Microsoft Dynamics 365

Deep dive into Demand Planning for Supply Chain Management

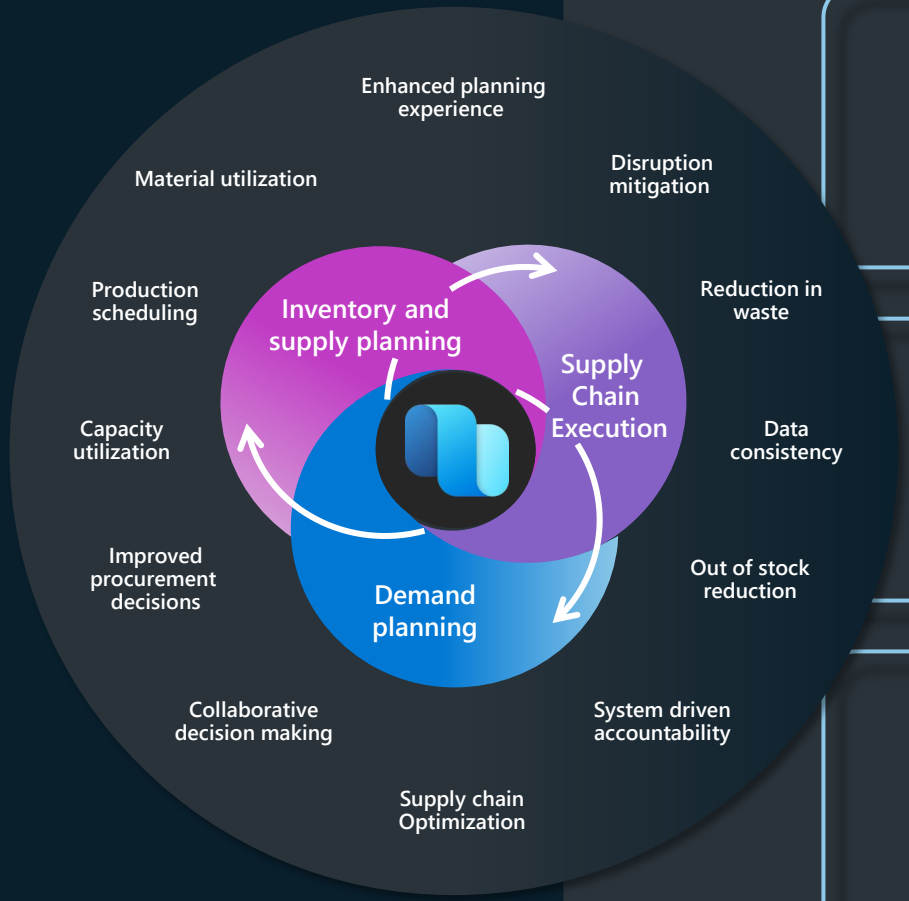
Presenters:

Erol Čelebić - Sr FastTrack Solution Architect
Mostafa Mansour - Software Engineer II
Peter Friis - Principal Engineering Manager
Anders Girke - Principal Product Manager

Agenda

- Overview of demand planning
- AI and Forecast models
- Architecture
- Licensing
- Roadmap
- Q&A

Full Planning and execution cycle with Dynamics SCM



Demand planning

- Visual forecast designer
- Flexible planning modeling
- Collaborative planning
- Autonomous forecast
- AI based algorithms
- Seamless integration
- External signals support
- Product phase in/out
- E2E process management

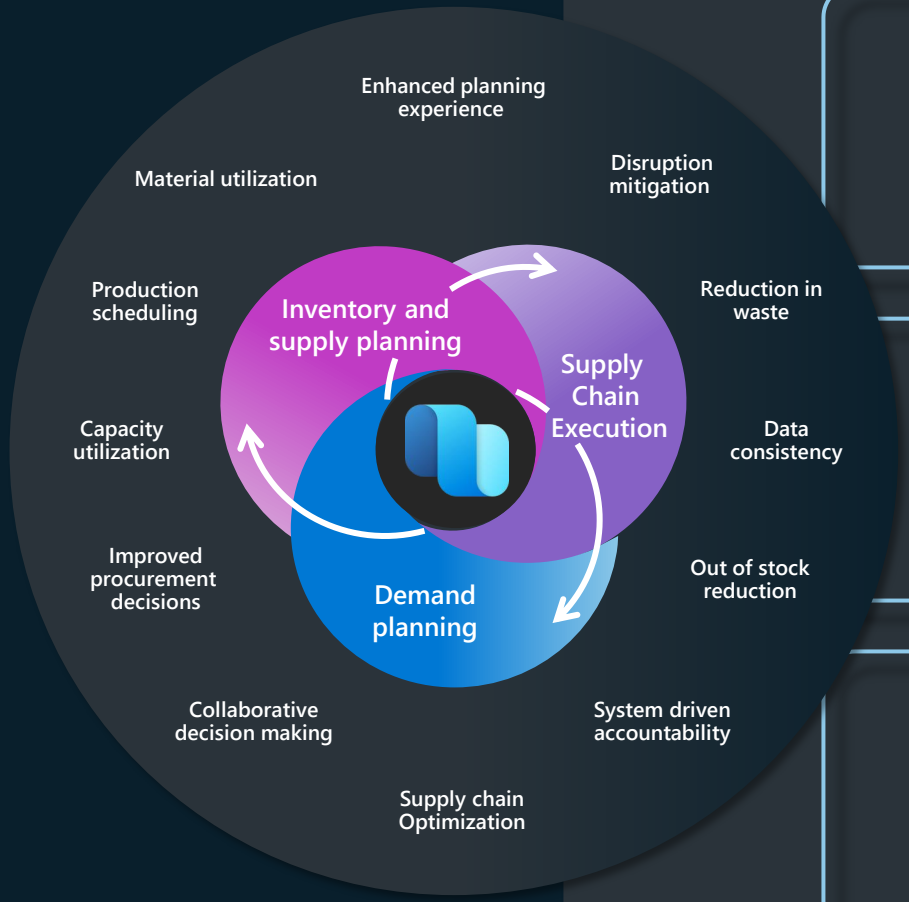
Supply planning

- MRP
- Safety stock calculation
- Intercompany planning
- DDMRP
- Multi sourcing
- Priority based planning
- Production scheduling
- Finite capacity/material
- Planning optimization

Supply chain execution

- Warehouse management
- Inventory visibility
- Asset management
- Transportation management
- Pricing
- Production control & MES
- Operations management
- Sales and procurement
- Product lifecycle management

Full Planning and execution cycle with Dynamics SCM



Demand planning

- Visual forecast designer
- Flexible planning modeling
- Collaborative planning
- Autonomous forecast
- AI based algorithms
- Seamless integration
- External signals support
- Product phase in/out
- E2E process management

Supply planning

- MRP
- Safety stock calculation
- Intercompany planning
- DDMRP
- Multi sourcing
- Priority based planning
- Production scheduling
- Finite capacity/material
- Planning optimization

Supply chain execution

- Warehouse management
- Inventory visibility
- Asset management
- Transportation management
- Pricing
- Production control & MES
- Operations management
- Sales and procurement
- Product lifecycle management

Demand Planning in D365 Supply Chain Management

Integrate with any data source

Azure data lake

Multiple F&O instances

Demand Planning

Import Data

- Historical Demand
- Past Forecasts
- Master data (product, locations, hierarchies,...)

