Supply Chain Management

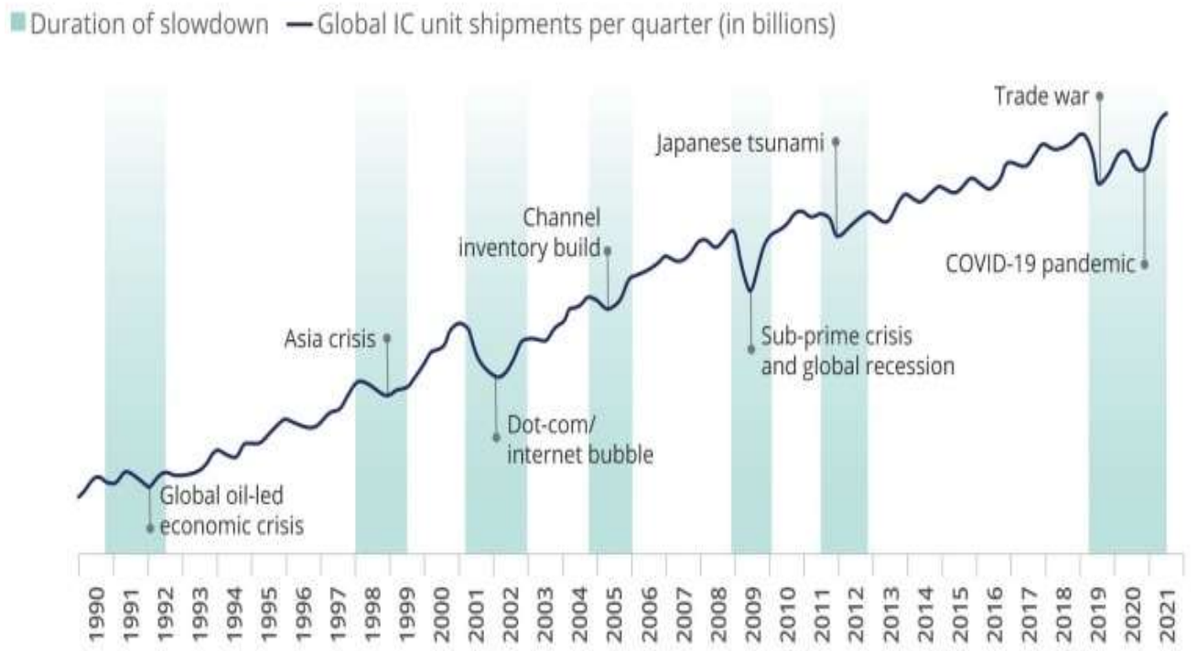
PriSoft
Inspired by Innovation. Competing on Analytics

- **Supply Chain Management** is the handling of the entire production flow of a good or service, starting from the raw components all the way to delivering the final product to the consumer.
- Supply chain management affects product and service quality, delivery, costs, customer experience and ultimately, profitability.
- Effective supply chain management systems minimize cost, waste and time in the production cycle.
- Top 5 Components of Supply Chain Management
    1. Plan
    2. Source
    3. Make
    4. Delivery
    5. Return

The Big Semiconductor Supply Chain Problem

FIGURE 1

Global Integrated Circuit (IC) unit shipments across various downturns, quarterly, 1990 to Q2, 2021 (log scale)



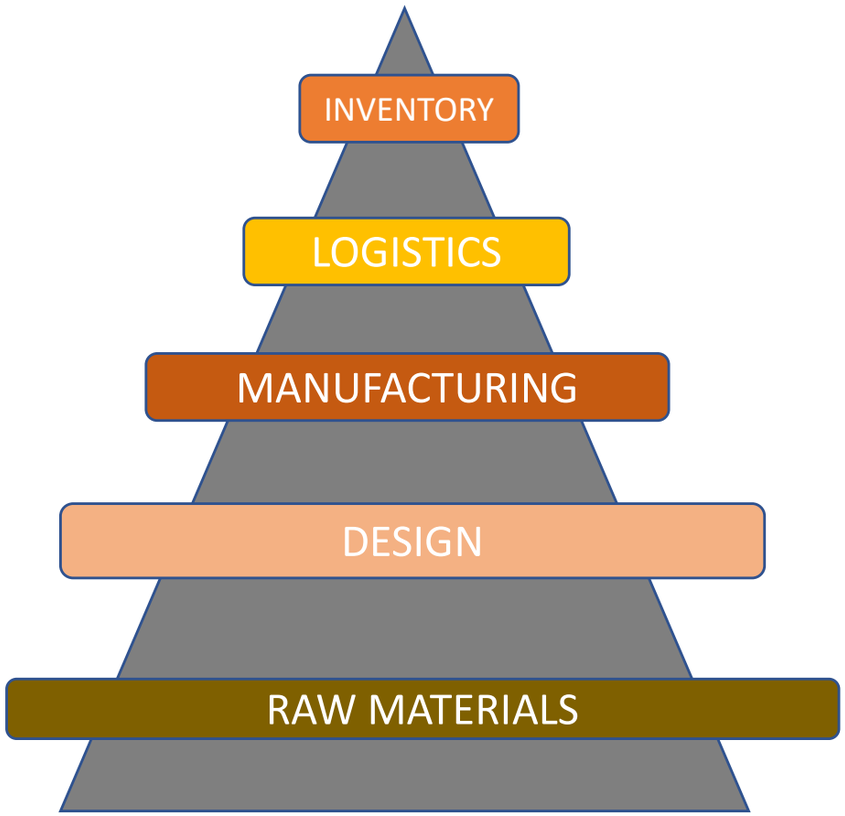
Source: Deloitte analysis based on secondary research and data gathered from publicly available articles and reports.

