SEELOZ

The world’s first Autonomous Requirements Planning (ARP) Engine

Supply Chain Automation Suite (SCAS) User Guide

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1.0 SCAS Overview

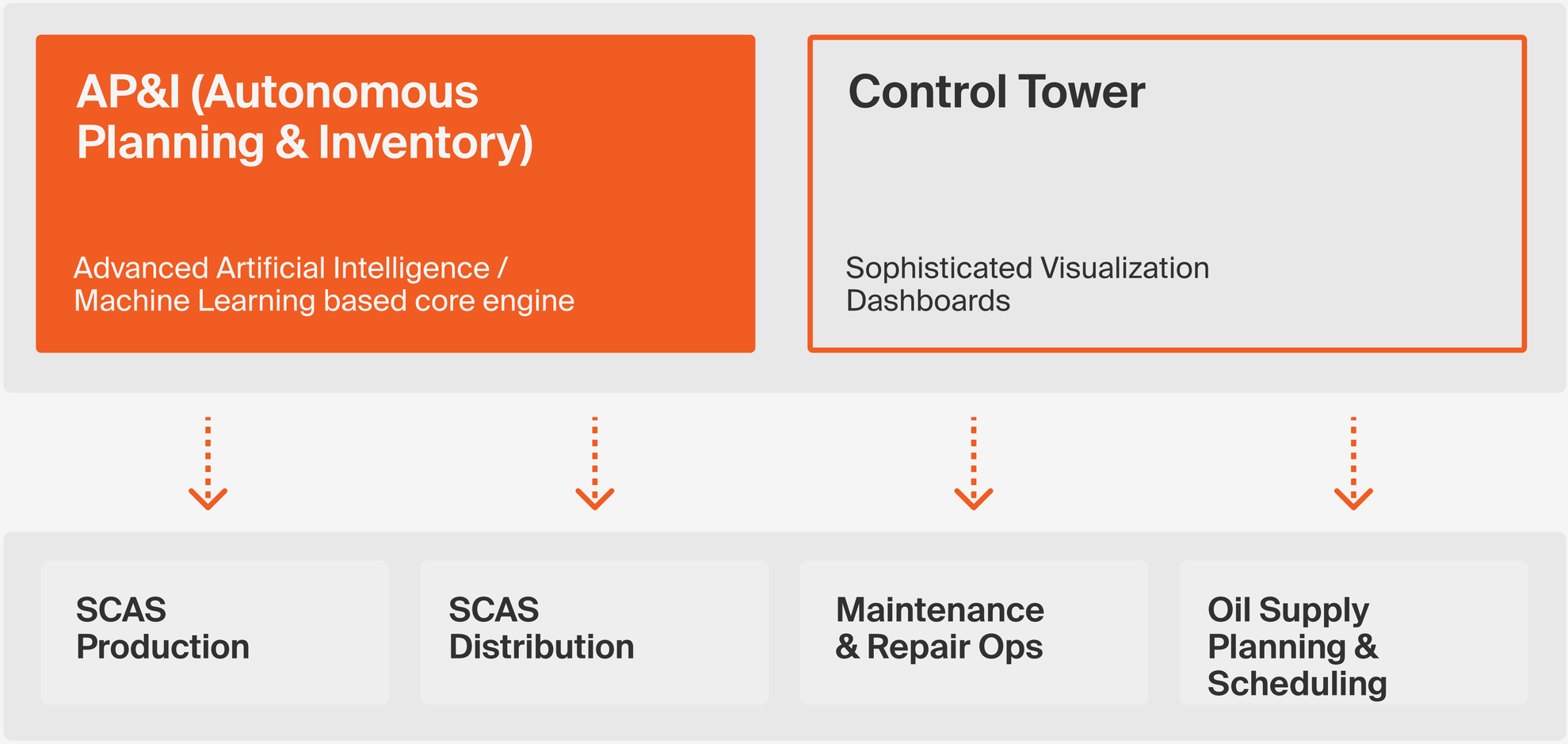
In times of uncertainty and rapid change, global supply chains are facing unprecedented challenges. Effectively navigating these volatile environments using traditional forecasting/ inventory management methods frequently results in inefficiencies throughout the supply chain.

SCAS (Supply Chain Automation Suite) is the world’s first Autonomous Requirements Planning (ARP) Engine. Designed to autonomously drive efficiency, resilience, and sustainability across essential supply chains, SCAS is the trusted auto-pilot that supports the captains of modern supply chains.

It serves as a reliable Artificial Intelligence solution that dynamically tunes the delicate balance between supply chain efficiency and robustness, enabling high velocity decision making.

While SCAS is easily integrated with ERPs, it offers vertical specific capabilities which can be customized to meet customer needs. With Vertical AI and access to data, SCAS is able to deliver transformative business results in verticals that are heavily reliant on global supply chains.

SCAS Core Modules



SCAS Solutions: Application-Specific Implementations of Core Modules

1.1 SCAS Core Modules

SCAS makes both the Production and Distribution ends of supply chains effortless and efficient. It integrates with all modern ERP systems and uses that deep coupling to train and deploy two select modules. SCAS is composed of two modules, namely Autonomous Procurement & Inventory (AP&I) and Control Tower.

The first of these modules, the Autonomous Planning & Inventory service or AP&I. Replacing existing Material Requirements Planning (MRP) & Distribution Requirements Planning (DRP) systems, AP&I uses AI to autonomously generate replenishment orders with no need for separately generated forecasts, traditional inventory management parameters or traditional equation-driven inventory optimization.

The second module, the Control Tower, is a complete supply chain visualizer that maps and tracks inventory movement at all stages of complex multi-location supply chains. It also serves as a complement to the AP&I by visualizing the purchase and manufacturing order suggestions of the AI suite in context of previous order values, highlighting any significant deviations from historic trends so that human operators can quickly scan and grasp the highlights of output of the AP&I.

1.2 SCAS Solutions

With vertical-specific AI capabilities and universal integrations, SCAS autonomously drives operational decisions across different types of supply chain., SCAS builds on its core differentiated capabilities to reimagine supply chain management across a wide range of verticals.

The four SCAS Solutions are:

1/ **SCAS Distribution:** Autonomous outbound Distribution supply chains with maximized availability and minimized inventory.

2/ **SCAS Production:** Autonomously driving procurement, production and cross-warehouse movements for complex multi-stage manufacturing supply chains.

3/ **SCAS MRO (Maintenance, Repair & Overhaul):** Highly reliable MRO Supply Chains with substantially minimized inventory and enhanced ability to handle unexpected failures or breakdowns.

4/ **SCAS OSPAS (Oil Supply Planning & Scheduling):** Autonomously optimized upstream Oil & Gas operations with minimized waste, enhanced ability to handle demand fluctuations & maximized sustainability.

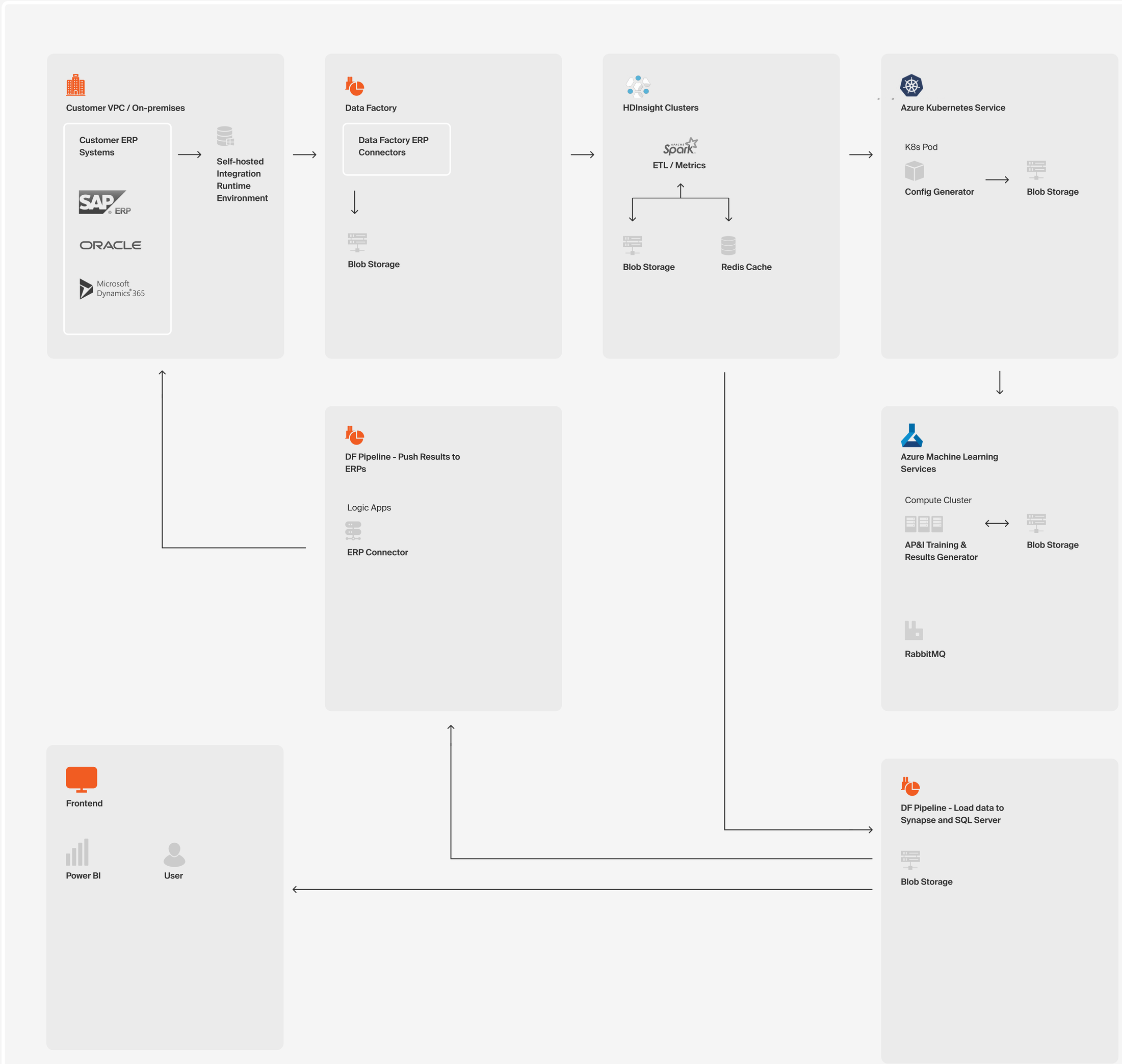


Figure 1: SCAS Production Service Architecture.

