layan Treasury Big Data MODUL TID

Form Prediksi Financial Distress

Pilih Kabupaten/Kota: KOTA SURABAYA\_1330

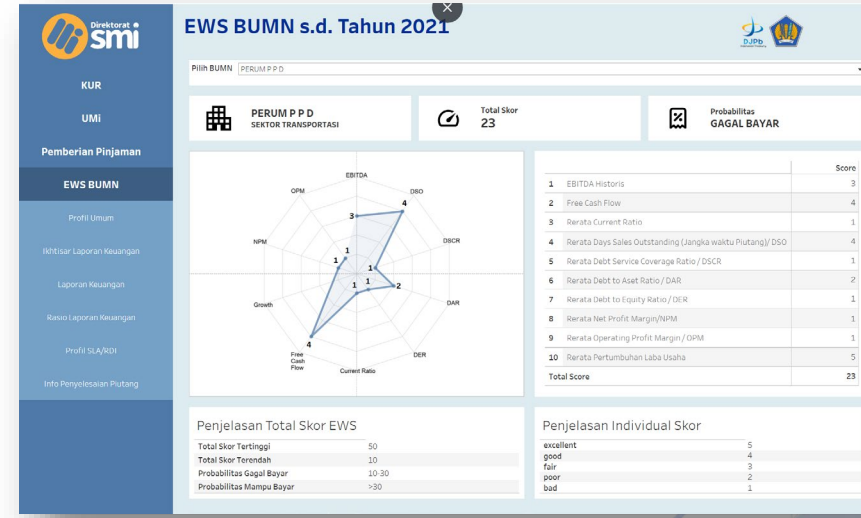
Pilih Kabupaten/Kota: KOTA SURABAYA\_1330

Load

1. Pendapatan Pajak Daerah: 3.648.730.000.000
2. Pendapatan Retribusi Daerah: 235.592.000.000
3. Pendapatan Hasil Pengelolaan Kekayaan Daerah yang Dipisahkan: 180.867.000.000
4. Lain-lain Pendapatan Asli Daerah yang Sah: 896.567.000.000
5. Dana Bagi Hasil Pajak: 538.285.000.000
6. Dana Bagi Hasil Bukan Pajak/SDA: 63.748.700.000
7. Dana Alokasi Umum: 1.187.960.000.000
8. Dana Alokasi Khusus: 384.347.000.000
9. Dana Otonomi Khusus: 0
10. Dana Kelatimewasan: 0
11. Dana Penyesuaian: 0
12. Dana Insentif Daerah: 48.997.000.000
13. Dana Desa: 0
14. Dana Bantuan Operasional Sekolah: 0
15. Pendapatan Bagi Hasil Pajak: 1.013.810.000.000
16. Pendapatan Bagi Hasil Lainnya: 0
17. Pendapatan Dana Otonomi Khusus (Kab/Kota): 0
18. Bantuan Keuangan dari Pemerintah Daerah Provinsi Lainnya: 3.255.400.000
19. Bantuan Keuangan dari Pemerintah Daerah Kabupaten: 0
20. Bantuan Keuangan dari Pemerintah Daerah Kota Lainnya: 0