Deloitte Insights | deloitte.com/insights

The absence of a US$1 chip can prevent the sale of a device, appliance, or vehicle worth much more. The world experienced a severe and long-lasting semiconductor shortage across multiple chip products from 2020 through fall of 2021, and Deloitte and McKinsey predict the chip shortage will continue through 2022, with lead times for some components pushing out to 2023, meaning it will have lasted over 24 months.

You can't prevent a shortage, but you can lessen its impact

The Building Blocks of Semiconductor Supply Chain



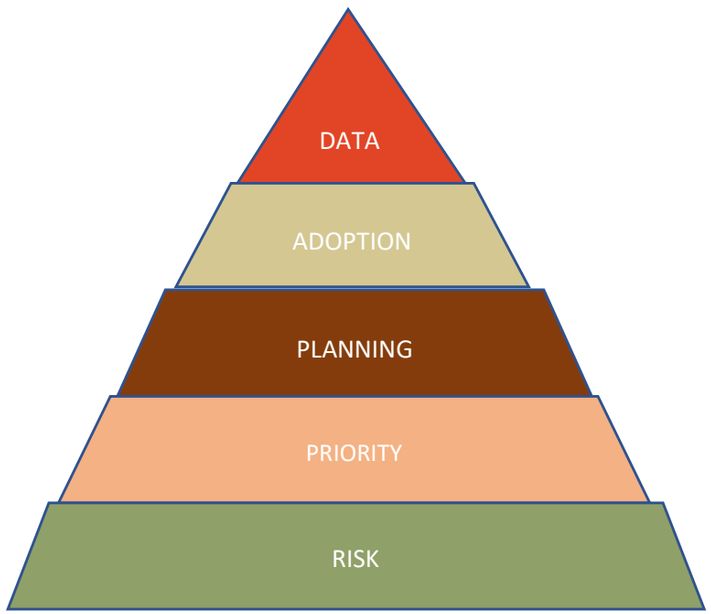
To Cater the future predicted and unpredicted demand, product inventory has become more critical than ever.

Logistics plays a vital role not only in delivering the end product but supplying different materials to the equipment.

Semiconductor manufacturing time has a major impact on customer commitments and can shake up the end to end Supply Chain
New product design feeds into the supply chain and impacts the subsequent process steps.

Semiconductor Fabrication and Assembly is dependent on vailability of raw materials like chemicals, semiconducting materials (silicon, germanium, gallium arsenide, etc.), substrate, and many other different types of resources. Shortage of raw material has direct impact on product supply.

The Future Blocksof Semiconductor Supply Chain



Data: Understanding the market demand is very important. Semiconductor supply chain teams have resources that can allow them to gauge the market swing. External disruptive factors like pandemic or war should be taken into consideration

Adoption: Just In Time (JIT) is a widely used methodology in manufacturing. However, the semiconductor supply chain needs to move beyond the traditional concepts. This demands changes in the supply chain working with the help of a detailed understanding of both technical and non-technical (like weather, outbreak, etc.) information that can affect the semiconductor supply chain.

Planning: Semiconductor supply chain planning should utilize more data points than simply relying on forecast or market intelligence.

Priority: In the end, decisions taken by the semiconductor supply chain teams are all about how to balance and prioritize product manufacturing. Prioritizing products is not an easy task, and that is why semiconductor supply chain teams need to find new ways to balance the inventory of different types of products.

Risk: Eventually, semiconductor supply chain management is a risky business. If the market demand is lower than the expected supply then it can lead to losses. On another side, if the product supply is not meeting the market demand, then the opportunity to gain on the high demand is lost. New strategies and concepts to be adoped that are more robust than the older production and supply systems.

