VuDecide Shock-Resilient Demand Planner app for Dynamics365

Last Updated 04/27/2024
Ver 0.9.1

The goal of this doc is to guide the user on how to use DeepVu's shock-resilient Demand Planning AI Agents along with their baseline forecast they get from Dynmiacs365 Forecasting app or their own internal model, and how to boost their accuracy in the presence of shock scenarios using our VuDecide Planning Agents.

Once DeepVu validates the historical data-set along with the forecasting baseline CSV file as valid demand data-set, it will train VuDecide to deliver compelling shock-resilience demand planning Agent on top of the user's validated data-set and the MSFT Dynamics Demand Forecast (and/or their own forecasting output).
Subsequently, the user is notified via an email that VuDecide Agent has been trained and is available via API and in the dashboard in our Resilient DemandPanner app's dashboard .

Validating User Data

For Dynamics demand forecast, it may be only the basic validation that it is a time-series that is sufficient, for which a forecast can be generated.
However, for DeepVu's AI Agent, for resilient planning and relevance to shock scenarios etc, it really has to be checked for being truly a demand planning data-set, i.e it satisfies these conditions:
(i) It is a valid time series.
(ii) It is a demand data-set, in other words, it is a historical sales (customer orders) data-set that includes the quantity of items sold.
(iii) It is with reasonable cadence, that is either daily, or weekly. Monthly data is just never a sufficient data-set for our deep-learning models.

Therefore we recommend users to upload a weekly-cadence historical data-set and if you're using Dynamics365 forecasting App to get a weekly-cadence forecast as well.

2. Answering the Questionnaire to Select a Shock Scenarios

Questionnaire to Guide Users to Select Shock Scenario

1. What industry sector best describes your product ?
   () Apparel () Beauty () CPG () Food & Bev
2. Are you interested in shock that impacts entire industry or specific to your product and your supply chain?
   () Macro () localized
3. Please choose only one category of shocks from among these
   ()A. Consumer Spend () B. Demand fluctuations
4. If you chose A in Q3, please choose one of the following
   () A. Consumer spend drops by 20% () B. Consumer Spend drops by 10%
5. If you chose B in Q3, please choose one of the following
   () A. Demand spikes by 30% or higher ()B. Demand spikes by 15%--29.9% ()C demand spikes by 5%--14.9%
6. Of these USA macroeconomic signals, please tick at least 3 that are very important to you for the model to integrate
   a. CPI b. Interest Rates c.unEmp d. GDP growth e. PCE aggregate f. PCE_food g.. PCE_recreation h.Crude oil i. Agro Commodities j.non-agro commodities etc
7. Name one or more competitor ……
8. Name one or more top supplier to your product ……

The questionnaire is intended to help you think about shocks that impact your demand planning and that wold be most relevant to your supply chain resilience. We've added an initial set of shocks, however, we intend to continue to scale the number and types of shocks in the system

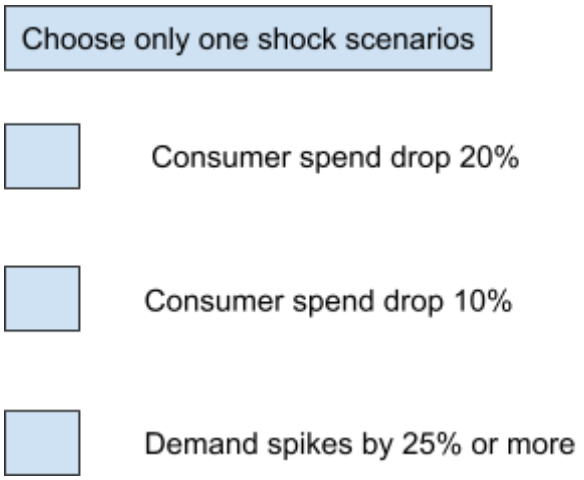


Fig1: UI to allow users to specify the desired shock scenario.

We think it would be confusing and/or overwhelming for users to have to sift through some hundred plus external signals from our supply chain knowledge graph, including some macro-economic signals they may have never heard of before.
Similarly if we were to select a smaller subset of say 30 well known macro-economic signals (Unemployment rate, PCE core, CPI core, bank deposits, crude oil etc), it may give the wrong/misleading impression to the sophisticated users and imply that we're restrictive and ignoring some core signals that they know would certainly have to be included for such an economic shock.