Input

Create Transformation

Adjusted signals

Data pre-processing
- Outlier smoothening
- Complete missing data
- Adjustments for new product introductions and substitution

Create Forecast

Baseline Forecast

Forecast Generation
- Qualitative or quantitative
- Peer review
- What-if analysis

Review

Demand Plan

Adjust, validate & aggregate
- Compare and analyze
- Adjust with human input
- Aggregate (Bottom-up)
- Allocate (Top-down)
- Collaborate

Export Data

Consensus Demand Plan (Output as Forecast model for MRP)

Consensus review, approve & publish
- Compare and align
- Demand review
- Adjust to align with business goals

Output

Multiple F&O instances

Azure data lake

Execution

Fulfill demand orders

Firmed supply orders

Execution - demand
- Sales orders
- Quotes

Execution - supply
- Production order
- Purchase order
- Transfer order
- Intercompany order
- Kanban

Supply Planning

(with SCM Planning Optimization)

Planned orders

Master planning (MRP)

Net requirements

Planning output
- Planned supply suggestions
- Actions
- Delays

Planning calculation
- Material coverage
- Production scheduling
- Capacity planning
- Capable to promise

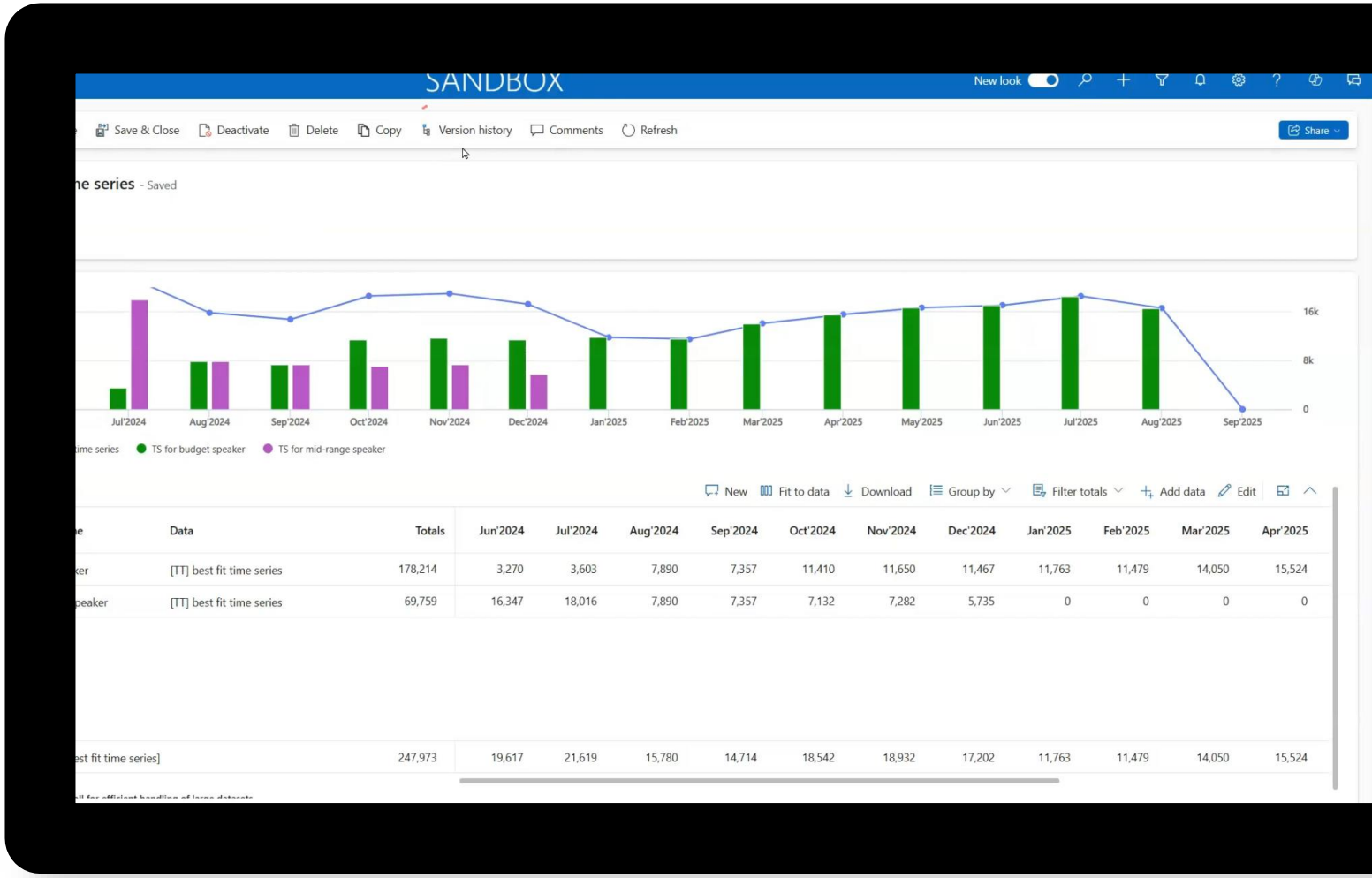
Planning input
- Inventory levels
- Sales orders & quotes
- Production material
- Demand forecast

Collaborative planning

Track changes made to forecasts over time, ensuring transparency and traceability

Maintain logs of all actions taken within the platform to meet compliance and accountability requirements

Foster collaboration with the embedded Teams experience and commenting capabilities