2.0 SCAS Technology

2.1 AP&I at a glance:

AP&I comprises two complementary functions:

A/ Supply Chain Behavioral Learning (replacing Forecasting):

Building on comprehensive correlation of past supply chain demand, inventory and supply, AP&I derives hundreds of millions of potential supply chain scenarios. By evolving to make continuously improved replenishment decisions, it drives competitive advantages throughout the supply chain.

B/ Autonomous Replenishment (without Equation-Driven Optimization):

Through a continuous Cross Supply Chain Visibility of current near real time supply chain behaviors (that is, granular changes across demand, inventory and supply), AP&I builds its learning capabilities to autonomously generate replenishment orders that maximize efficiency and profitability.

Once applied, AP&I demonstrates tangible ROI across three primary dimensions:

Bottom Line Improvements (P&L): Reduce costs related to carrying inventory, supply chain management, cross-warehouse movements, expediting and expirations (whenever applicable).

Top Line Improvements (P&L): Minimize stockouts while maximizing availability.

Cash to Cash Cycle (Balance Sheet): Minimize inventory Days to free tied up capital.

2.2 What Inputs does AP&I Need and how does it integrate?

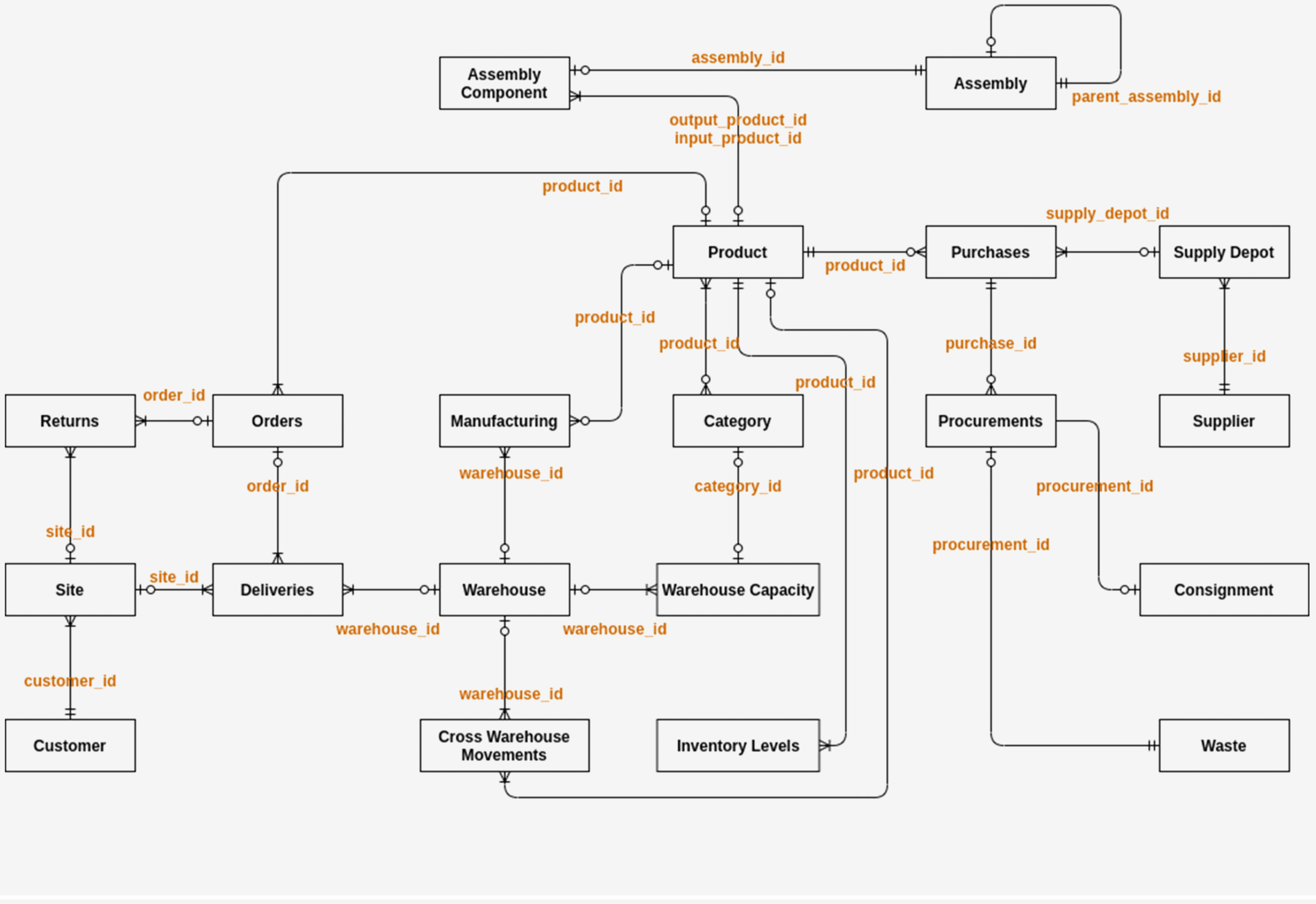
AP&I needs to analyze many transactional tables and fields from an ERP to be able to output meaningful recommendations. Whether the client uses Oracle, SAP or another ERP, Seeloz has created a Data Utility with the ability to easily and efficiently pull data from the client’s ERP. AP&I then uses these inputs along with config files generated by the Data Science team to trigger the AP&I machine learning. Below is a subset of the tables needed to run AP&I.

Type	MDM Entity	SAP ECC 6.0 Source Tables
Core (Distribution)	Product	MARA, MAKT
	Purchases	EKKO, EKPO, EKET
	Procurements (Inbound Deliveries from Purchases	MSEG, MKPF
	Waste	MSEG, MKPF, T157D
	Supplier	LFA1
	Supply Depot	LFA1
	Consignments / Lots	MSEG, EKET, MCHA
	Orders	VBAK, VBAP, VBRP
	Deliveries	LIKP, LIPS, VBEP
	Returns	MSEG, MKPF, LIKP, T157D, T157E
	Warehouse	T001W
	Customer	KNA1
	Site (Customer Branches)	KNA1
	Inventory Levels	MSEG, MARD
	Warehouse Movements	MSEG, MKPF
Manufacturing	Production	MSEG, MKPF, MBEW
	Consumption	MSEG, MKPF, MBEW
	Assembly Components	STKO, STPO

Once the Data Utility has successfully pulled the needed tables, data mapping is implemented via the Master Data Model. The Master Data Model for Seeloz represents a single schema that links all the entities from major ERP schemas (e.g., Oracle E-Business Suite, SAP ECC, Microsoft Dynamics) which are needed for SCAS' various data-driven operations.

The Data Utility and MDM power the Control Tower dashboard, providing all the visualization data needed as well as the proper structure for report building/generation. By having a comprehensive MDM that feeds into a state of the art Control Tower dashboard, Seeloz makes it easy for customers to see exactly what is going on with their supply chain and make better informed decisions on the rate and volume of their procurements.

Below is a sample master data model for a typical ERP with which SCAS integrates.



2.3 How does AP&I AI/Machine Learning Work?

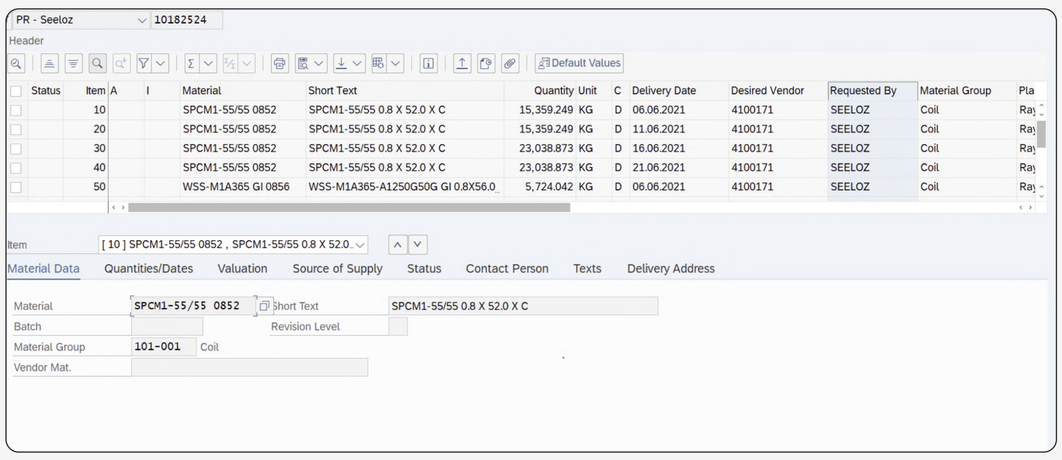
AP&I takes the same techniques computers used to beat the world’s leading chess grandmaster and applies them to winning the supply chain game! This differs from status quo AI supply chain planning systems that are simply creating computer enhanced statistical models to refine traditional forecasts. Unlike historical forecast based systems, AP&I AI engine plays out millions of possible scenarios of how the supply chain game might develop.