Therefore, by choosing a broad abstracted "shock type" as listed above, DeepVu will represent this shock by a set of "appropriate" signals that manifest such a shock and we internally in Vudecide/VuSim will represent the shock scenario with high credence, and which will be projected forward to the time frame we're forecasting/deciding for.

For example, shock A above "Consumer spend drops 20%" would imply the following:

a. All consumer spend signals would be impacted by a 20% reduction for the Q1 2024 (or the latest month given in the API input), therefore the following set of signals: PCE_aggregate, PCE_food_at_home, PCE_food_away from home, PCE_recreadtional services, etc. all would be projected forward to week1–week12 of 2024 with the corresponding reduction compared to Dec 2023 values.
b. VuDecide would be trained with such a shock pattern already, so it knows how to decide to optimize the Reward with such a shock environment present.
c. At Inference/decisioning time, when the user asks VuDecide to output the demand plan with the env="consumer_spend_drop_20", then basically DeepVu is calling the model for inference/decision with those signals in the shocked state, and it'll output the demand decision for that shocked state.

3. Integration Architecture and API Communication

We have decided to use Azure cloud storage for communication between Dyanmics265app and VuDecide for the first set of releases.

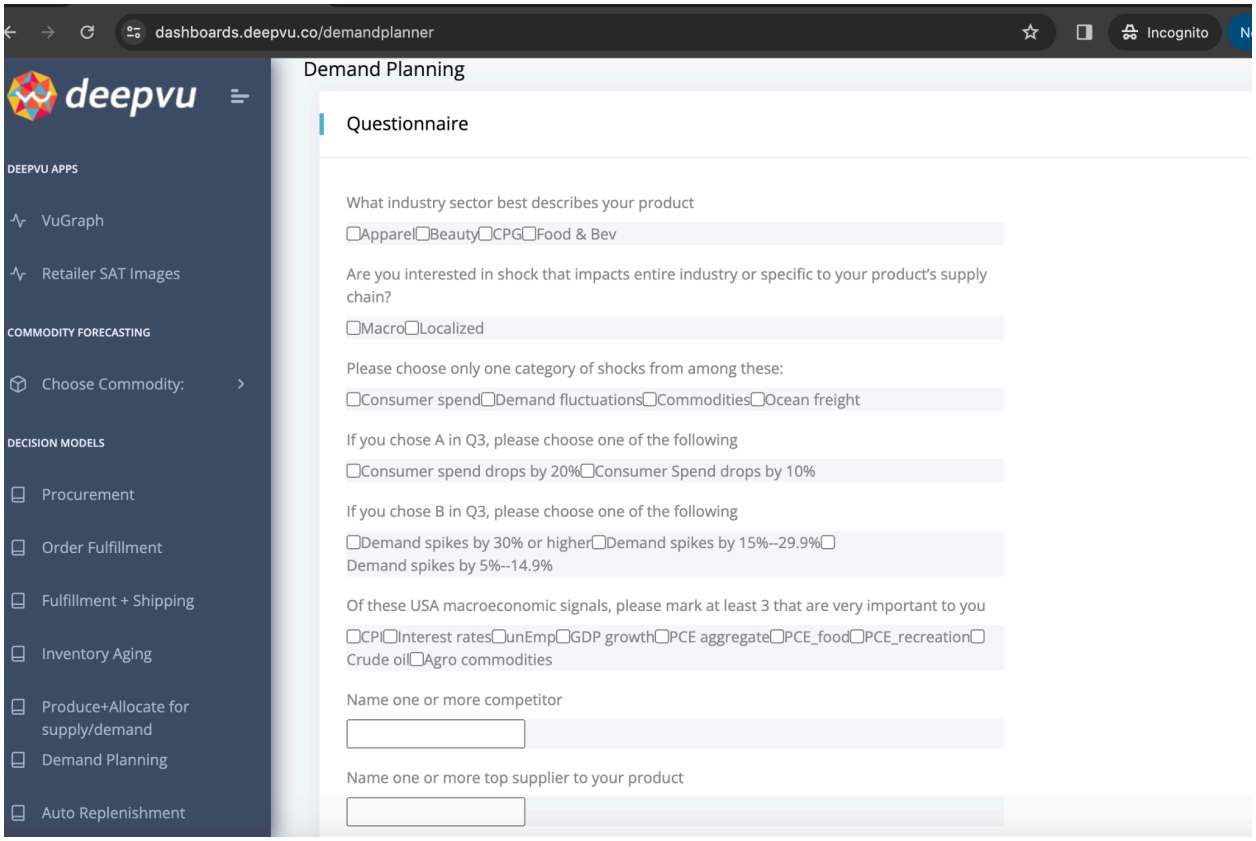
4. The ResilientPlanner AI Agent Web App