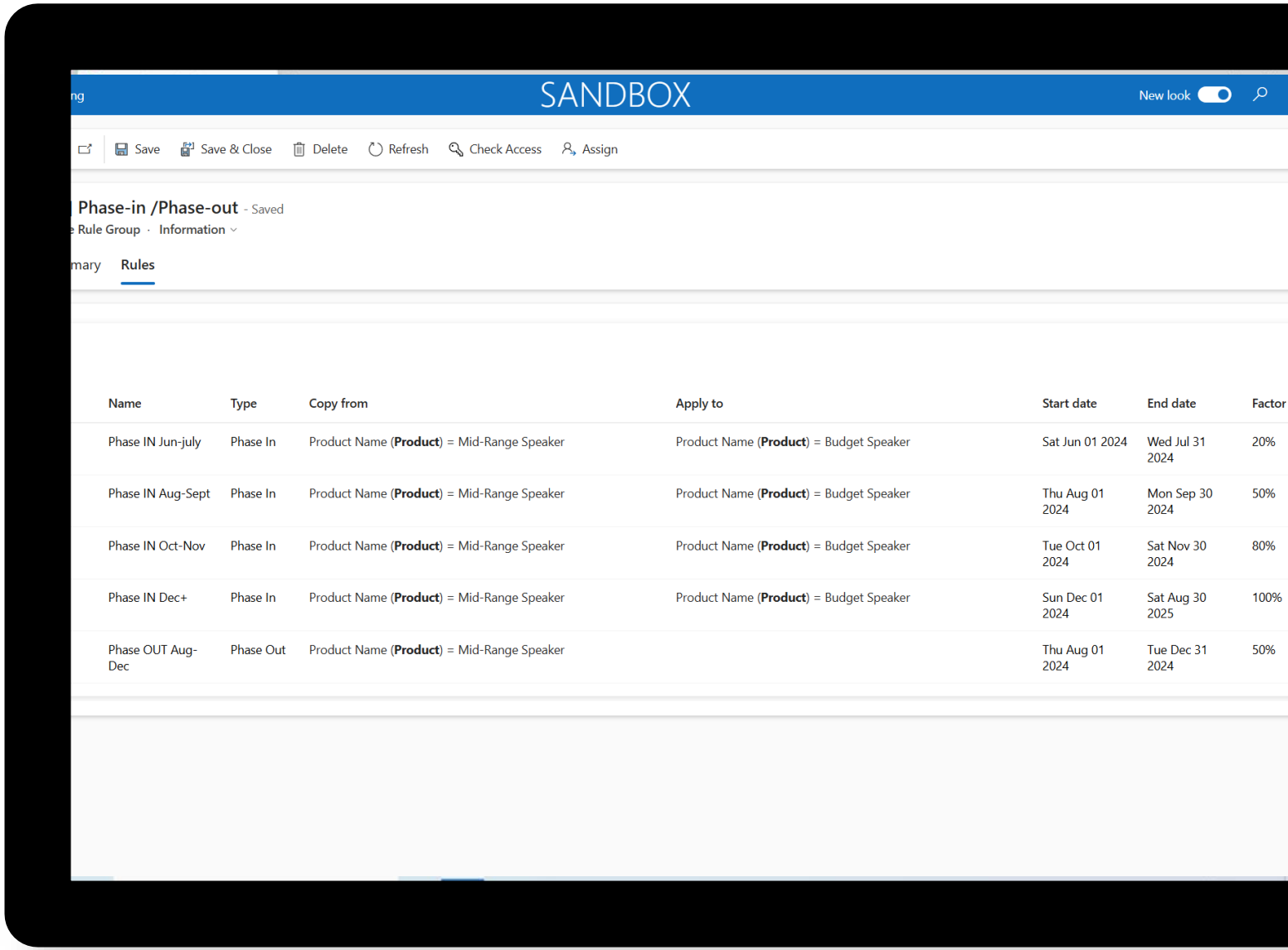


Ease product lifecycle handling

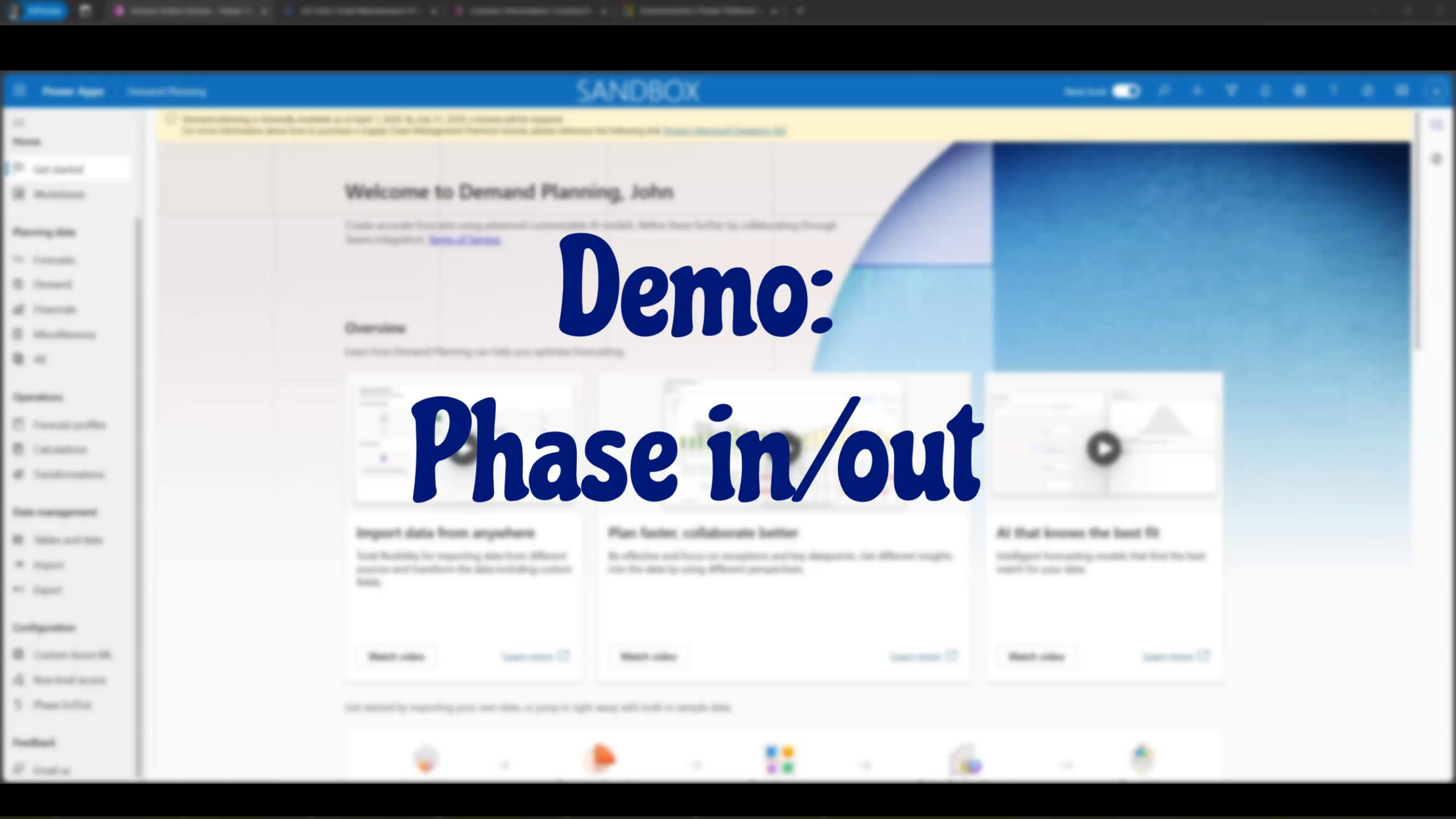
Predict demand for new products seamlessly with phase-in-phase-out features

Forecast new product by utilizing two or more similar products

Plan new stores/warehouses based on existing ones



Name	Type	Copy from	Apply to	Start date	End date	Factor
Phase IN Jun-july	Phase In	Product Name (**Product**) = Mid-Range Speaker	Product Name (**Product**) = Budget Speaker	Sat Jun 01 2024	Wed Jul 31 2024	20%
Phase IN Aug-Sept	Phase In	Product Name (**Product**) = Mid-Range Speaker	Product Name (**Product**) = Budget Speaker	Thu Aug 01 2024	Mon Sep 30 2024	50%
Phase IN Oct-Nov	Phase In	Product Name (**Product**) = Mid-Range Speaker	Product Name (**Product**) = Budget Speaker	Tue Oct 01 2024	Sat Nov 30 2024	80%
Phase IN Dec+	Phase In	Product Name (**Product**) = Mid-Range Speaker	Product Name (**Product**) = Budget Speaker	Sun Dec 01 2024	Sat Aug 30 2025	100%
Phase OUT Aug-Dec	Phase Out	Product Name (**Product**) = Mid-Range Speaker		Thu Aug 01 2024	Tue Dec 31 2024	50%