## Financial Distress Pemda

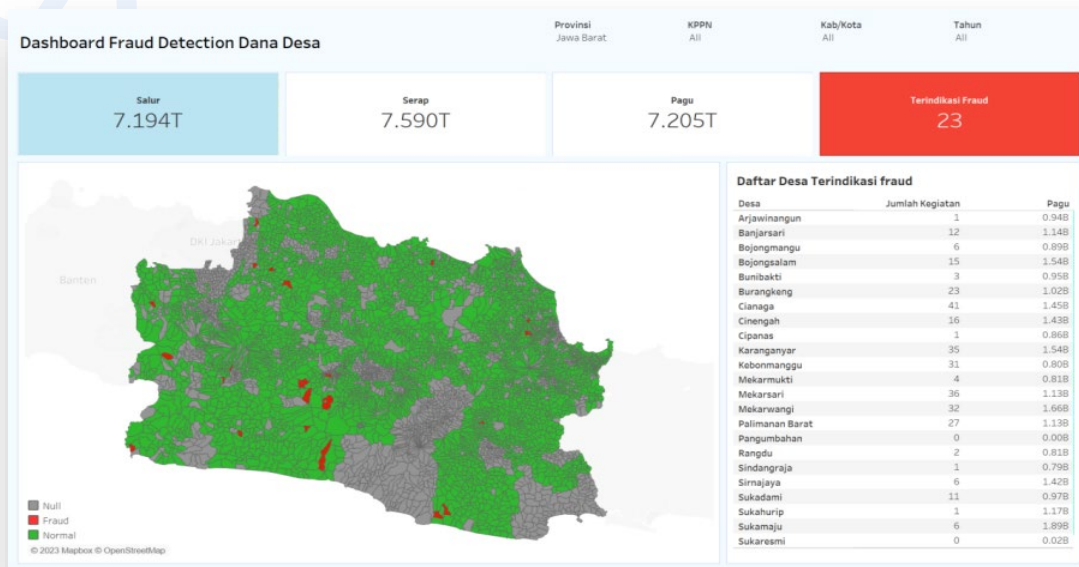
Using machine learning as a risk mitigation effort in predicting debtor (local government) failure to pay. The user selects the name of the Province/City and then adjusts the existing financial components so that the user can predict whether the debt can be paid or not



## Early Warning System For State-Owned Enterprise

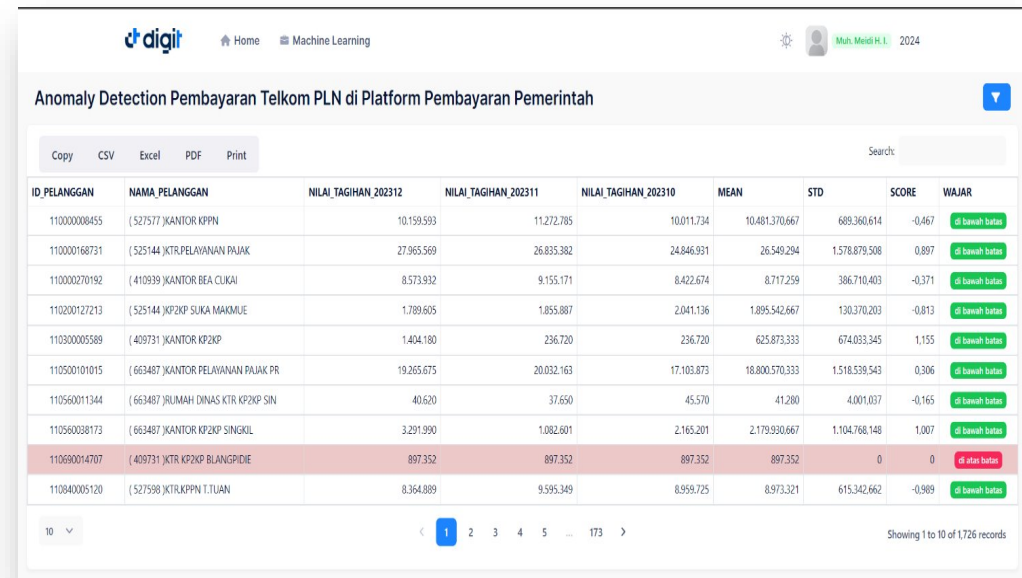
Platform to determine the payment capacity of state-owned enterprises as a step to prevent payment failures of state-owned enterprises.

# Machine Learning



## Fraud Detection Utilization of Village Funds

Machine Learning technique used to identify unusual patterns in terms of Village Fund distribution.