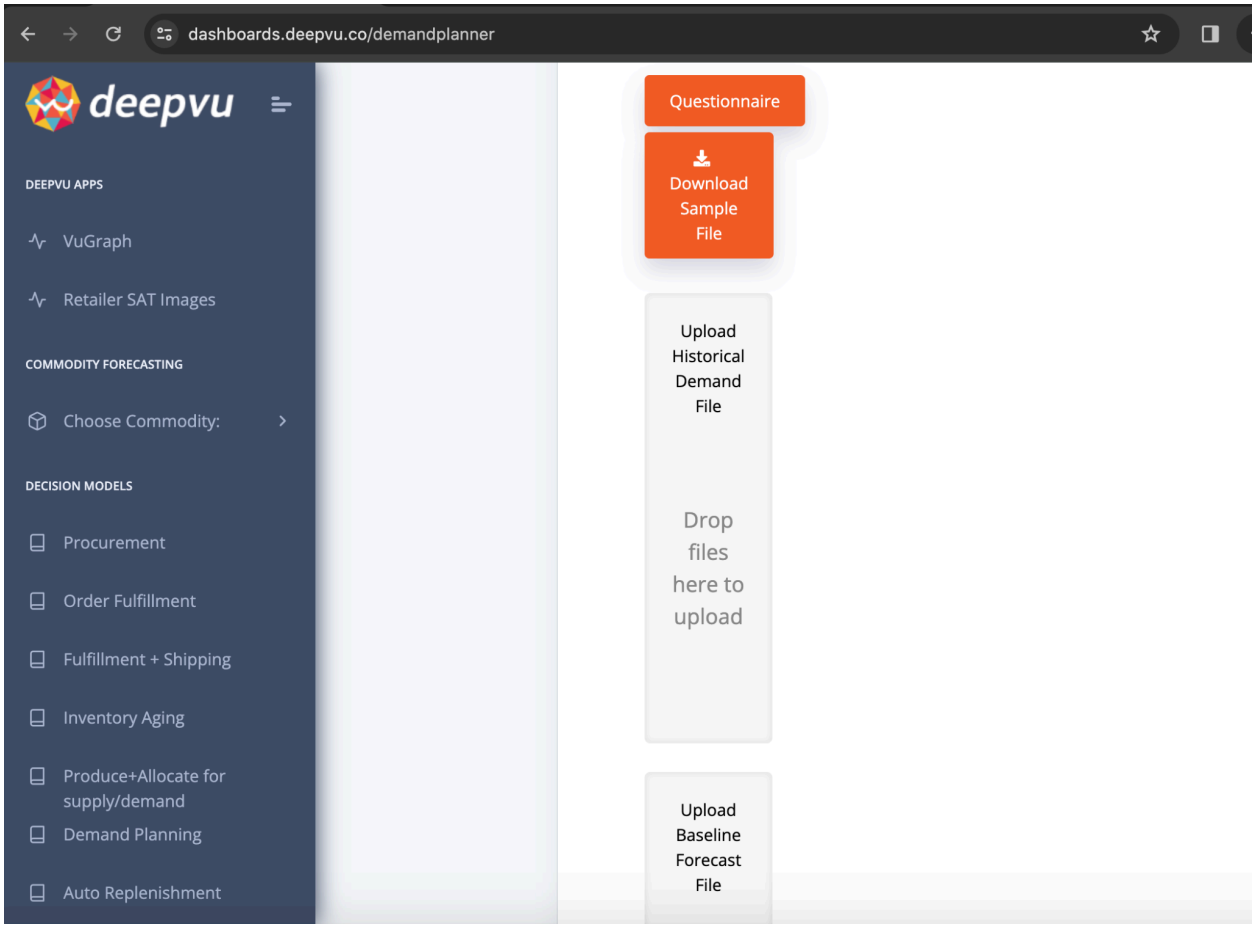
We've already started implementing this web application, and we've used our own forecasting model as a standin for the MSFT Dynamics forecasting model API.