The RPRTRL Metric in Semiconductor Supply Chain

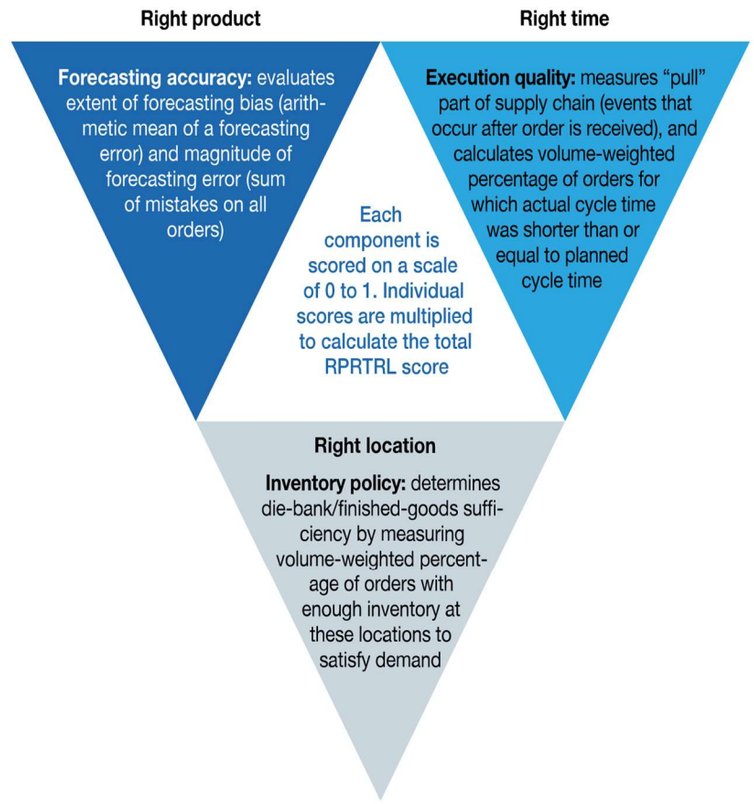
PriSoft
Inspired by Innovation. Competing on Analytics

A modern and extensive metric can provide detailed insights into the semiconductor supply chain's end-to-end
efficiency. It asks several questions for each order:
Were demand forecasts

1. Accurate enough to enable businesses to produce the right product (RP)? is it true
2. That execution went according to plan, allowing all tasks to be completed at Right Time (RT)?
3. Was inventory staged at the Right Locations (RL) in the semiconductor supply chain?

This metric, abbreviated as RPRTRL, is calculated using hard data to provide an objective evaluation of supply-chain
efficiency. For the first time, companies will recognize all root causes behind performance problems, create an improvement plan, and quantify their progress using the insights given by the RPRTRL measurement.

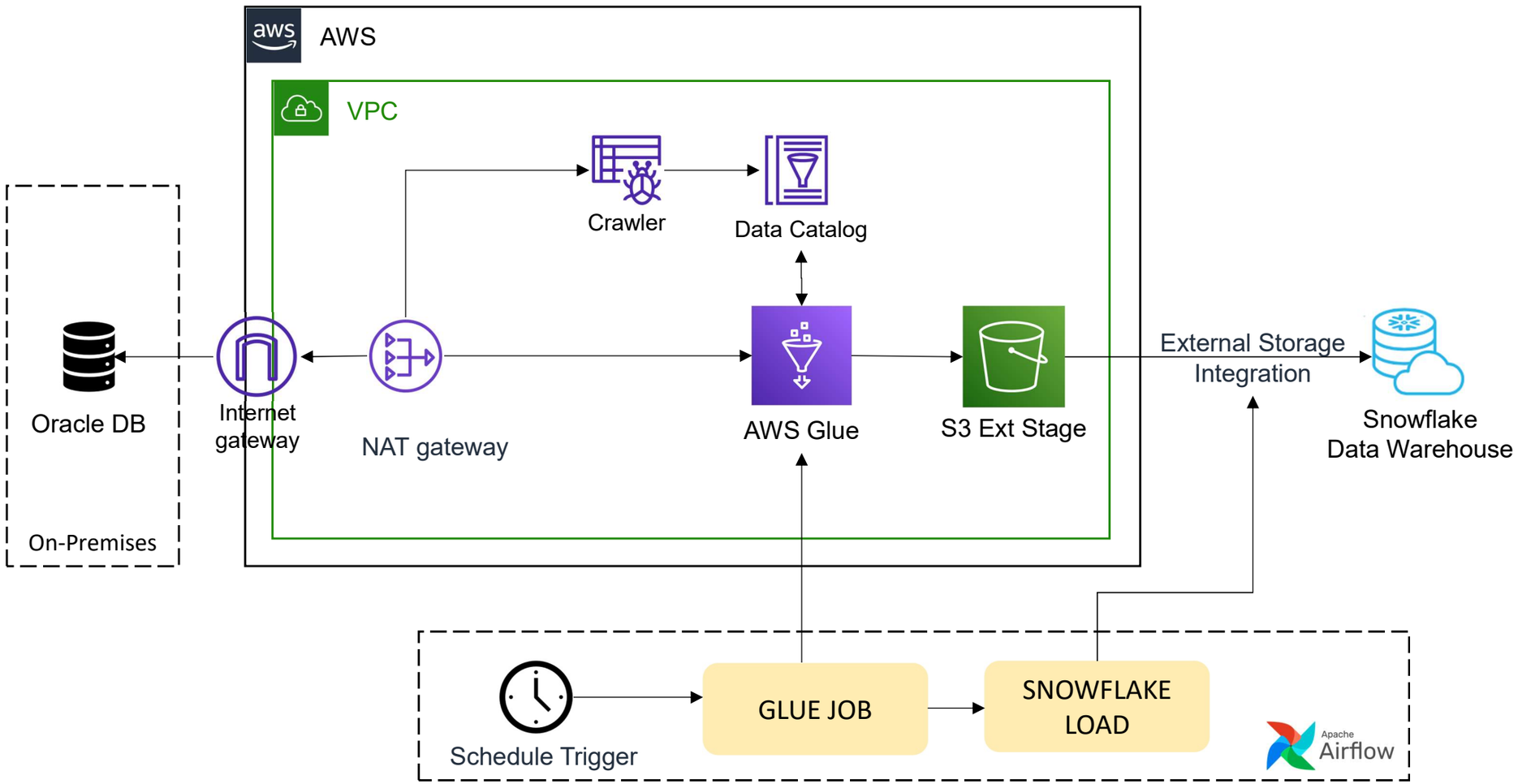
The right product, right time, right location (RPRTRL) calculation uses scores from three areas.