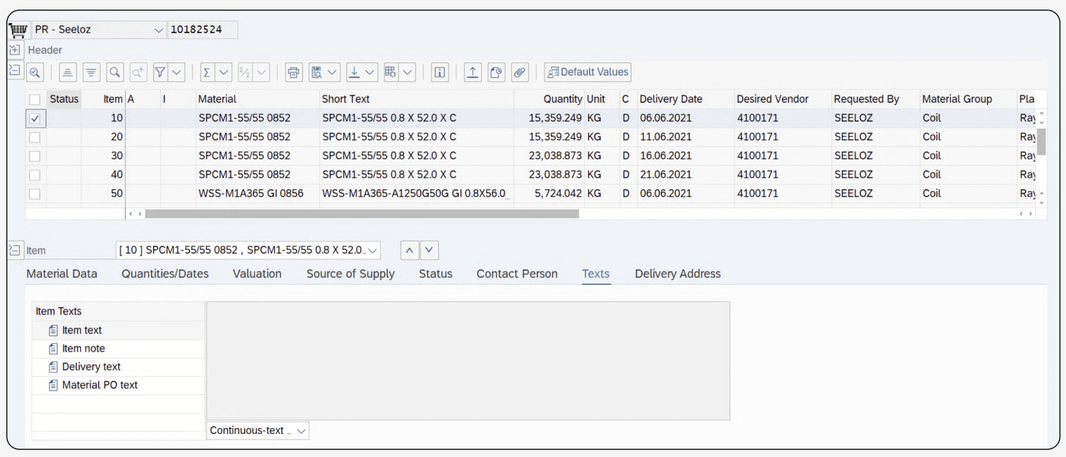
It then picks out moves that maximize future success in the vast majority of these anticipated futures. These moves are then translated into decisions that are seamlessly pushed to the transactional ERP’s for human approval/update & immediate execution. This process completely outperforms traditional AI planning tools in real world environments.

2.4 What are the Outputs of AP&I?

The outputs of AP&I are twofold. First, a set of procurement recommendations are pushed to the client’s SAP via the Seeloz Data Push Adapter. These recommendations come in the form of Purchase Requisitions that may be edited by the on-site decision maker. Below is an example of the Data Push to a customer using SAP. The material, quantity, delivery date, as well as the desired vendor are displayed for each product to be procured. Simultaneously, a user is able to edit this Purchase Requisition to better fit the best data available.

Below are some snapshots showing SCAS AP&I generated PRs in SAP:





The recommendations are also provided to the customer in excel format alongside the push to the ERP. The AP&I outputs are also accessible through the Control Tower (see section 3.4 and 3.5 of this document for details).

3.0 SCAS Usage Overview

3.1 Control Tower Overview:

The Control Tower is a one stop solution that allows users to have a comprehensive picture of their supply chain flows at any given time.

It is also the main source of information on the outputs of the Autonomous Planning & Inventory service where supply chain leaders can quickly skim through the outputs in the context of historical trends and future benefit.

The Control Tower is based on the robust Microsoft Power BI software system and Seeloz will provide your organization with an agreed number of users that access various levels of the Control Tower based on their clearance levels and credentials.

The system has multiple sections shared across or specialized to each of the SCAS Solutions.

In the following sections, we’ll cover the most common sections across the different SCAS Solutions and discuss the usage of each of them.

3.2 Executive Dashboard: (Fig.1)

This section is designed for the leadership team and allows executives to monitor, at a glance, the health of the production supply chain. We have designed it to be meaningful and concise so that the leadership team can stay focused on the bigger picture while flagging issues that might need their attention or intervention.

a1/ Navigation buttons: used to navigate between the different tabs.

a2/ Date slicer: used to select the time period for the displayed information.

a3/ Information cards: displays the total number of warehouses, customers, suppliers, and products for the selected time period.

a4/ Overview: displays a high-level overview on metrics such as days of inventory, value of orders, average inventory, and total procurement. These are shown as absolute values and as a percentage, compared to the previous year.

a5/ Actionable Insights: displays metrics that may reveal issues in the supply chain that need attention and resolution, we track flag items like Delays, Lost Sales etc.

a6/ AP&I Impact: AP&I (Automatic Inventory & Planning) Advantage: Summarizes the business impact of Seeloz SCAS on the overall supply chain by comparing Pre & Post on vital business metrics like Stock-Outs, Inventory levels, Average Procurement etc.

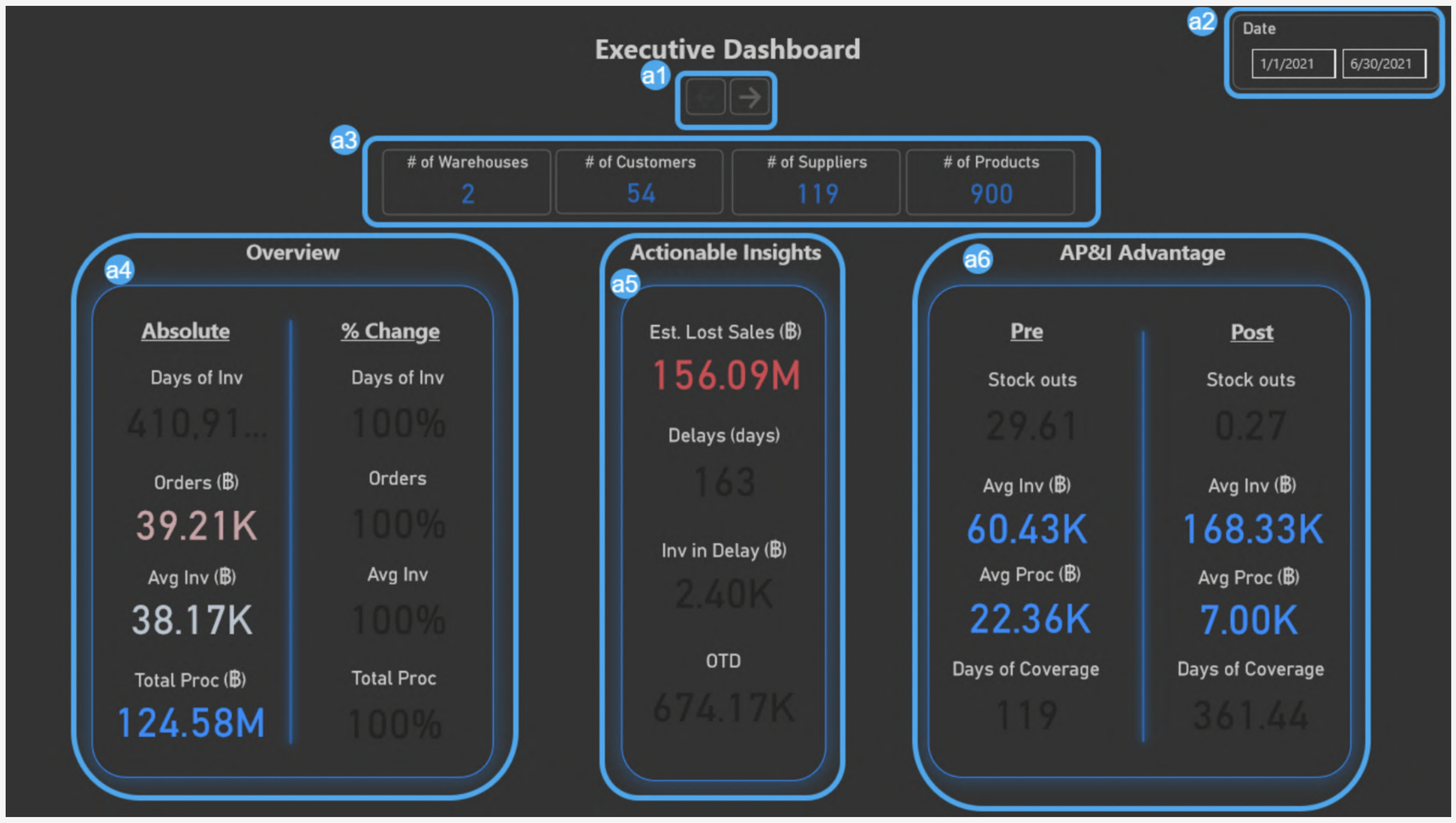


Fig.1: Executive Dashboard

3.3 Control Tower Main Dashboard

These sections on the main dashboard allow the business users to see their data, from four different perspectives (Warehouses, Supplies, Customers and Inventory), at a high level, or drill down to lower levels.

3.31 Warehouse Dashboard: (Fig.2)

This section shows all details on the warehouses, total warehouse resources and their distribution between the warehouses.

b1/ ProductCode slicer: used to filter the dashboard by ProductCode.
b2/ WarehouseCode slicer: used to filter the dashboard by WarehouseCode.
b3/ ProductType slicer: used to filter the dashboard by ProductType.
b4/ Date slicer: used to select the time period for the displayed information.
b5/ Navigation buttons: used to navigate between the different tabs.
b6/ Breakdown of inventory by warehouse.
b7/ Information cards showing information from all warehouses.
b8/ Graphs showing inventory values by warehouse.
b9/ Warehouse geographic locations.
b10/ Table showing details on each warehouse.