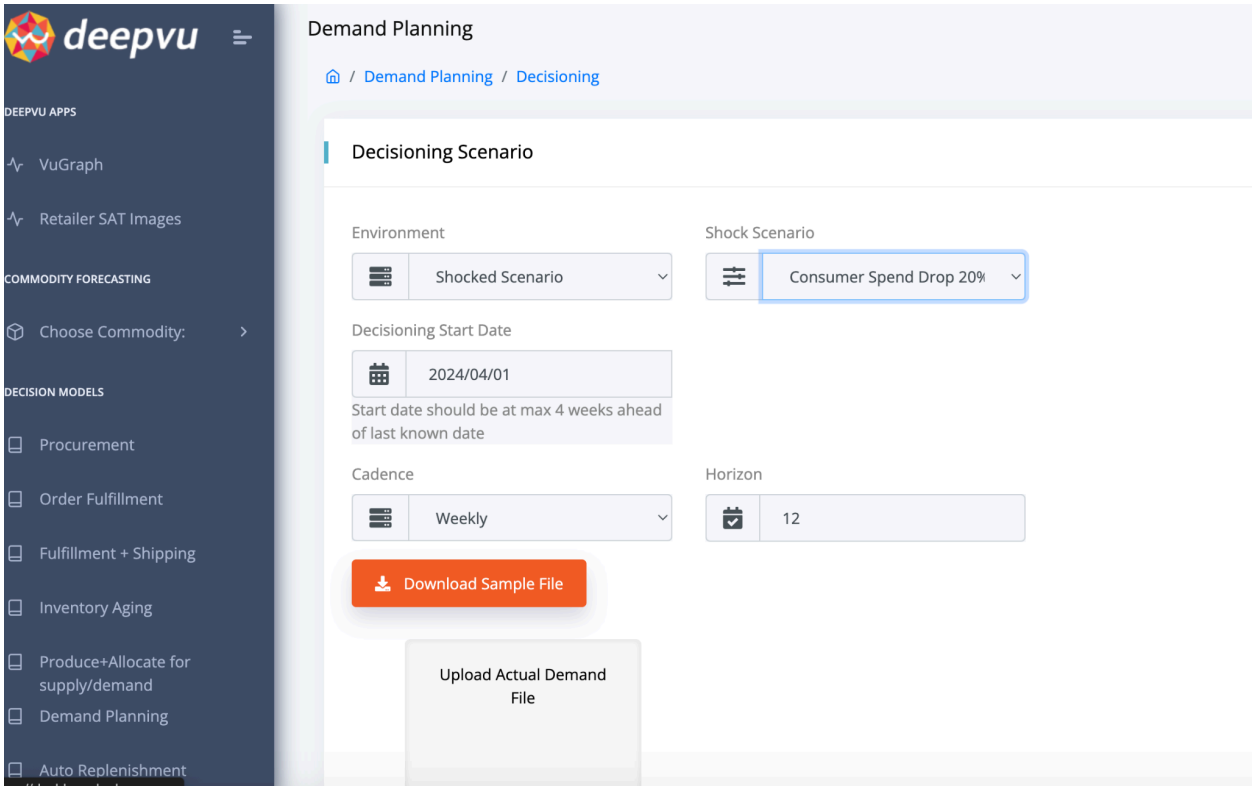
The App has two flows— real time decisioning flow and planning and analytics flow.