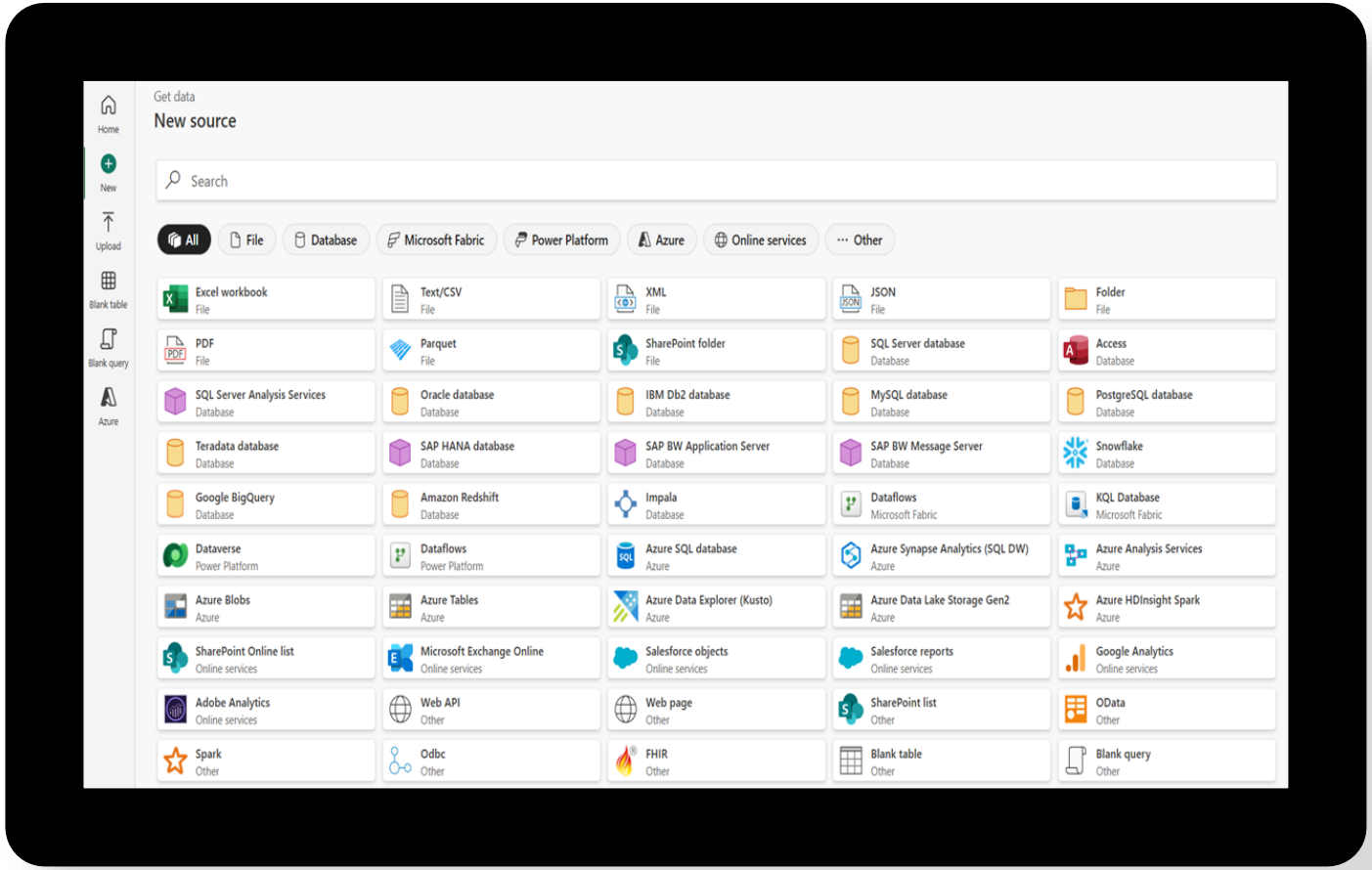

SANDBOX
Welcome to Demand Planning, John
Overview
Import data from anywhere
Plan faster, collaborate better
AI that knows the best fit
Demo:
Phase in/out