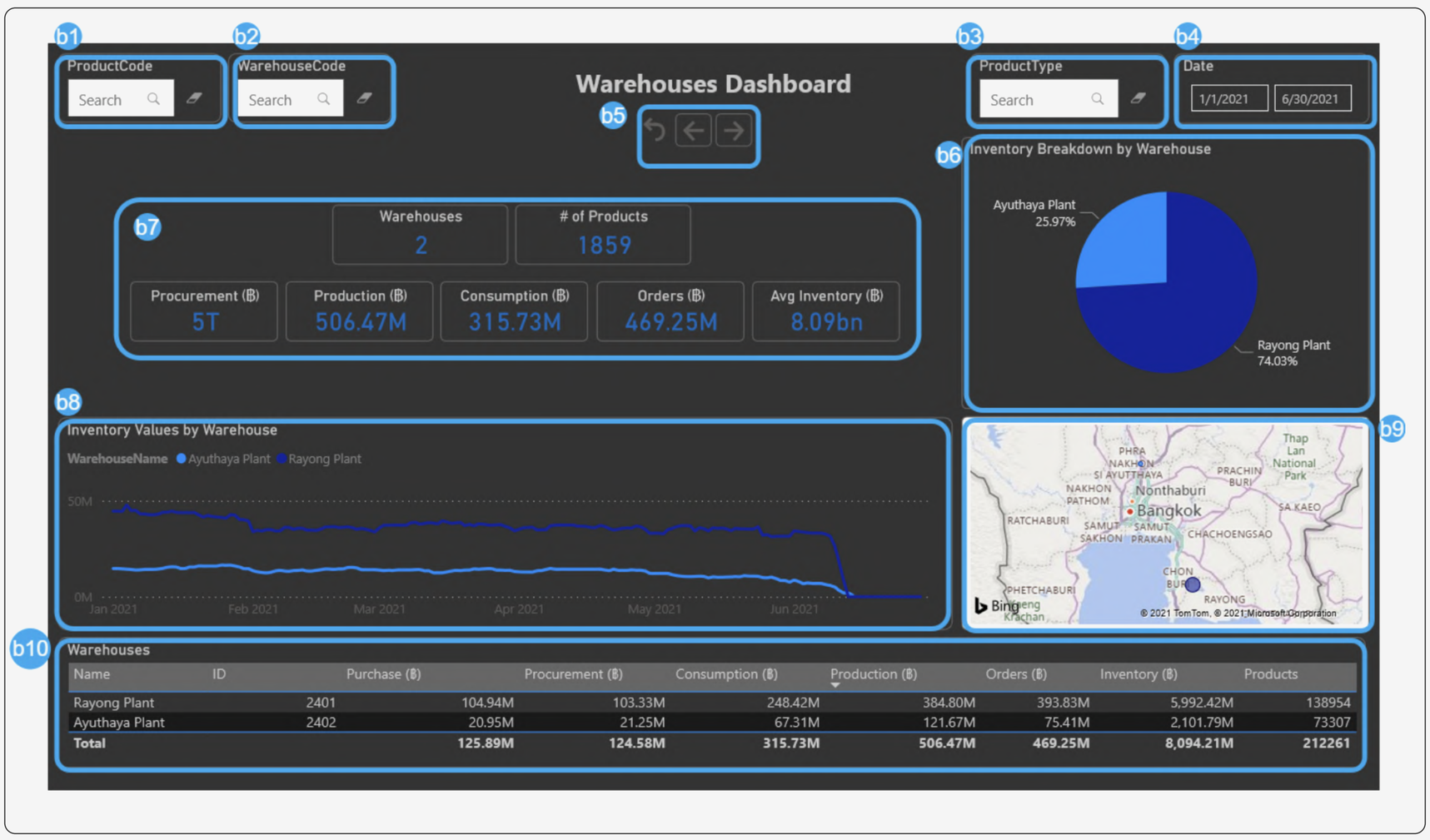


Fig.2: Warehouses Dashboard

3.32 Suppliers Dashboard: (Fig.3)

This section shows details on the suppliers and the division of procurements between them.

c1/ SupplierName slicer: used to filter the dashboard by SupplierName.
c2/ ProcurementID slicer: used to filter the dashboard by ProcurementID.
c3/ Information cards showing information from all suppliers.
c4/ Suppliers’ geographic locations.
c5/ Table showing details on each supplier.
c6/ Table showing details on every procurement.
c7/ Procurement breakdown by supplier.
c8/ Number of on-time deliveries (OTD) per vendor.
c9/ Procurement lead-times per supplier.

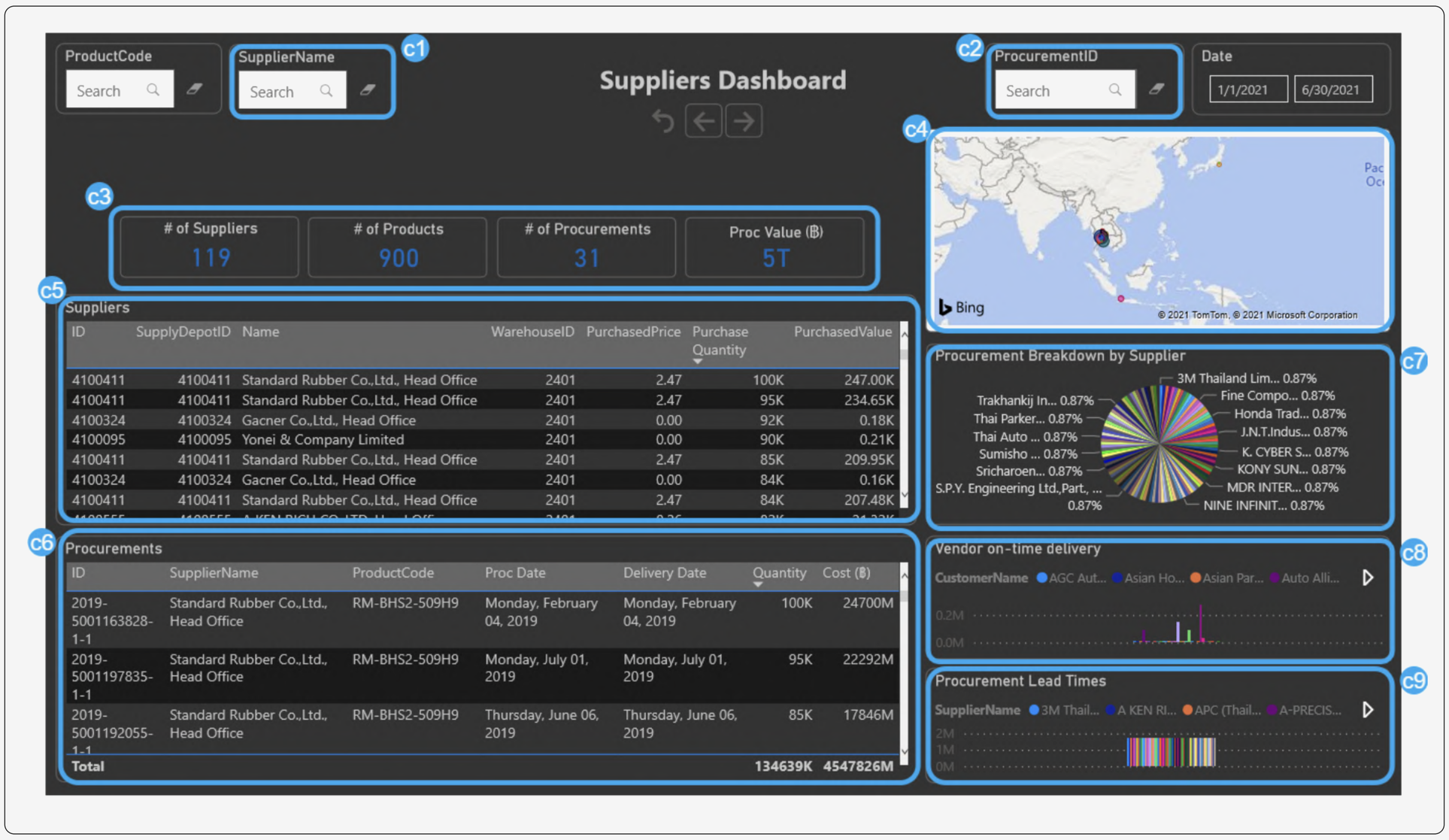


Fig.3: Suppliers Dashboard

3.33 Customers Dashboard: (Fig.4)

This section shows details on their customers and the customers’ orders across the entire foot-print of the customer’s supply chain that is in scope for SCAS - Production.

d1/ OrderID slicer: used to filter the dashboard by OrderID.
d2/ Information cards showing information from all customers.
d3/ Customers’ geographic locations.
d4/ Table showing details on each customer.
d5/ Table showing details on each order.
d6/ Order breakdown by customer.
d7/ Customer on-time deliveries (OTD).
d8/ Customer delivery lead times.

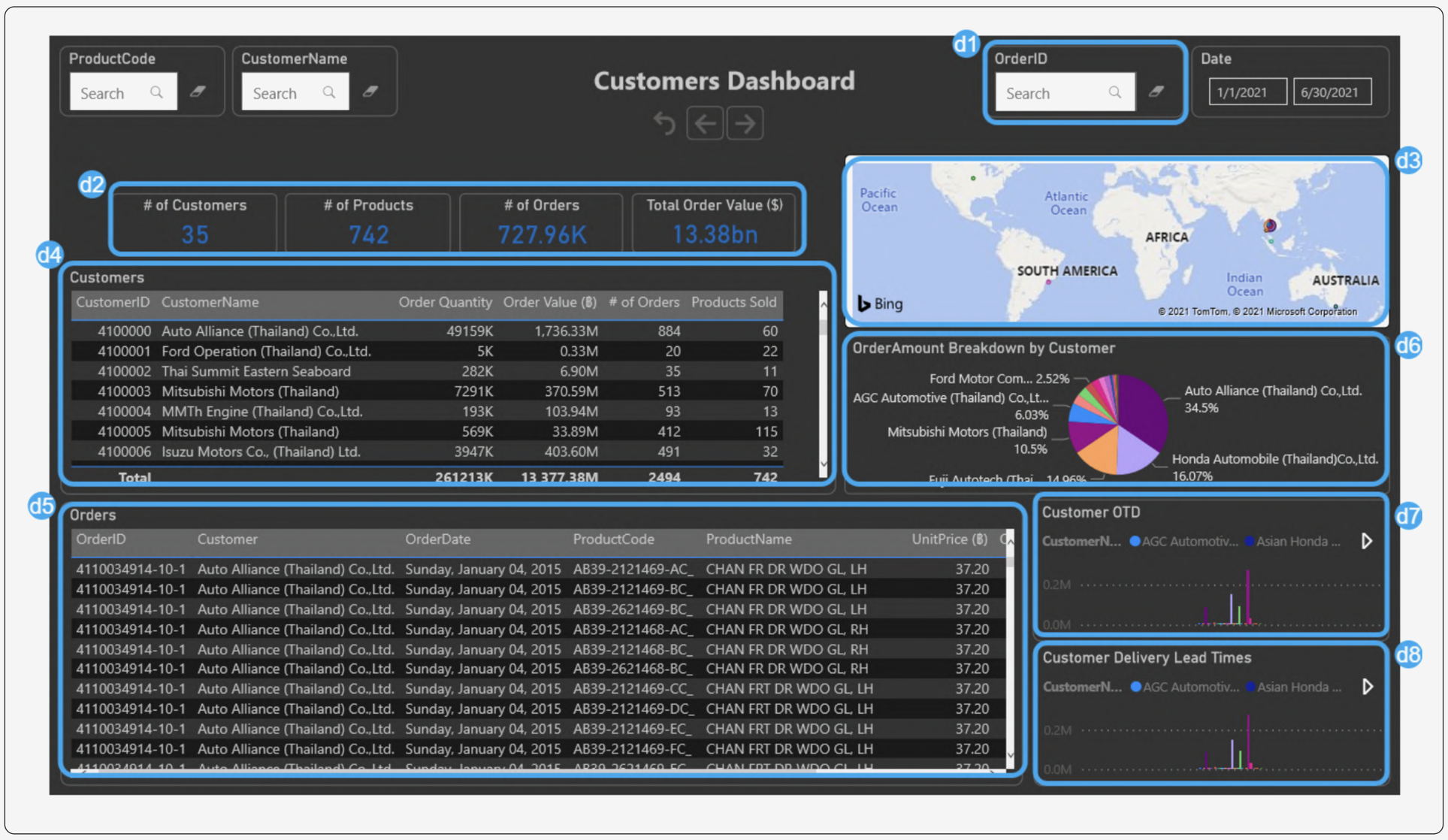


Fig.4: Customers Dashboard

3.34 Inventory Dashboard: (Fig.5)

This section shows historic inventory details with the option to drill down on a product-level.