4.1 Initialization and Configuration

Shock and Data-set Questionnaire





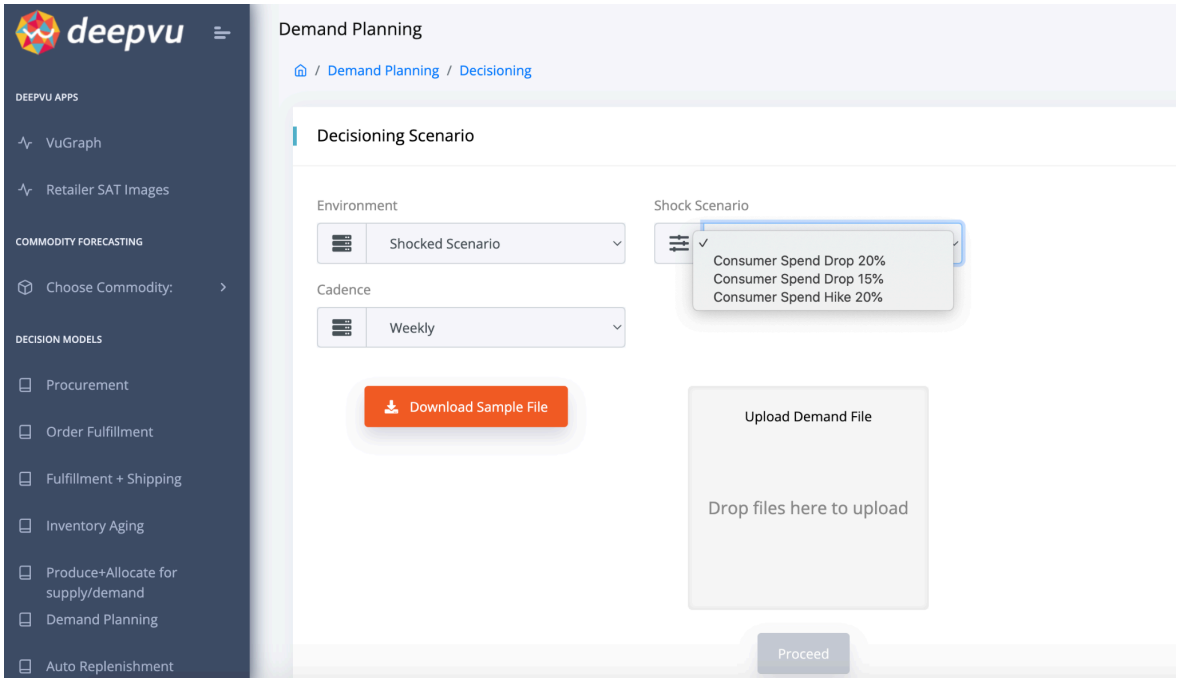


4.2 Decisioning Flow

For the real time AI decisioning assistant flow, the user is asked to upload the historical demand data but clearly it's important that it is the EXACT same data-set that Dynamics365 forecasting model was trained on, or your own internal model, along with the forecasting models's output as the baseline forecast.

The user needs to also input the following:

a) Cadence (daily, weekly or monthly – weekly is highly recommended)
b) Shock scenario (choose from a predetermined set)
c) Industry vertical



4.3 Decisioning Output

This is your decisioning assistant view and it is intended tot inform your decision on the demand plan in the presence of the shock vs. the baseline forecast. Clearly, since this is for future weeks, it won't have the actuals to compare against until much later. For periods where you have actuals you can compare the accuracy vs. the baseline in the “planning & control tower” pane.

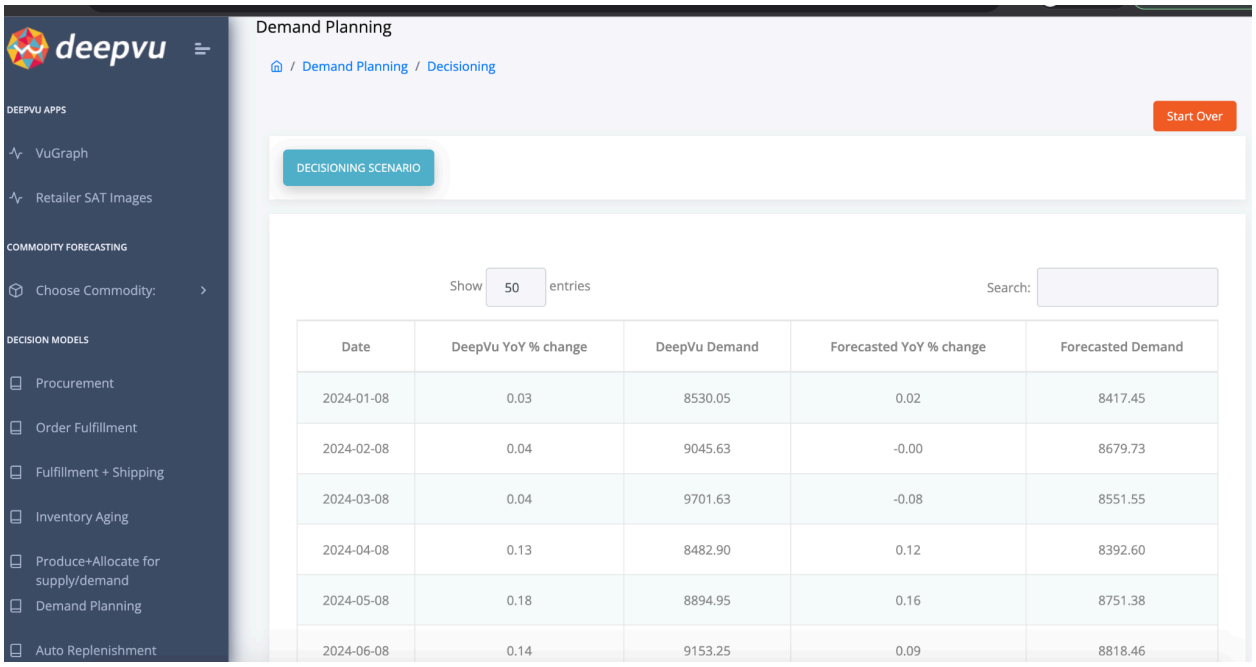


Fig: Monthly demand plan vs. forecast

Note: A Button to “approve/override” will be added in the V1.0 release.