Scalability, composability, extensibility

Experience fast data query performance even with large volumes

Connect to any system in your network with the composable platform

Easily create and extend tables and columns without code

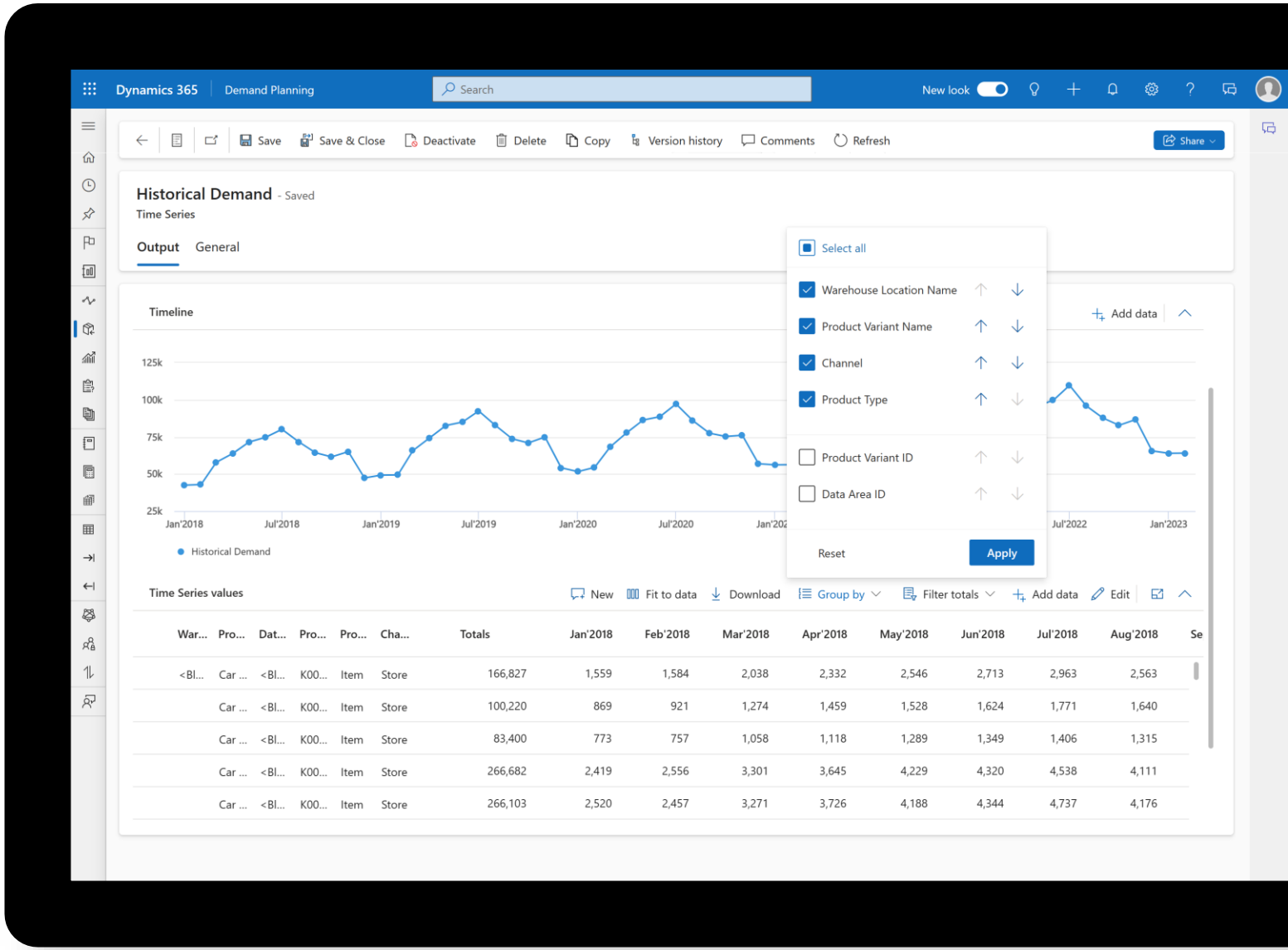


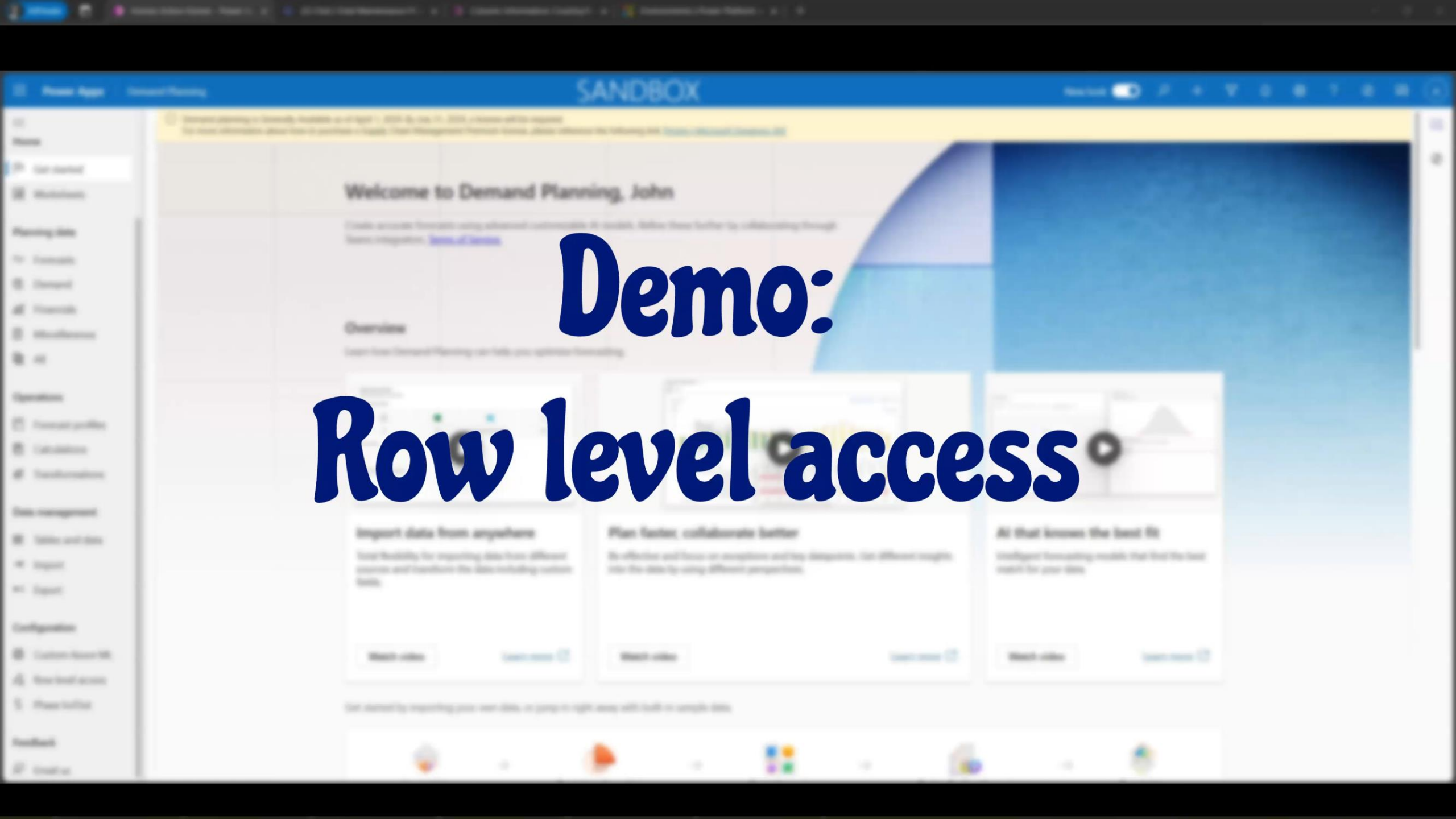
Segmentation analysis

Slice and dice forecasts by dimension such as products, channels, regions, customers

Aggregate and disaggregate demand forecasts in real time, making changes on any level

Control what each user is allowed to view and modify based on their related segments (Row level security)