McKinsey&Company

DATA FLOW ARCHITECTURE

PriSoft
Inspired by Innovation. Competing on Analytics



JDA Data Model Demand Forecast and Planning

JDA Demand

1. SalesMaster : Defines sales, channel, geography or marketing entities used in forecast and fulfillment processes.
2. SalesOrderMaster : Defines the list of sales orders and header information, including the sales order id, customer, priority, demand type, etc. Sales Order is a document from a customer for a particular end item or a number of end items
3. SalesOrderLine : Defines the list of all the line items that have been requested in a sales order. This contains the item, quantity, and due date information for sales lines.
4. SalesOrderSubLine : Defines the list of all the configurable items that have been requested for a particular sales order line. This is used when placing orders for (CTO) Configure to Order Products.
5. SalesProductCalendar : Associate the sales name with a sales calendar to reflect time varying selling prices
6. Forecast Group : Master table for the forecasts
7. ForecastDetail : Priority of the forecast, Quantity of the forecast, Due Dates, Tolerance Dates
8. SOLineSchedule : Data to be input into this only if a Sales Line is expected to be shipped in multiple shipments, each having a different shipment date.

JDA Planning

This slide details the planning related files required for TMAPI. These are data specifications that may be required to govern planning behavior of SCP or that of specific solvers. TMAPI is a programming interface for accessing and manipulating data held in a topic map used by JDA.

1. PlanParameters : Defines the different planning parameters.
2. ObjectiveParameters : This table holds the objective levels for the lpOPt and defines the hierarchy of objective levels required for planning and their attributes. This table is used in conjunction with the LPLayer table. This table is relevant only for the lpOPt solver.
3. LpLayers :Define the different layers and the mapping of demand ranks to layers. This table usedin conjunction with the ObjectiveParameters table. This table is relevant only for thelpOPt solver.

Output tables

This section details the different export tables supported by SCP. These are exported directly into the Manufacturing ABPP database MasterProductionPlan

1. MaterialPeggingInfo
2. ProcurementPlan
3. DistributionPlan
4. ShipmentPlan
5. CapacityPeggingInfo
6. ForecastFulfillmentPlan
7. ManufacturingPlan
8. OperationsPlan
9. InventoryPlan
10. Resource Plan

.

Input Data tables

1. EnterpriseMaster
2. SupplyChainMaster
3. OrganizationMaster
4. PlanMaster
5. CalendarMaster
6. ItemMaster
7. ProductMaster
8. BOM and Routing
9. Vendor and SupplierMaster
10. Inventory
11. Requisition, Purchase Order

(The entire list is documented in SCP_TMAPI_Record_Manual_6.3.2)