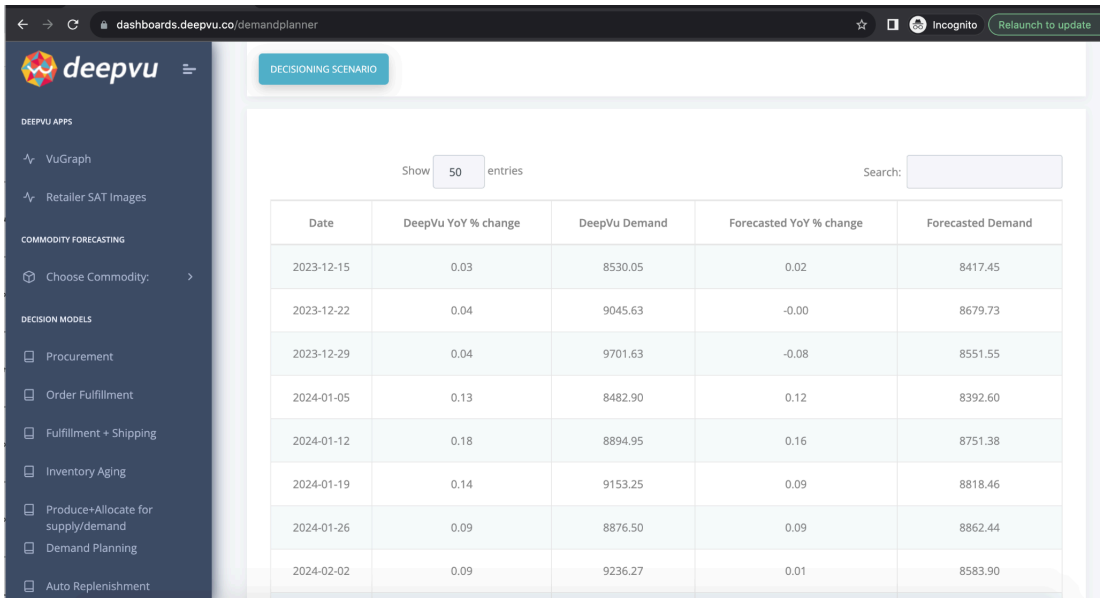


Fig: Weekly demand plan vs.forecast

4.4 Planning and Control Tower Flow

Here you evaluate our AI Demand Planner Agents performance vs. the Baseline forecasting app weather its Dynamics or home grown in the presence of the shock scenario you have selected.