SANDBOX
Welcome to Demand Planning, John
Overview
Demo:
Row level access

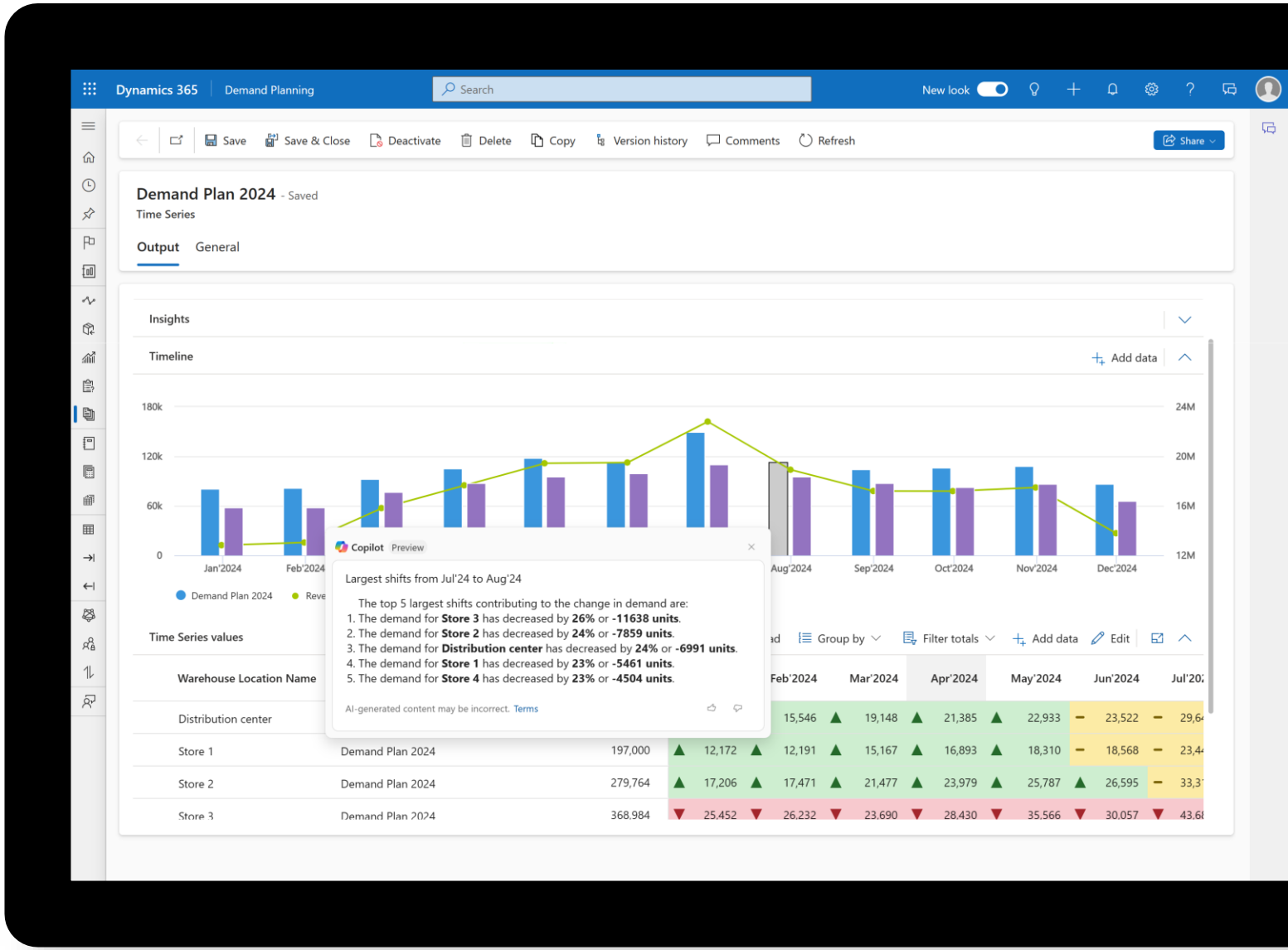
Insights and analytics

Leverage Copilot to understand key data insights

Use interactive worksheets to visually interpret forecast results

Empower users to dynamically create, customize, and save worksheets

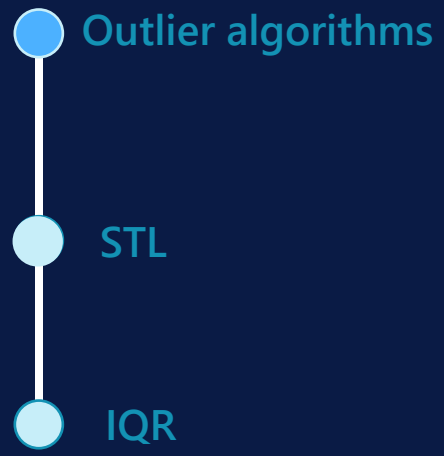
Use conditional formatting to draw attention to critical areas




Copilot
Analytics

Forecast models & Outlier removal methods

Outlier algorithms



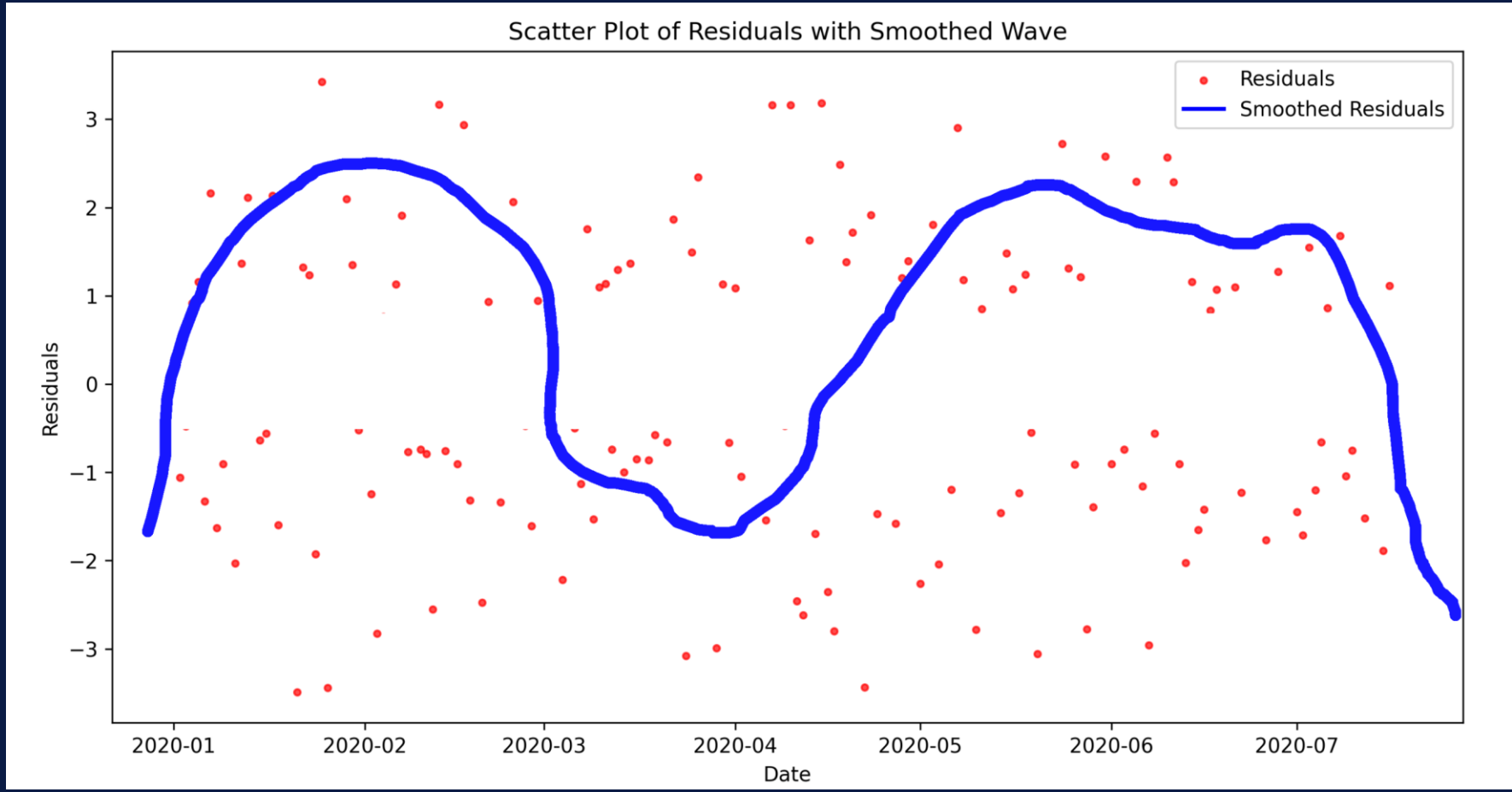
- **STL** (Seasonal-Trend decomposition using LOESS)
- **IQR** (Interquartile range)

STL Seasonal-Trend decomposition using LOESS

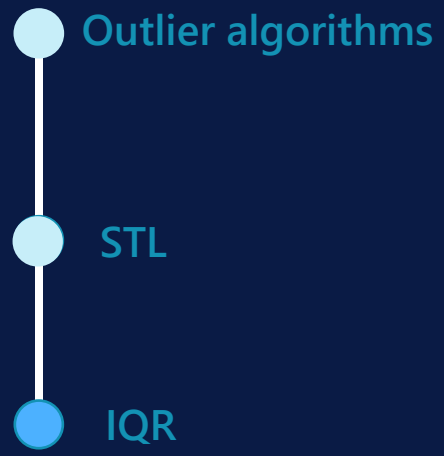
- Outlier algorithms
- STL
- IQR

STL Seasonal-Trend decomposition using LOESS

- Outlier algorithms
- STL
- IQR



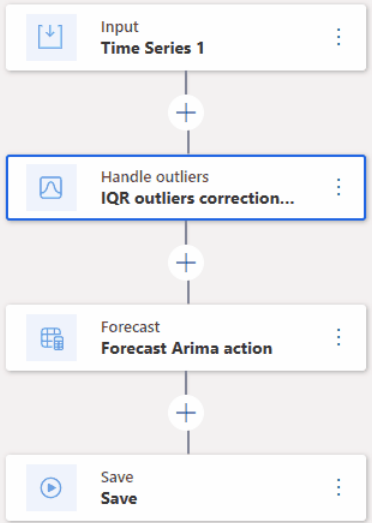
IQR Interquartile Range



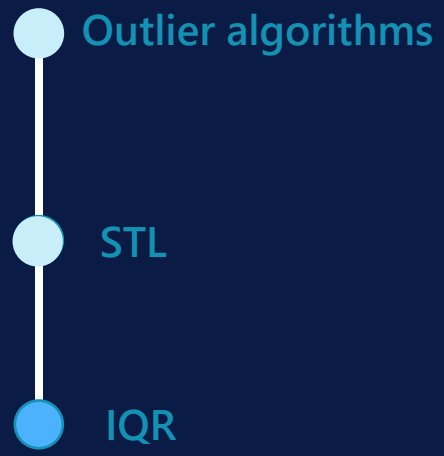
- Identifies data points that fall outside a certain range defined by the quartiles
- Calculates IQR and determines *IQR* range.