e1/ General information cards related to inventory.

e2/ Graph showing value metrics for inventory value analysis.

e3/ Table showing inventory quantity changes over time.

e4/ Filter that allows dashboard filtering using one of the top products.

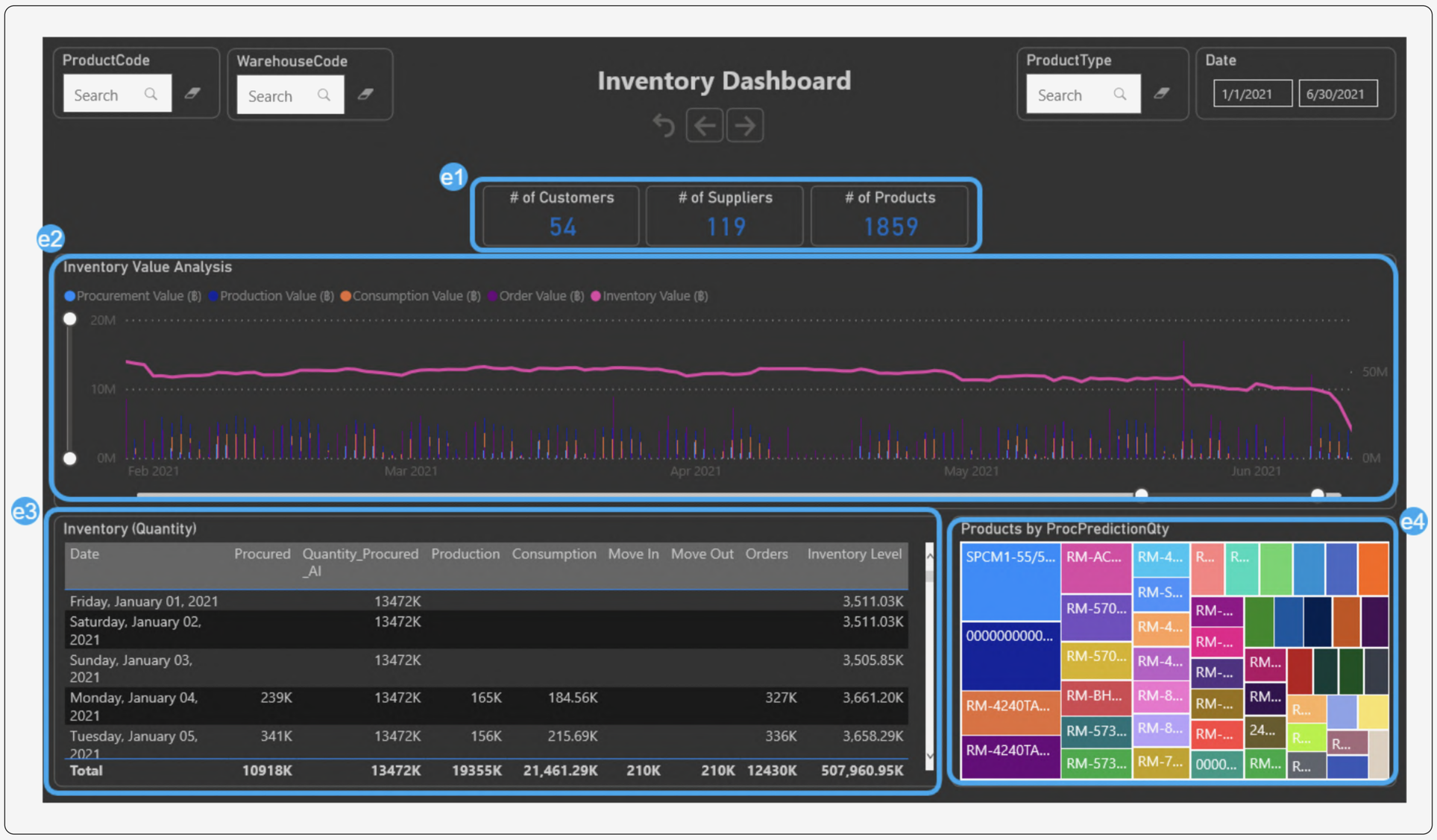


Fig.5: Inventory Dashboard

3.4 AP&I Dashboard

When Seeloz first deploys the AP&I for a client, we run a comprehensive Diagnostic Assessment of the existing supply chain. This allows the AP&I to highlight the opportunities and potential benefits that the customer can expect once the complete APR solution is deployed.

After the AP&I is fully integrated with the customer systems, we offer a comprehensive view on the recommendations that the APR makes. The tabs allow the client to see AP&I’s predicted output, compare it with historical data, as well as procurement recommendations and predicted outcomes of following them.

3.41 Procurement Analysis: (Fig.7)

On a full-scale AP&I deployment after the diagnostic phase we have the first screen that provides a comprehensive analysis of AP&I’s procurement recommendations and qualifies it in historical context. The first tab shows details of AI-generated procurement data.

g1/ Information cards summary of AP&I procurements.

g2/ Graph comparing historical and AI-predicted data for procurement quantities.

g3/ Procurement cost breakdown by warehouse.

g4/ Table showing procurement details in terms of quantity metrics.

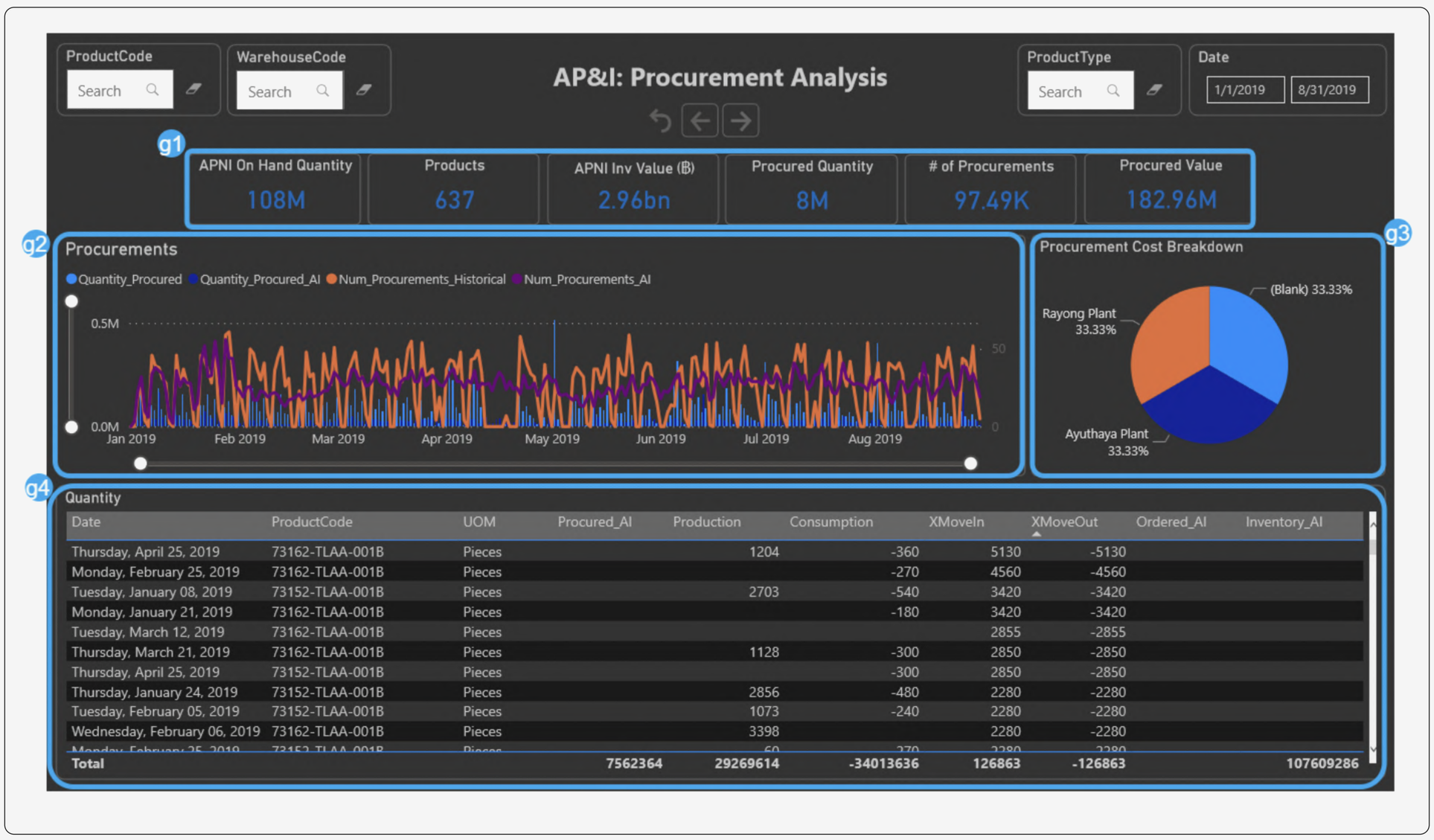


Fig.7: AP&I - Procurement Analysis Tab

3.42 Recommendations Context & Impact: (Fig.8)

This section shows AP&I’s procurement recommendations (per product) and predicted outcome of selecting said recommendations. We also highlight products where the APR is suggesting a significant deviation from historical average order sizes by using a color scale from green (close to previous averages) to orange (very above or below previous averages).

h1/ Table showing AP&I recommendations per product. Products are color coded, with highest variance products being orange and products closest to mean being green.

h2/ Filter that allows dashboard filtering using products of highest variance.

h3/ Graph comparing historical inventory to predicted inventory, if recommendation is used.

h4/ Graph comparing historical procurement to predicted inventory, if recommendation is used.