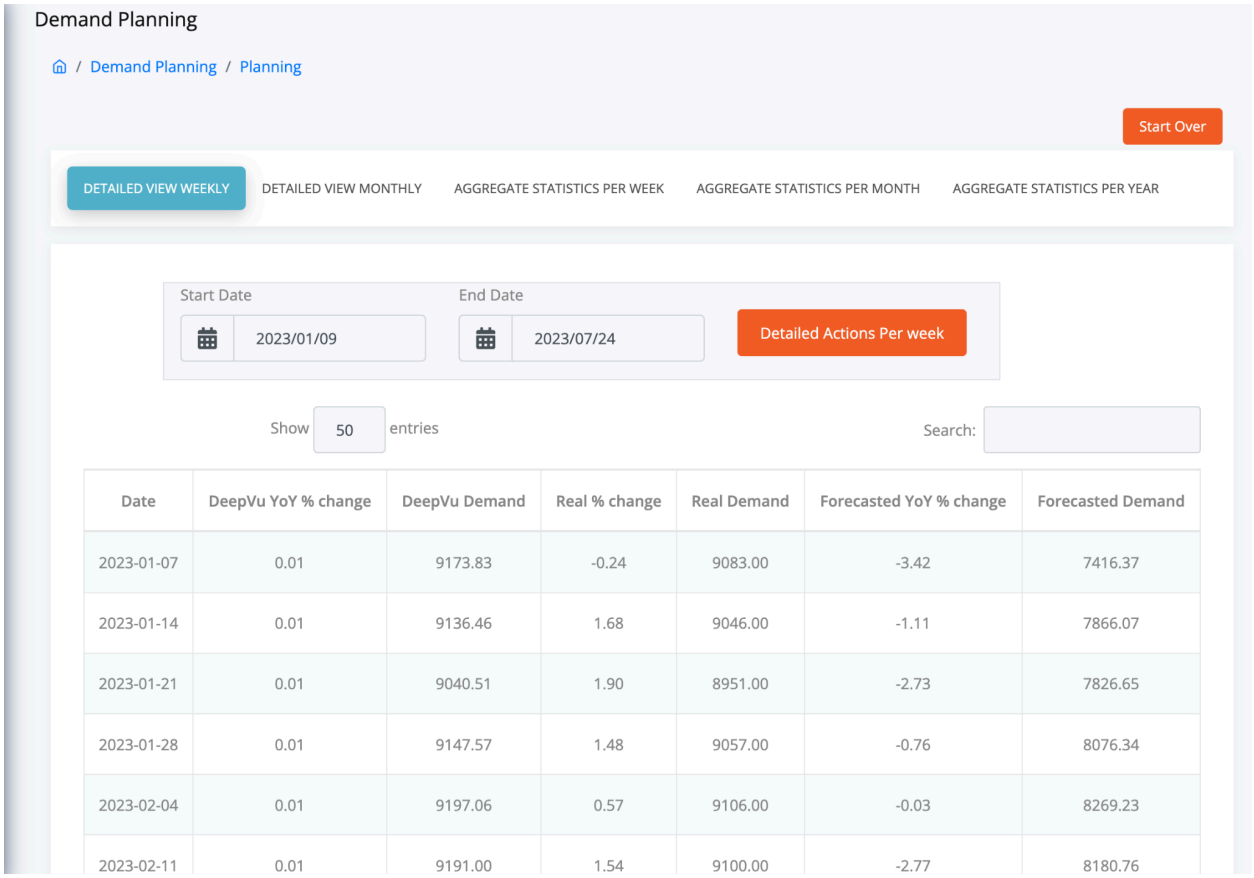


Fig: Weekly detailed view

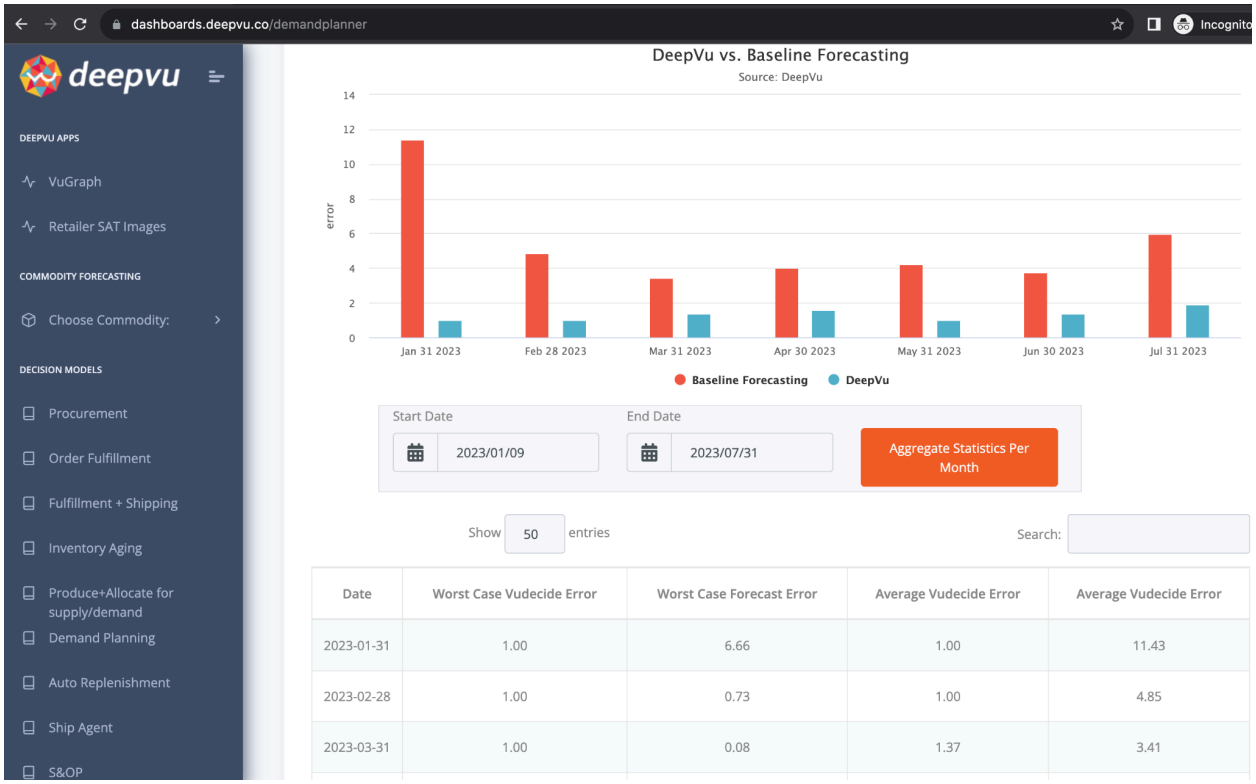