Supply Chain Analytics

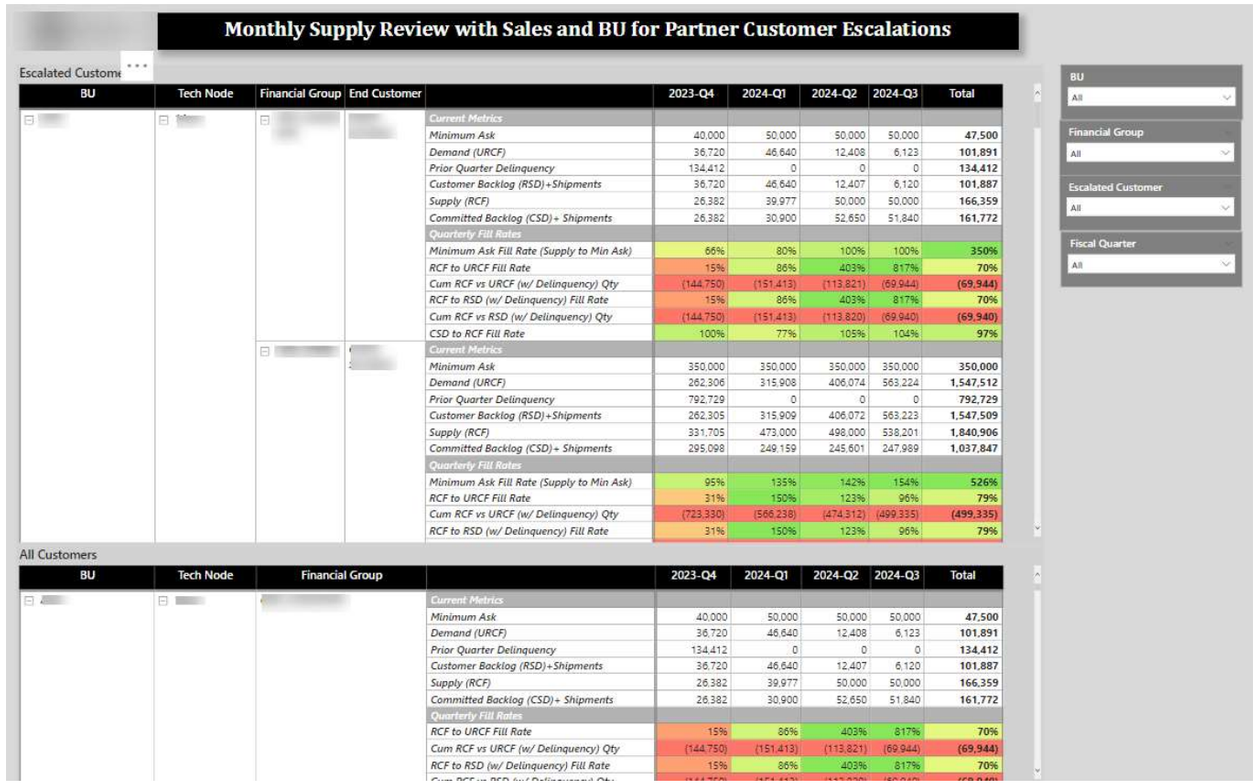
SOW Item	Description
1	Monthly Supply Review with Sales and BU for Partner Customers Escalations
2	Weekly Master Planner Cross-Functional Review
3	Foundry Commit vs Ship Tracking
4	Fabout Waterfall Dashboard
5	Kit Planning Dashboard
6	KPI Analysis -1
7	KPI Analysis -2
8	Backlog RSD, CSD Pushouts/ Pull Ins

Monthly Supply Review with Sales and BU for Partner Customers Escalations

SOW 1:
On the right hand side picture shows two matrix visuals which has monthly supply review data for the escalated customers and all customers.

The above matrix of the picture has the escalated customers data, which shows the quarterly fill rates. All the data's are coded in different colors as per their quarterly delta change. And all the (– ve) values are enclosed in a bracket.

The below matrix of the picture shows the same data for all the customers i.e., escalated and non-escalated.



BU	Tech Node	Financial Group	End Customer		2023-Q4	2024-Q1	2024-Q2	2024-Q3	Total
				Current Metrics					
				Minimum Ask	40,000	50,000	50,000	50,000	**47,500**
				Demand (URCF)	36,720	46,640	12,408	6,123	**101,891**
				Prior Quarter Delinquency	134,412	0	0	0	**134,412**
				Customer Backlog (RSD)+Shipments	36,720	46,640	12,407	6,120	**101,887**
				Supply (RCF)	26,382	39,977	50,000	50,000	**166,359**
				Committed Backlog (CSD)+ Shipments	26,382	30,900	52,650	51,840	**161,772**
				Quarterly Fill Rates					
				Minimum Ask Fill Rate (Supply to Min Ask)	66%	80%	100%	100%	**350%**
				RCF to URCF Fill Rate	15%	86%	403%	817%	**70%**
				Cum RCF vs URCF (w/ Delinquency) Qty	(144,750)	(151,413)	(113,821)	(69,944)	**(69,944)**
				RCF to RSD (w/ Delinquency) Fill Rate	15%	86%	403%	817%	**70%**
				Cum RCF vs RSD (w/ Delinquency) Qty	(144,750)	(151,413)	(113,820)	(69,940)	**(69,940)**
				CSD to RCF Fill Rate	100%	77%	105%	104%	**97%**
				Current Metrics					
				Minimum Ask	350,000	350,000	350,000	350,000	**350,000**
				Demand (URCF)	262,306	315,908	406,074	563,224	**1,547,512**
				Prior Quarter Delinquency	792,729	0	0	0	**792,729**
				Customer Backlog (RSD)+Shipments	262,305	315,909	406,072	563,223	**1,547,509**
				Supply (RCF)	331,705	473,000	498,000	538,201	**1,840,906**
				Committed Backlog (CSD)+ Shipments	295,098	249,159	245,601	247,989	**1,037,847**
				Quarterly Fill Rates					
				Minimum Ask Fill Rate (Supply to Min Ask)	95%	135%	142%	154%	**526%**
				RCF to URCF Fill Rate	31%	150%	123%	96%	**79%**
				Cum RCF vs URCF (w/ Delinquency) Qty	(723,330)	(566,238)	(474,312)	(499,335)	**(499,335)**
				RCF to RSD (w/ Delinquency) Fill Rate	31%	150%	123%	96%	**79%**