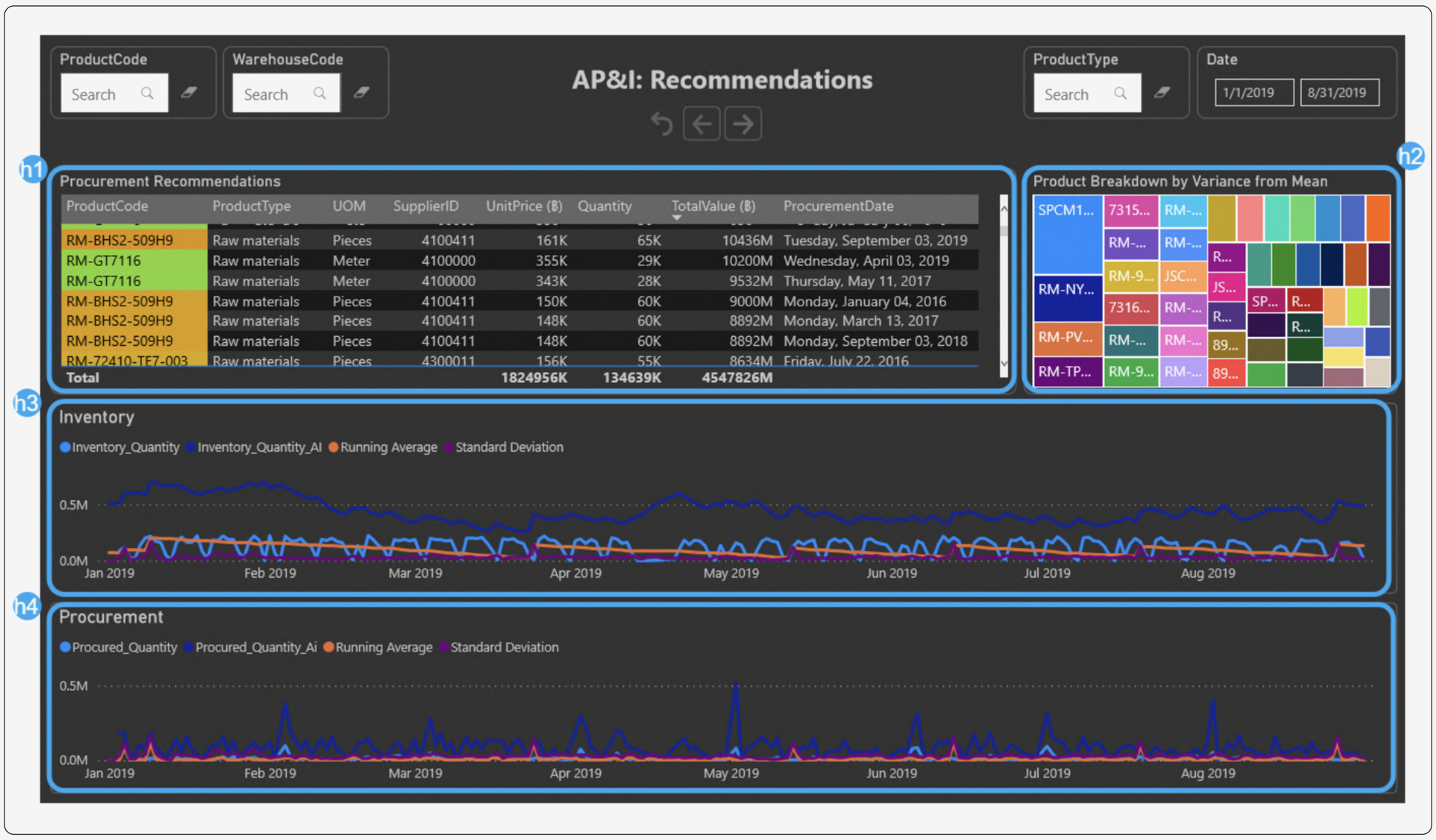


Fig.8: AP&I - Recommendations Tab

3.43 Open Orders - Pending Approval: (Fig.9)

This section shows pending orders (today’s and previous) and AP&I’s procurement recommendations (per product) and predicted outcome of selecting said recommendations. We also highlight products where the APR is suggesting a significant deviation from historical average order sizes by using a color scale from green (close to previous averages) to orange (very above or below previous averages).

i1/ Table showing AP&I recommendations per product. Products are color coded, with highest variance products being orange and products closest to mean being green.

i2/ Filter that allows dashboard filtering using products of highest variance.

i3/ Table showing today’s pending orders, color coded by variance from mean.

i4/ Table showing previous pending orders, color coded by variance from mean.

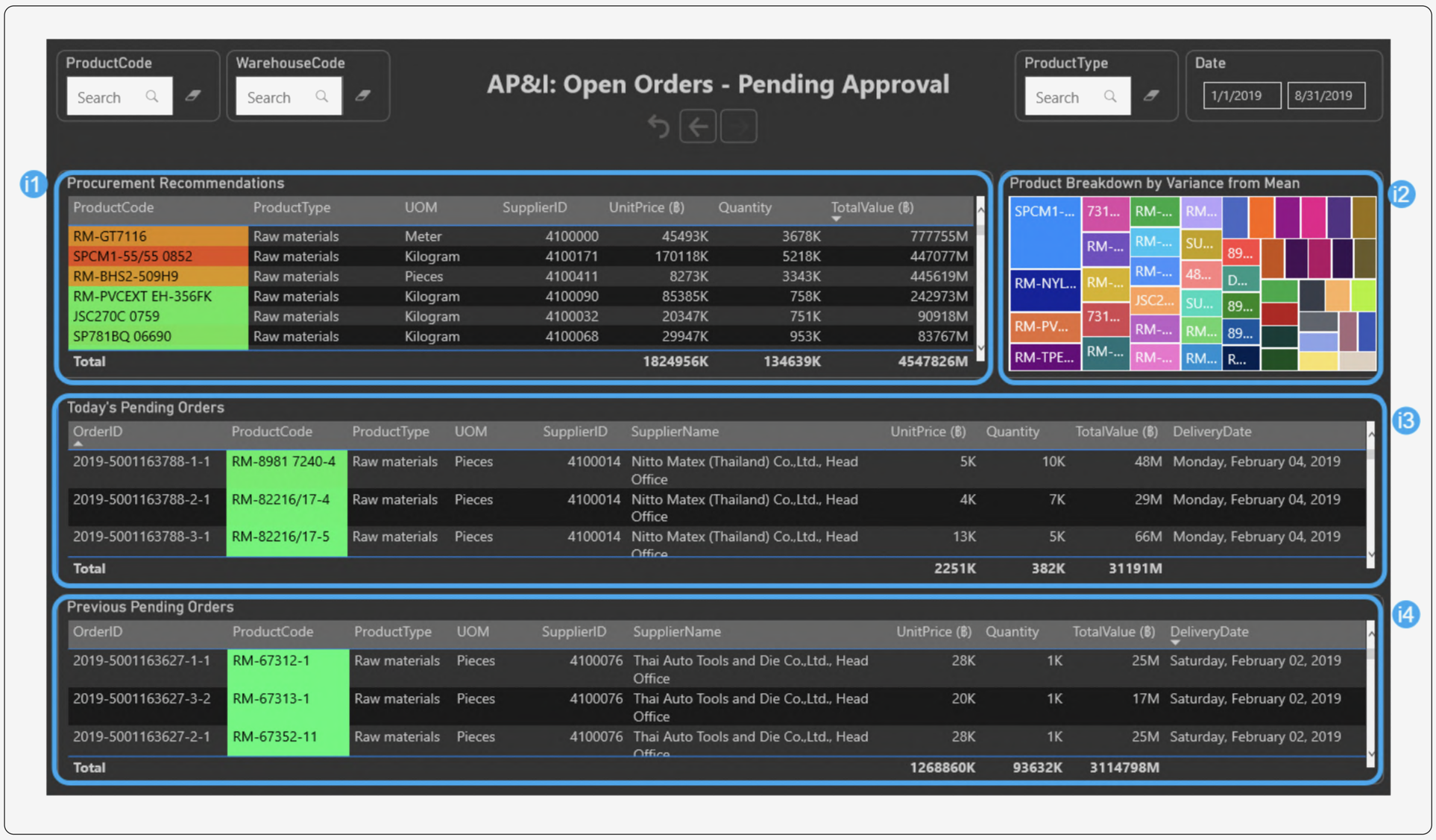


Fig.9: AP&I - Open Orders - Pending Approval Tab

3.5 AP&I Impact Analysis

The AP&I Impact Analysis is a specialized dashboard that highlights the impact and performance of the SCAS system on the distribution and replenishment management of your supply chain. It is a dynamic dashboard that you can easily slice and dice the data on and clearly see the impact and value of the underlying AP&I system.