## Anomaly Detection PPP

It is used to identify data or events that are unusual or do not match existing patterns in the Government Payment Platform (PPP) data set using machine learning.

# Machine Learning

## Metode Labeling

Labeling dilakukan dengan menggunakan label

**1** & **2**

NON-URGENT

URGENT

Kolom yang dipertimbangkan



Rest API

## SPM/SP2D (Disbursement Documents) Labeling to Determine Payment Priorities Description

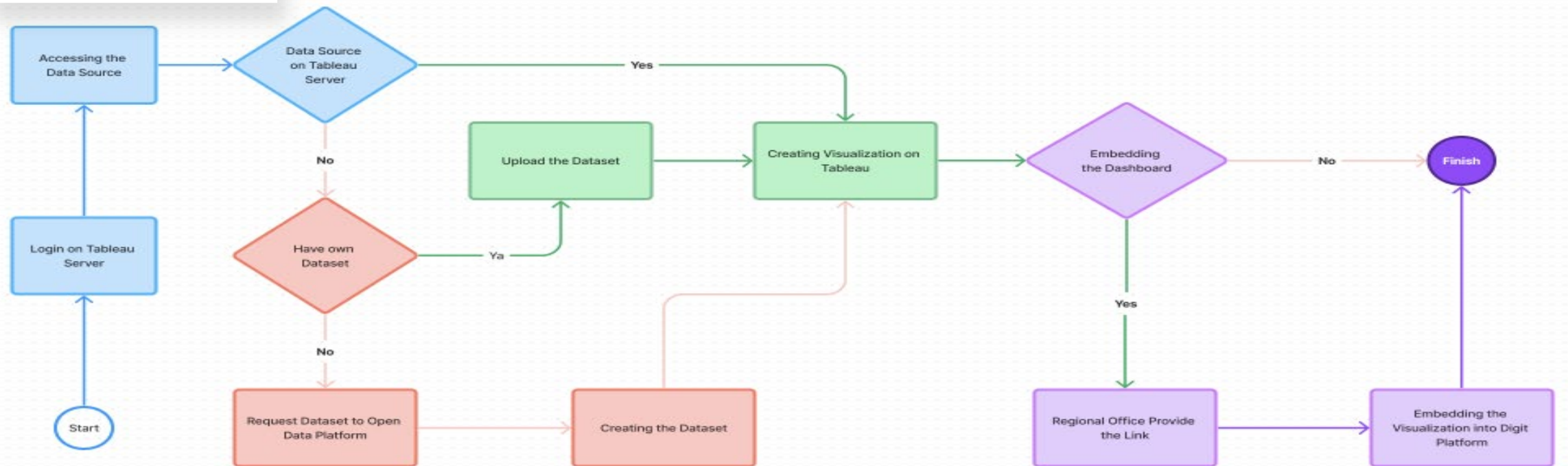
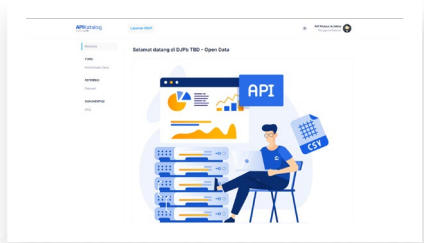
Machine Learning for classifying SPM which is processed into SP2D based on the level of urgency.



# Future Works



# Integrated Platforms



Developing an integrated platform that will be used by the Regional Office of the Directorate General of Treasury (Kanwil DJPb) and the State Treasury Services Office (KPPN).