BU	Tech Node	Financial Group		2023-Q4	2024-Q1	2024-Q2	2024-Q3	Total
			Current Metrics					
			Minimum Ask	40,000	50,000	50,000	50,000	**47,500**
			Demand (URCF)	36,720	46,640	12,408	6,123	**101,891**
			Prior Quarter Delinquency	134,412	0	0	0	**134,412**
			Customer Backlog (RSD)+Shipments	36,720	46,640	12,407	6,120	**101,887**
			Supply (RCF)	26,382	39,977	50,000	50,000	**166,359**
			Committed Backlog (CSD)+ Shipments	26,382	30,900	52,650	51,840	**161,772**
			Quarterly Fill Rates					
			RCF to URCF Fill Rate	15%	86%	403%	817%	**70%**
			Cum RCF vs URCF (w/ Delinquency) Qty	(144,750)	(151,413)	(113,821)	(69,944)	**(69,944)**
			RCF to RSD (w/ Delinquency) Fill Rate	15%	86%	403%	817%	**70%**

Report:

Weekly Master Planner Cross-Functional Review

PriSoft
Inspired by Innovation. Competing on Analytics

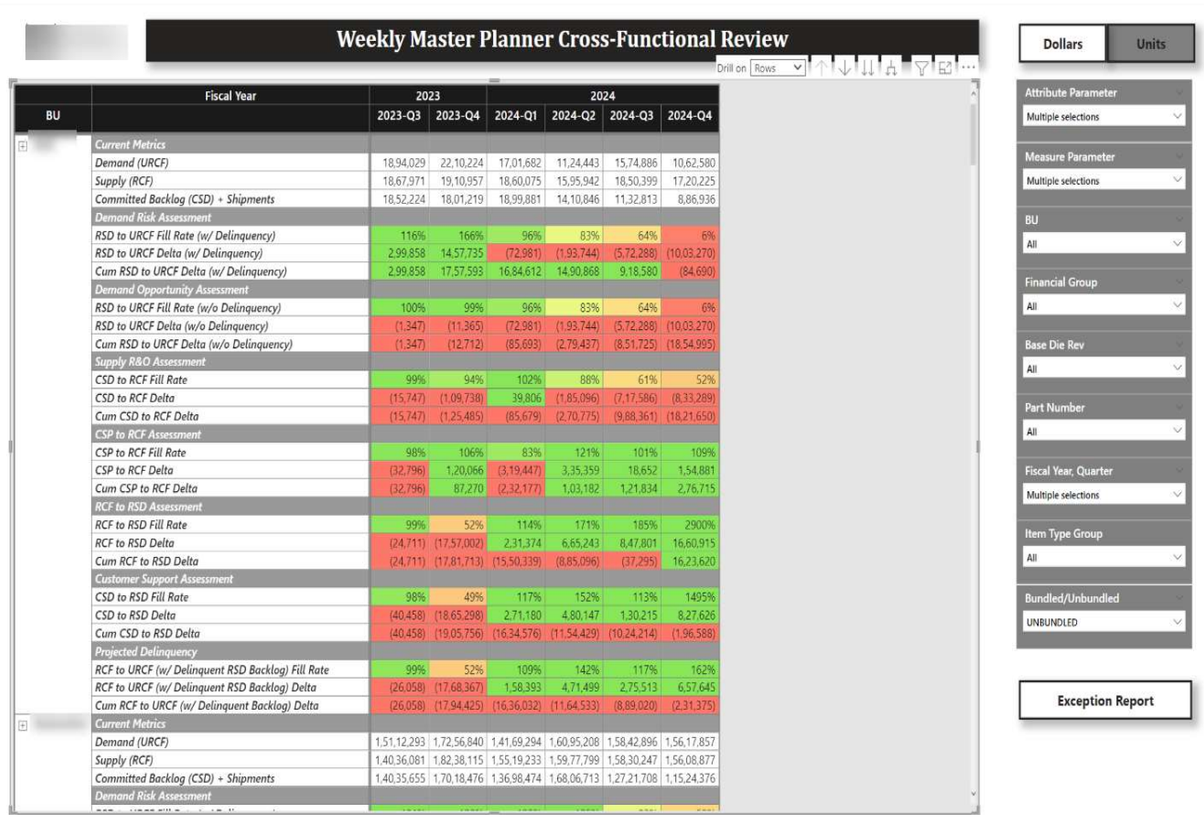
SOW 2:
On the right hand side picture shows a matrix visuals which has weekly master planner review data.