Summarize Delete Refresh Check Access Assign Share

Forecast model | Run Schedule | Jobs



IQR Interquartile Range



- Identifies data points that fall outside a certain range defined by the quartiles
- Calculates IQR and determines *IQR* range.
- Multiplier of the IQR is determined by the user.
  - Lower bound = Q1 - Multiplier X *IQR*
  - Upper bound = Q3 + Multiplier X *IQR*
- $IQR = Q3 - Q1$

When to use what

Scenario	IQR	STL
Data with Seasonal or Trend Patterns		
Robust Handling of Outliers		
Faster Performance		
Sensitivity to Extreme Values		

Forecast models

ARIMA

ETS

PROPHET

Best Fit

ETS Exponential Smoothing

- ETS
- Arima
- Prophet
- Best Fit

- Assign various weights to different observations.
- Recent data points are more weighted than older ones.

$$F_{t+1} = \alpha A_t + (1 - \alpha) F_t$$

- F_{t+1} : Forecasted value
- F_t : Previous forecasted value
- A_t : Actual historical value
- α : Smoothing constant $0 \leq \alpha \leq 1$

ARIMA Autoregressive integrated moving average

- Works well with stationary data
  - Time series with no trend or seasonality
- Execute differencing on the data if it is not stationary
- Finds correlation between lagged data points
- Calculates moving average error.

ARIMA Autoregressive integrated moving average

- ETS
- Arima
- Prophet
- Best Fit

$$(AR)\ y_t = c + \phi_1 y_{t-1} + \phi_2 y_{t-2} + \dots \phi_p y_{t-p} + \epsilon_t$$

Y_t : *Value at time t*

c : *constant*

$\phi_1, \phi_2, .. \phi_p$: *Coefficients of the model*

ϵ_t : *white noise error term*

$$(MA)\ y_t = c + \epsilon_t + \Theta_1 \epsilon_{t-1} + \Theta_2 \epsilon_{t-2} + \dots + \Theta_q \epsilon_{t-q}$$

Y_t : *Value at time t*

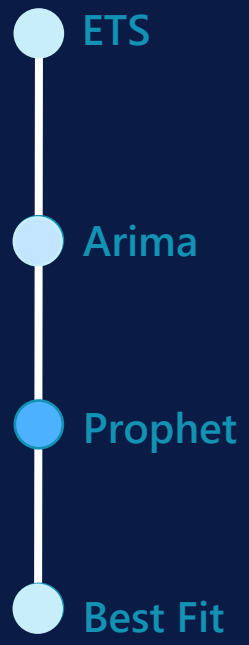
c : *constant*

$\epsilon_t, \epsilon_{t-1} .. \epsilon_{t-q}$: *Error terms at time t, t-1, … ,t - q*

Θ_2 : *Coefficients of the model*

(ARIMA) = (AR) + (MA) After differencing the time series

Prophet



- Built-in outliers' handler.
- Decomposition:
  - Seasonality
  - Trend
  - Holidays
- Predicts trend direction.
- Takes into account error and holidays.

When to use what

- ETS
- Arima
- Prophet
- Best Fit

Scenario	ETS	Arima	Prophet
Simple business case			
Time series has different (linear/exponential trend and several seasonality types)			
Time series exhibits a clear linear trend.			
Data is stationary			
Data is non-stationary			
Require quick forecasting			
Forecasting with focus on recent period			

Recommended

Neutral

Not recommended

ETS

Arima

Prophet

Best Fit

Best Fit

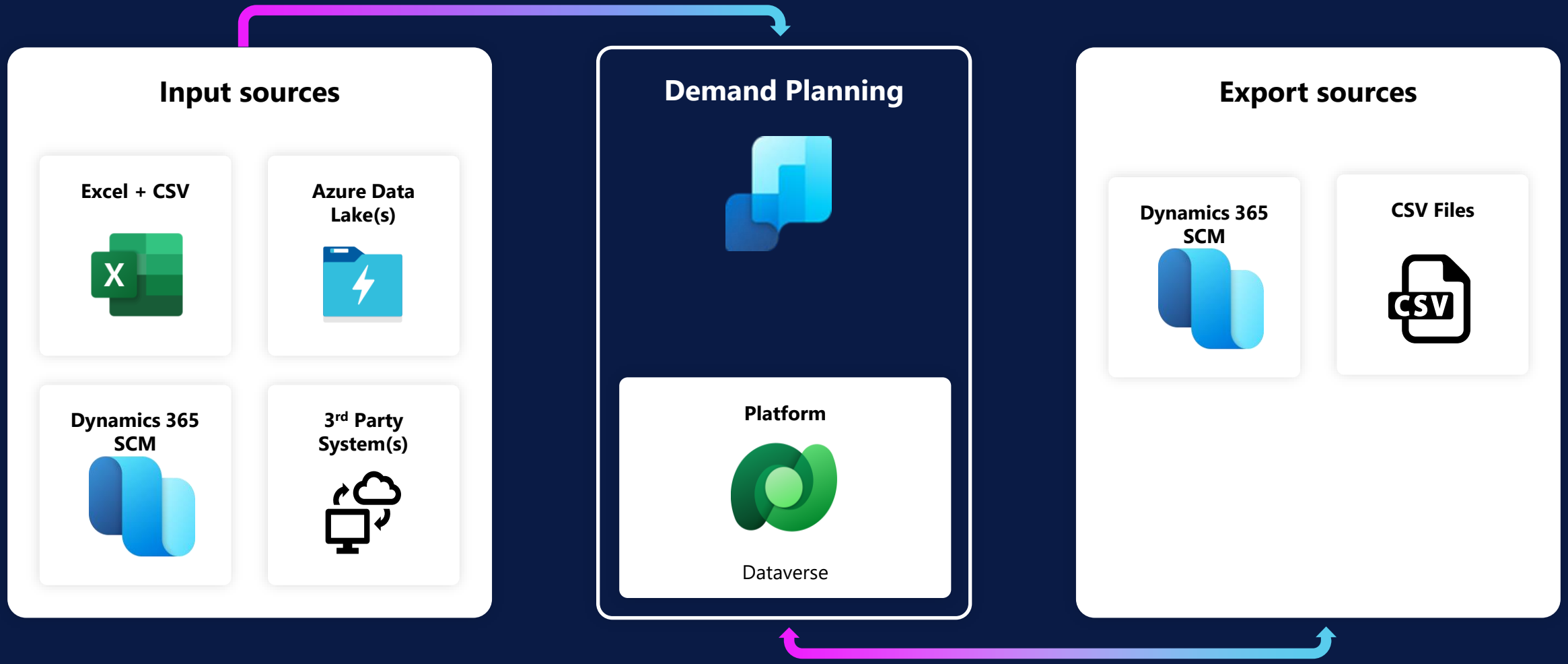
- Iterates through every model/dimension combination.
- Best model depending on the MAPE score

$$Mean\ Absolute\ Percentage\ Error = \frac{1}{n} \sum_{t=1}^{n} \left| \frac{A_t - F_t}{A_t} \right|$$