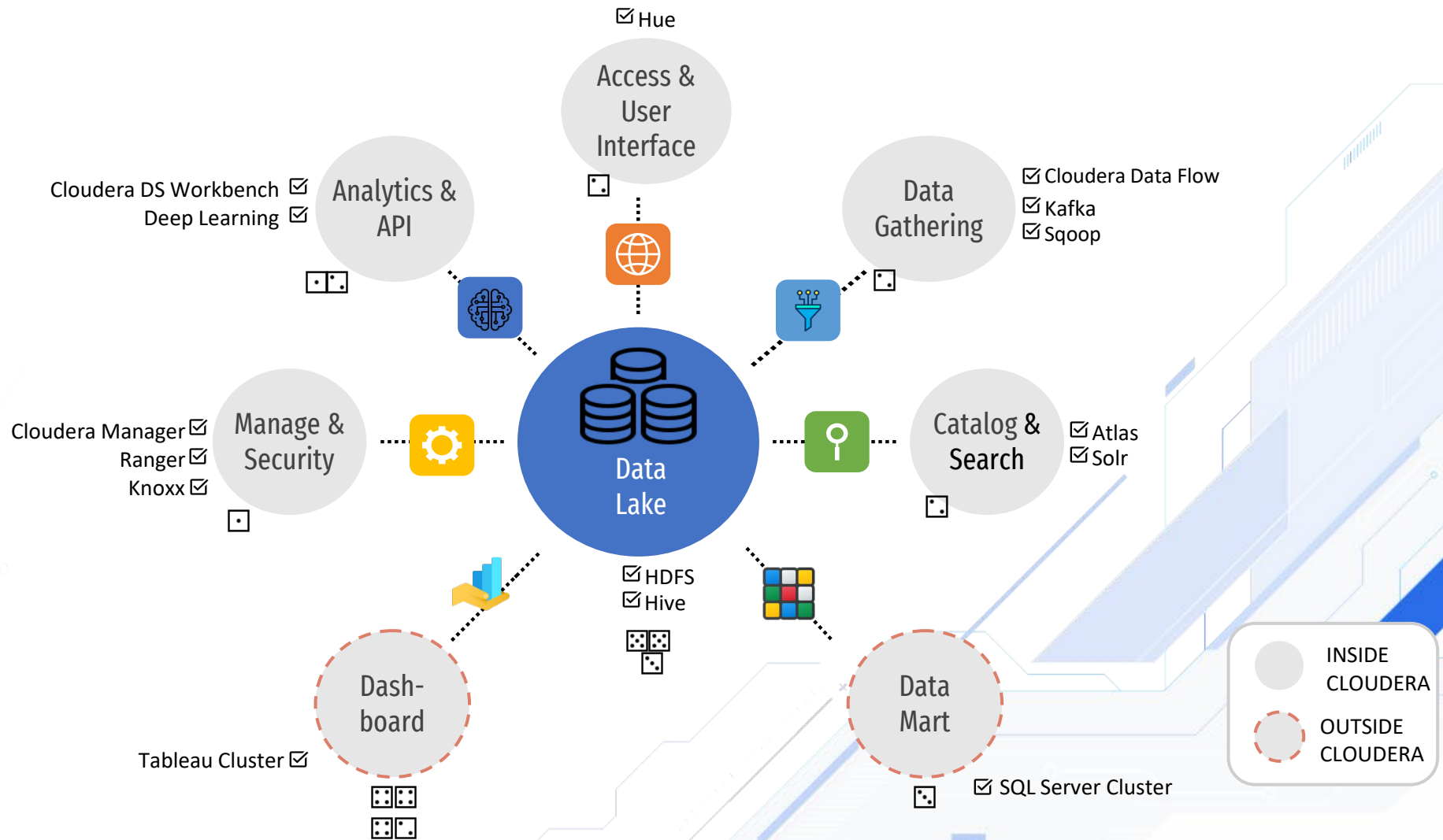
# Natural Language Processing

Using non-structured data from HAI (customer service platform in DG of Treasury) as a dataset using NLP and making it as a database for answering the questions from stakeholders using Chatbot

# Computer Vision and Image Recognition

Mitigating the risk and early fraud detection for the internal compliance division by scrapping employee social media picture and compare it with their salary profiles

# Enhancing Treasury Big Data Environment for the Next Data Science Projects



# THANK YOU