3.5.1 SCAS Distribution Executive Dashboard

b1/ WarehouseID slicer: used to filter the dashboard by WarehouseID.
b2/ ProductID slicer: used to filter the dashboard by ProductID.
b3/ Date slicer: used to filter the dashboard by Date.
b4/ Conventional Planning vs AI -Planning: Numbers and % Impact.
b5/ Graph comparing historical and predicted inventory values.

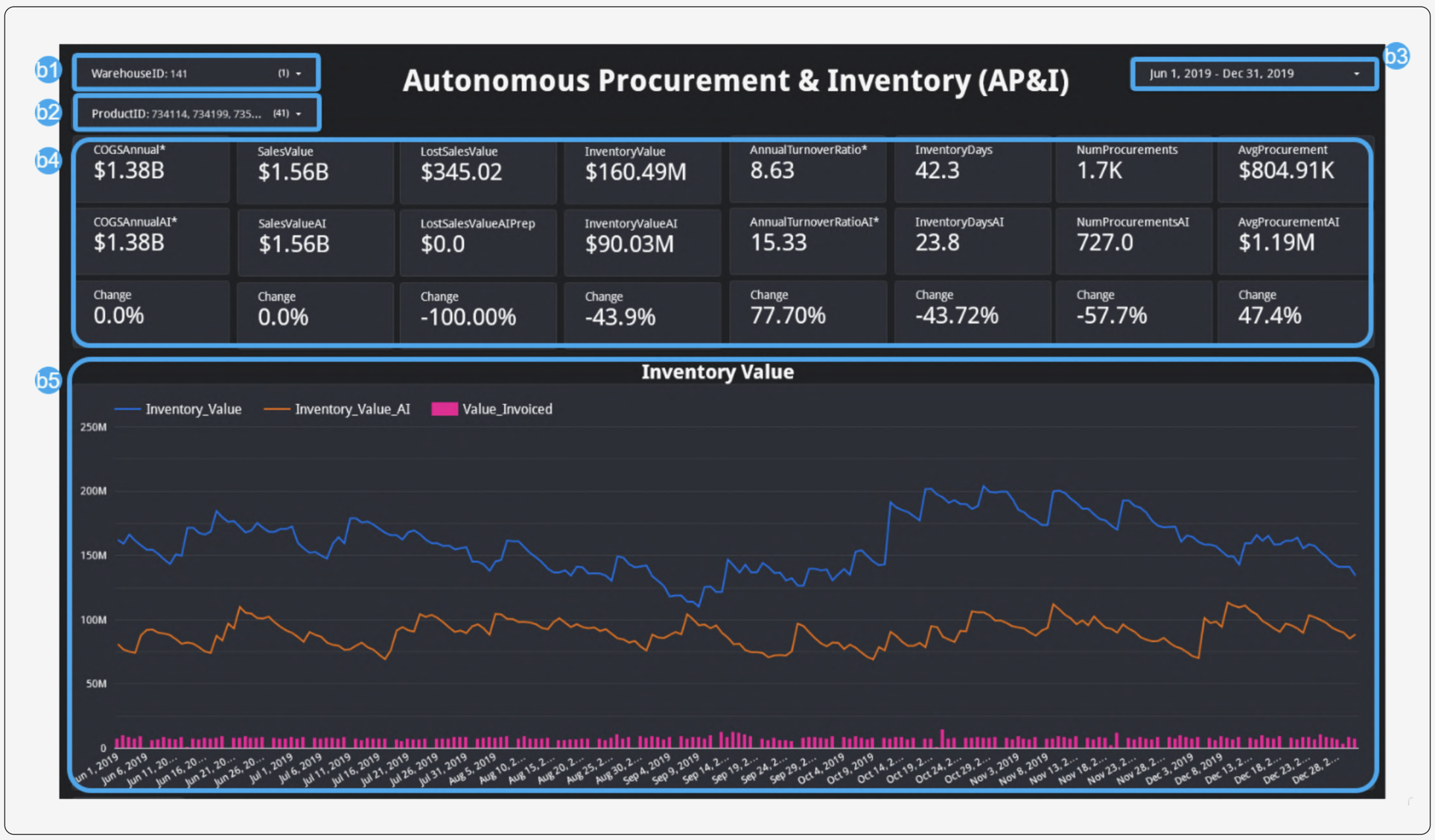


Fig.10: SCAS Distribution Executive Dashboard

3.52 SCAS Distribution Products Dashboard

b6/ Visual product filter, allowing filtering of the dashboard down to a single product.

b7/ Table detailing product information (historical and predicted).

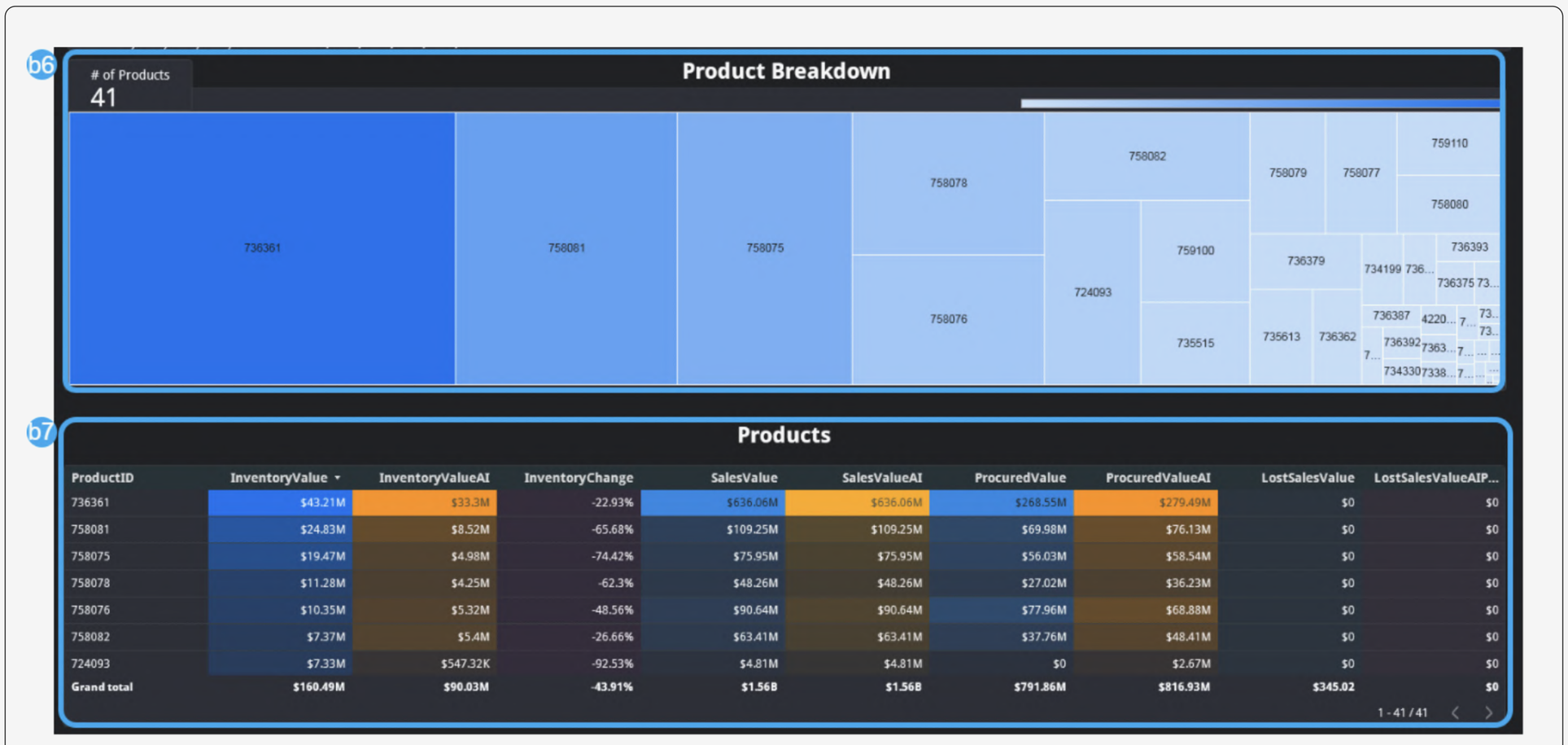


Fig.11: SCAS Distribution Products Dashboard

3.5.3 SCAS Distribution: Inventory Dashboard

b8/ Graph comparing historical and predicted inventory quantities.

b9/ Graph comparing historical and predicted procurements.