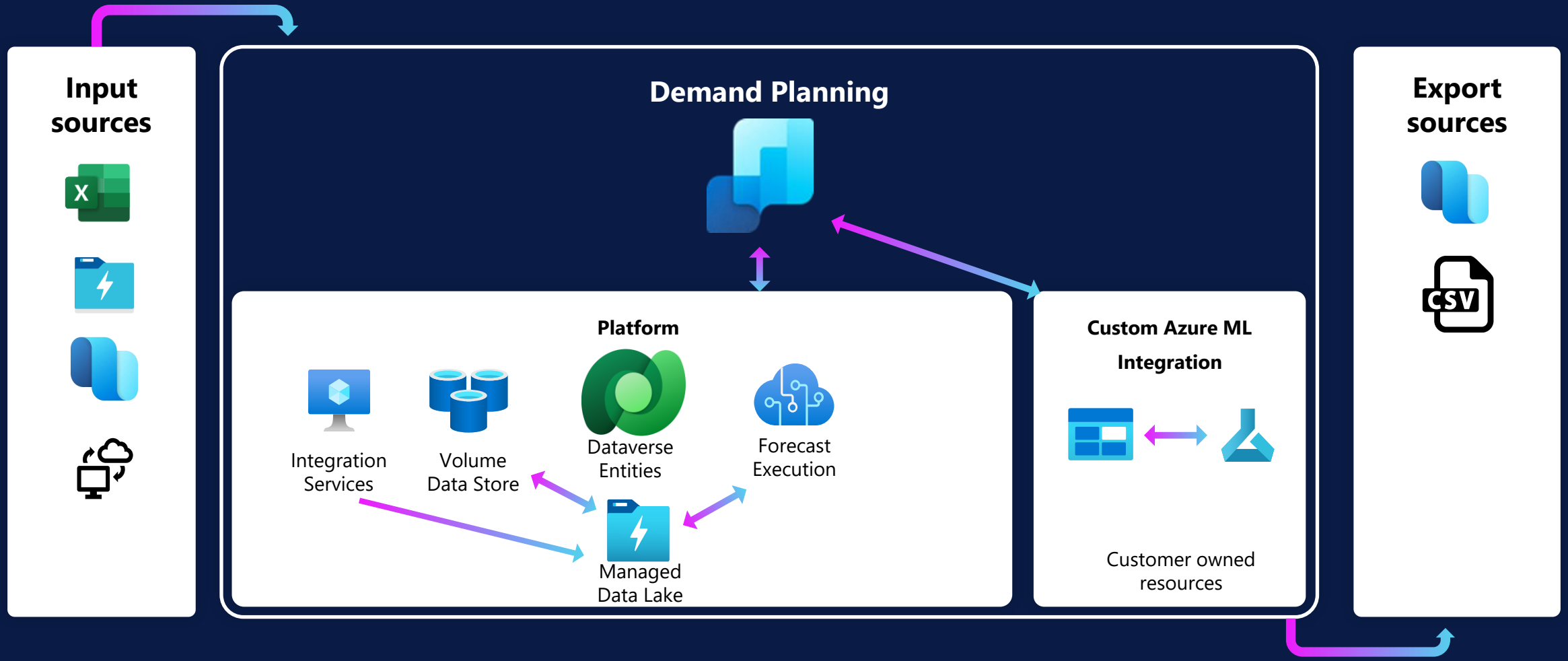
- n : *number of observations*
- A_t : *Actual value*
- F_t : *Forecast value*

Architecture

Architecture - Integration



Architecture – Data flows & storage usage



Application lifecycle management

Installation

- Install App from Power Portal Admin Center(PPAC)
- Default installed on SCM Dual-Write environments

Update

- Updates will be available every month – visible on doc site
- Updates rolls out over 2-3 weeks
- Is force updated approx. 2 weeks after last Geo rollout

Supported lifecycle events

- Enable/Disable organization
- Copy organization
- Delete organisation

Licensing

Dynamics 365 Supply Chain Management Premium

Optimize your licensing mix to ensure users have access to the right capabilities

Advanced planning capabilities built into your solution

- Demand planning capabilities – 10 seat minimum
- Additional capacity and storage entitlements

Dynamics 365 Supply Chain Management

Scalable, composable, secure, and streamlined solution for an intelligent supply chain.

$180.00
User/month

Dynamics 365 Supply Chain Management Premium

Enhance supply chain adaptability and performance with advanced planning, analytics, and insights.

$300.00
User/month

[Supply Chain Management Pricing]

	Dynamics 365 Supply Chain Management	Dynamics 365 Supply Chain Management Premium
⊕ Core supply chain management	●	●
⊖ Demand planning	◆	●
Read-only access, cell commenting	●	●
Full access – create, edit, analyze, publish		●
⊕ AI and machine learning	●	●
⊖ Capacity and storage		●
Higher entitlements		●

Roadmap

Roadmap

Short-term:

- New Copilot pre-prompt questions
- Context aware insights with Copilot
- Copilot explainability for deep analytics & insights
- Demand Planning Core
  - Support selection (filtering which LE's data is required) within the DP app
  - Complete view of Best fit selection of model per PU (Planning unit)
  - **Implement for support of external signals (Inflation%, Weather) in Forecast calculation**
  - Time fence rules (blocking for edits in specific periods)
  - FNO, Entity, Direct Sales invoices, POS
  - Export provider, Open up for Extension and Mapping for D365 FNO
  - Ability to Aggregate on time (Year, Quarter, Week) in the Grid (matrix view)
  - Perform calculation in Grid (Add data view) that updates in real time
  - View of All jobs in common page (focus on Failed)
  - Weighted Avg as aggregation method
  - Support Bi-directional calculations Q -> $ and $ -> Q
  - New Export provider, Export to Fabric/Datalike,
  - Allocation between Dimensions based on an Allocation basis
  - Extensibility of Calculations and Transformation
  - A view of Profiles/Time-series dependencies

Longer-term:

- Supply and Demand balancing incl Inventory
- S&OP
- Demand planning agent

Additional resources

Documentation:

Learn - Demand Planning

Yammer:

Dynamics 365 and Power Platform Preview Programs : Demand Planning Application

Previous TechTalk:

Demand planning for Dynamics 365 Supply Chain Management (Nov 2023)

In app tutorial & videos

Microsoft Dynamics 365

Q&A

Dankie Faleminderit شكرًا Chnorakaloutioun Hvala Blagodaria

Děkuji **Tak** Dank u Tänan Kiitos **Merci** Danke Ευχαριστώ A dank

Mahalo ධන්‍යවාද. **Dhanyavād** Köszönöm Takk Terima kasih **Grazie** Grazzi

Thank you!

감사합니다 Paldies Choukrane Ačiū **Благодарам** ありがとうございました

谢谢 Баярлалаа **Dziękuję** Obrigado Mulţumesc **Спасибо** Ngiyabonga

Ďakujem Tack Nandri Kop khun **Teşekkür ederim** Дякую Хвала Diolch