The matrix shows all the cumulative delta changes in the different quarter .The values are coded in different colors by conditionally. And all the (– ve) values are enclosed in a bracket.

Its showing the data for the business functionality that how much are in the opportunity and how much are in risk.

There are two buttons like unit and dollar that is like switching the matrix from unit to dollar matrix.

One special features is added i.e. **attribute parameter** by that you can limit the dimension of the matrix.



BU	Fiscal Year	2023		2024			
		2023-Q3	2023-Q4	2024-Q1	2024-Q2	2024-Q3	2024-Q4
	Current Metrics						
	Demand (URCF)	18,94,029	22,10,224	17,01,682	11,24,443	15,74,886	10,62,580
	Supply (RCF)	18,67,971	19,10,957	18,60,075	15,95,942	18,50,399	17,20,225
	Committed Backlog (CSD) + Shipments	18,52,224	18,01,219	18,99,881	14,10,846	11,32,813	8,86,936
	Demand Risk Assessment						
	RSD to URCF Fill Rate (w/ Delinquency)	116%	166%	96%	83%	64%	6%
	RSD to URCF Delta (w/ Delinquency)	2,99,858	14,57,735	(72,981)	(1,93,744)	(5,72,288)	(10,03,270)
	Cum RSD to URCF Delta (w/ Delinquency)	2,99,858	17,57,593	16,84,612	14,90,868	9,18,580	(84,690)
	Demand Opportunity Assessment						
	RSD to URCF Fill Rate (w/o Delinquency)	100%	99%	96%	83%	64%	6%
	RSD to URCF Delta (w/o Delinquency)	(1,347)	(11,365)	(72,981)	(1,93,744)	(5,72,288)	(10,03,270)
	Cum RSD to URCF Delta (w/o Delinquency)	(1,347)	(12,712)	(85,693)	(2,79,437)	(8,51,725)	(18,54,995)
	Supply R&O Assessment						
	CSD to RCF Fill Rate	99%	94%	102%	88%	61%	52%
	CSD to RCF Delta	(15,747)	(1,09,738)	39,806	(1,85,096)	(7,17,586)	(8,33,289)
	Cum CSD to RCF Delta	(15,747)	(1,25,485)	(85,679)	(2,70,775)	(9,88,361)	(18,21,650)
	CSP to RCF Assessment						
	CSP to RCF Fill Rate	98%	106%	83%	121%	101%	109%
	CSP to RCF Delta	(32,796)	1,20,066	(3,19,447)	3,35,359	18,652	1,54,881
	Cum CSP to RCF Delta	(32,796)	87,270	(2,32,177)	1,03,182	1,21,834	2,76,715
	RCF to RSD Assessment						
	RCF to RSD Fill Rate	99%	52%	114%	171%	185%	2900%
	RCF to RSD Delta	(24,711)	(17,57,002)	2,31,374	6,65,243	8,47,801	16,60,915
	Cum RCF to RSD Delta	(24,711)	(17,81,713)	(15,50,339)	(8,85,096)	(37,295)	16,23,620
	Customer Support Assessment						
	CSD to RSD Fill Rate	98%	49%	117%	152%	113%	1495%
	CSD to RSD Delta	(40,458)	(18,65,298)	2,71,180	4,80,147	1,30,215	8,27,626
	Cum CSD to RSD Delta	(40,458)	(19,05,756)	(16,34,576)	(11,54,429)	(10,24,214)	(1,96,588)
	Projected Delinquency						
	RCF to URCF (w/ Delinquent RSD Backlog) Fill Rate	99%	52%	109%	142%	117%	162%
	RCF to URCF (w/ Delinquent RSD Backlog) Delta	(26,058)	(17,68,367)	1,58,393	4,71,499	2,75,513	6,57,645
	Cum RCF to URCF (w/ Delinquent Backlog) Delta	(26,058)	(17,94,425)	(16,36,032)	(11,64,533)	(8,89,020)	(2,31,375)
	Current Metrics						
	Demand (URCF)	1,51,12,293	1,72,56,840	1,41,69,294	1,60,95,208	1,58,42,896	1,56,17,857
	Supply (RCF)	1,40,36,081	1,82,38,115	1,55,19,233	1,59,77,799	1,58,30,247	1,56,08,877
	Committed Backlog (CSD) + Shipments	1,40,35,655	1,70,18,476	1,36,98,474	1,68,06,713	1,27,21,708	1,15,24,376
	Demand Risk Assessment						

Report:

Foundry Commit vs Ship Tracking

PriSoft
Inspired by Innovation. Competing on Analytics

SOW 3:
On the right hand side picture shows a matrix visuals which shows the tracking of commit and shipping of products.