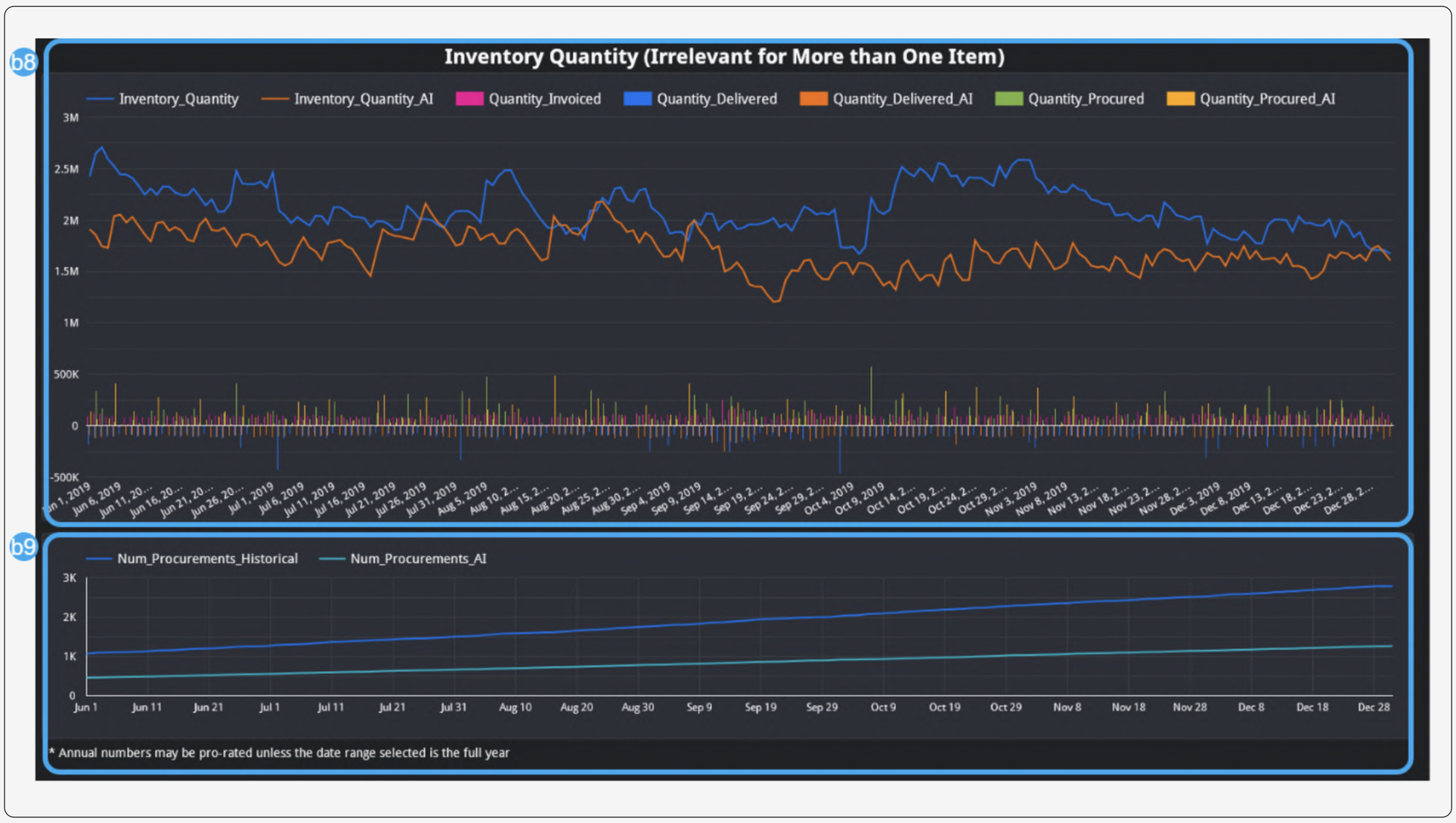


Fig.12: SCAS Distribution: Inventory Dashboard

3.5.4 SCAS Distribution Detailed Views Dashboard

a1/ WarehouseID slicer: used to filter the dashboard by WarehouseID.

a2/ ProductID slicer: used to filter the dashboard by ProductID.

a3/ Date slicer: used to filter the dashboard by Date.

a4/ Information cards with high-level overview information.

a5/ Table with details on warehouses.

a6/ Warehouse geographic locations on map.

a7/ Table detailing customer sites.

a8/ Customers’ geographical locations on map.

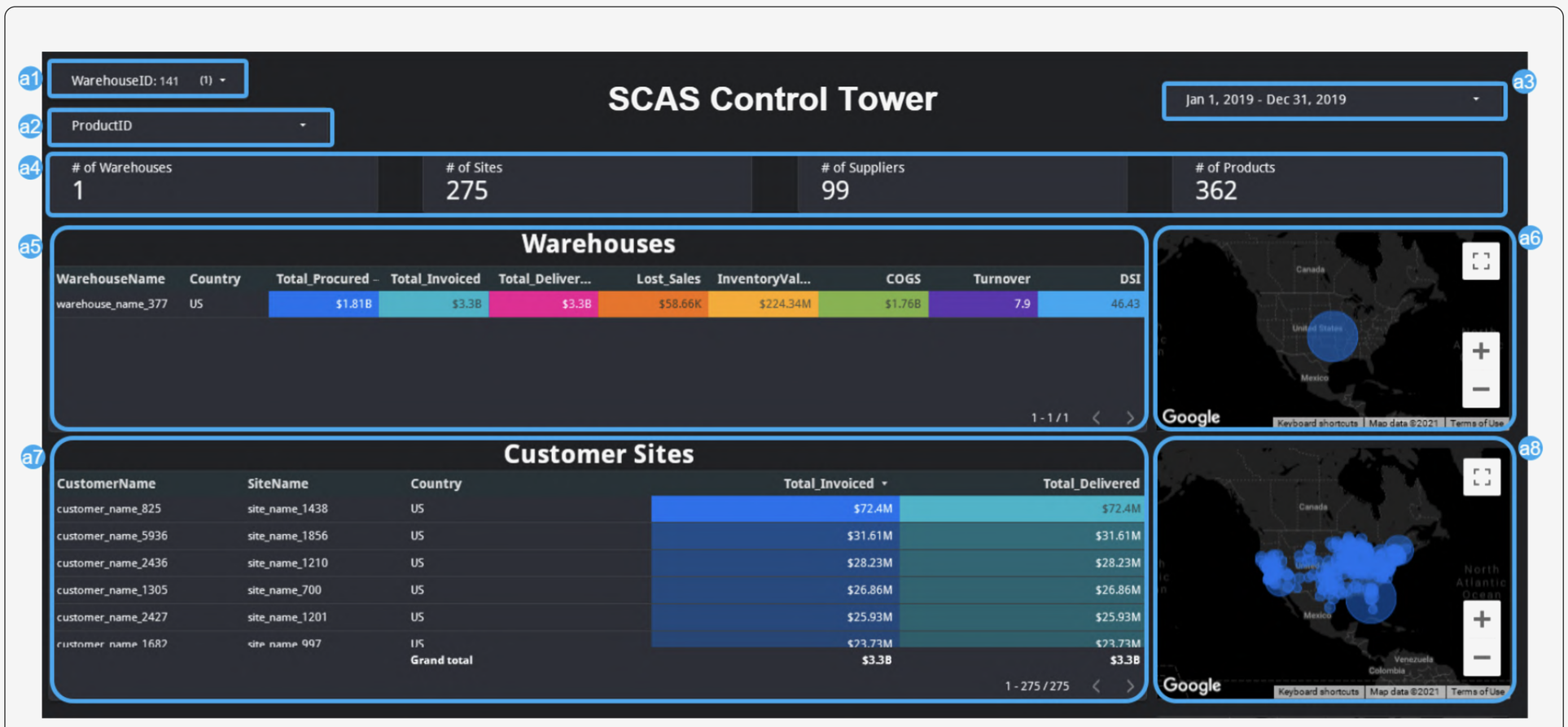


Fig.13: SCAS Control Tower Distribution Dashboard

a9/ Table detailing information on suppliers.

a10/ Suppliers' geographic locations on map.

a11/ Table detailing product information.

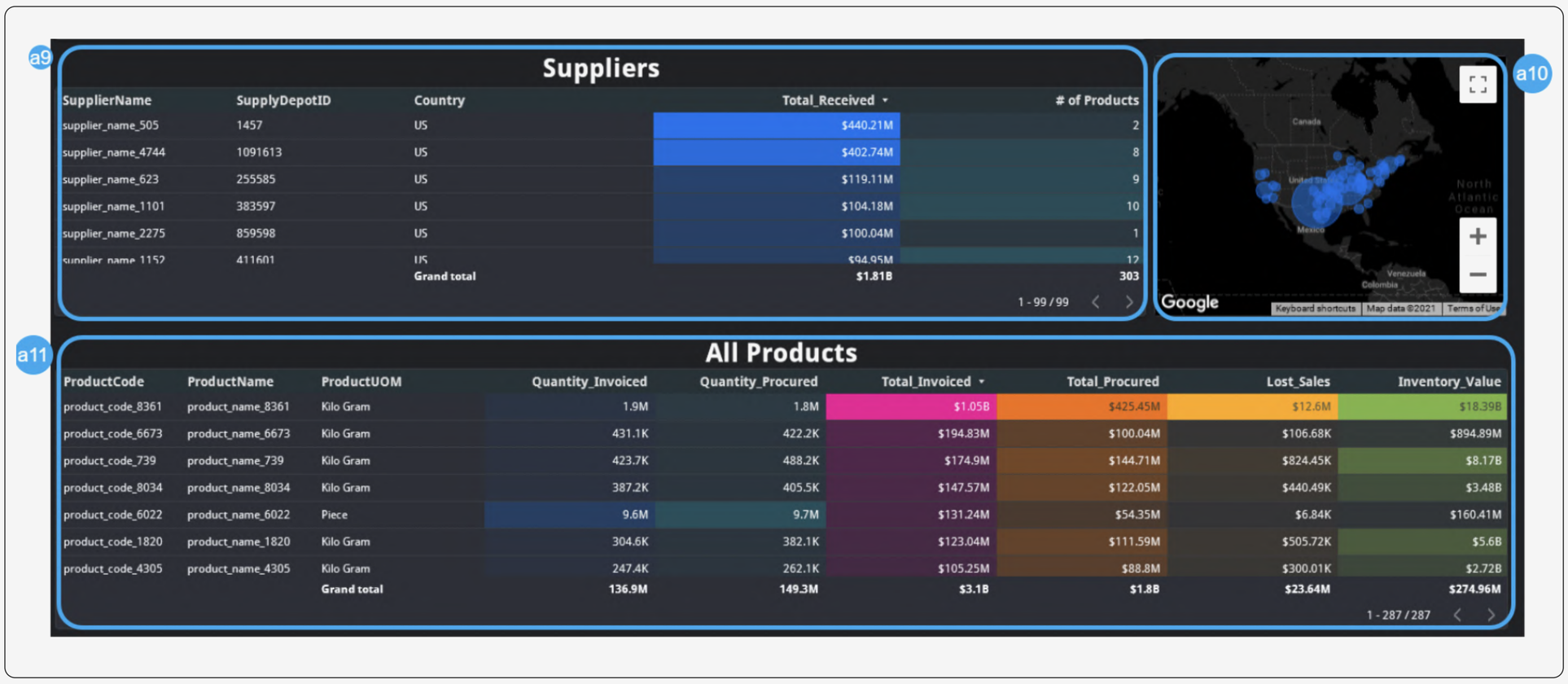


Fig.14: Supplier information

a12/ Visual product filter, allowing filtering of the dashboard down to a single product.

Fig.15: Visual product filter