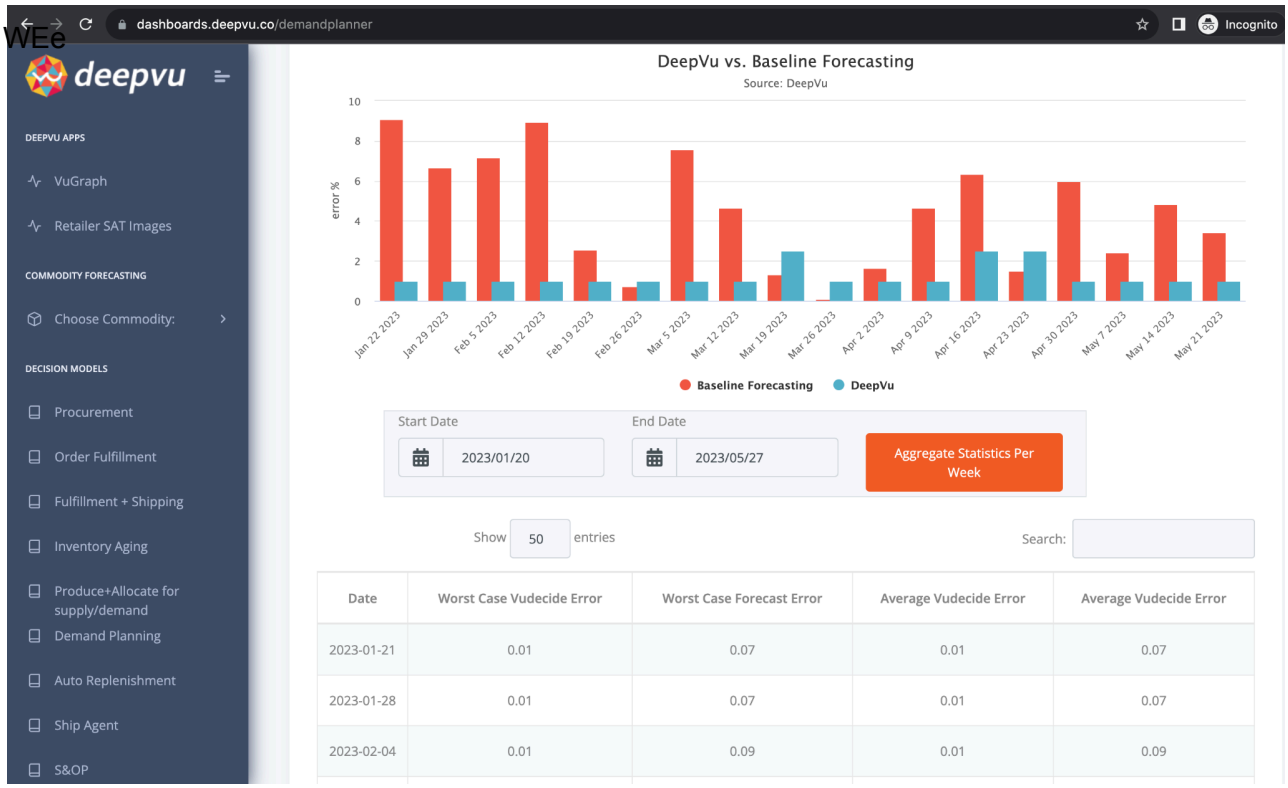


Fig: Monthly Aggregate Stats Chart and Table



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