The matrix shows the tracking data like when you have committed to ship the product. It also shows the quantity of product, how much is early and how much is late in monthly wise.

There are two buttons like Fiscal and Calendar quarter that is like switching the matrix from the usual calendar to the business calendar.

There are few more buttons to show the detail report of the matrix visual and committed graphs .

Report:

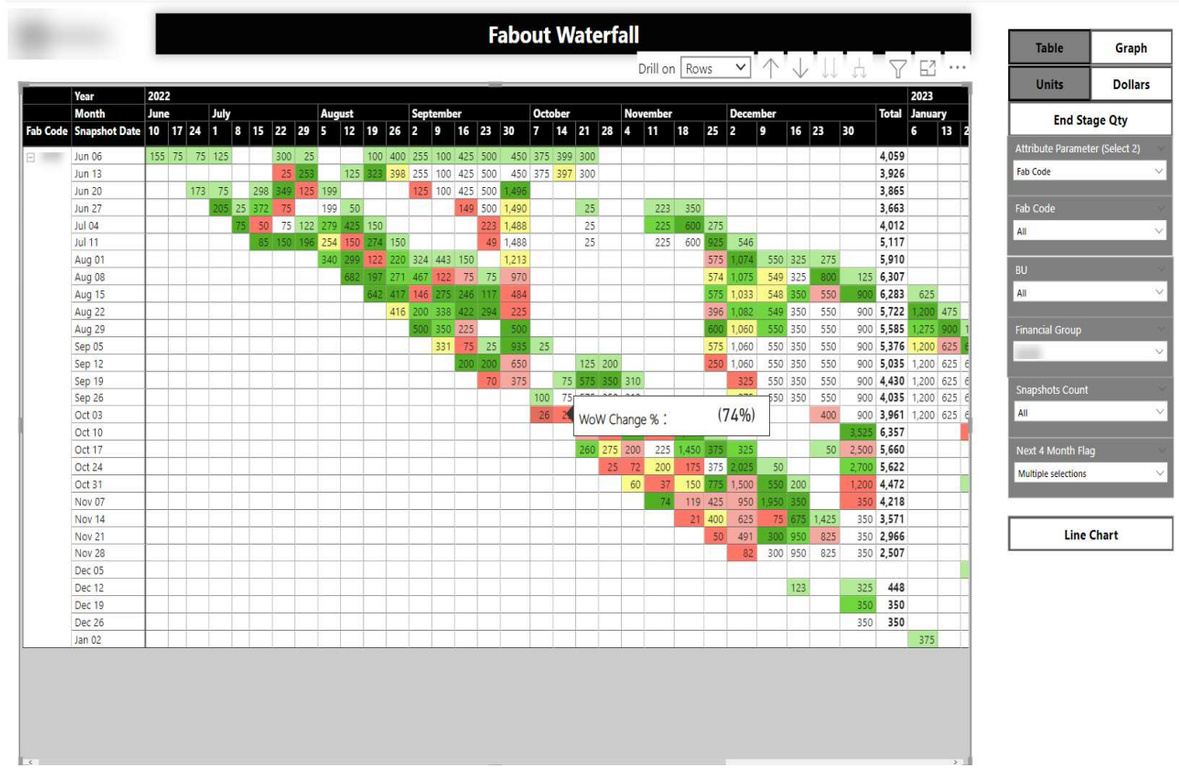
Foundry Commit vs Ship Tracking

PriSoft
Inspired by Innovation. Competing on Analytics

SOW 4:
On the right hand side picture shows a matrix visuals which shows the Forecasted value of the products.

The matrix shows the units of the products to be deliver in a particular day wise. It's like the company is predicting that this amount of units we will be getting from the vendor.

The colors are coded conditionally as per their units delivered. and there is a tooltips that shows the changes if you will hover on it.
There are few more buttons to show the graph of the matrix visual and also unit dollar matrix.



Report:

Kit Planning Dashboard

PriSoft
Inspired by Innovation. Competing on Analytics

SOW 5:
On the right hand side picture shows a matrix visuals which shows the kit Planning data .

The matrix shows the how much of unit is coming in a bunch and how much are singular unit.

The colors are coded conditionally according to the values. Its shows all the cumulative delta changes in month wise.

There is a buttons to show the detailed report of the matrix.

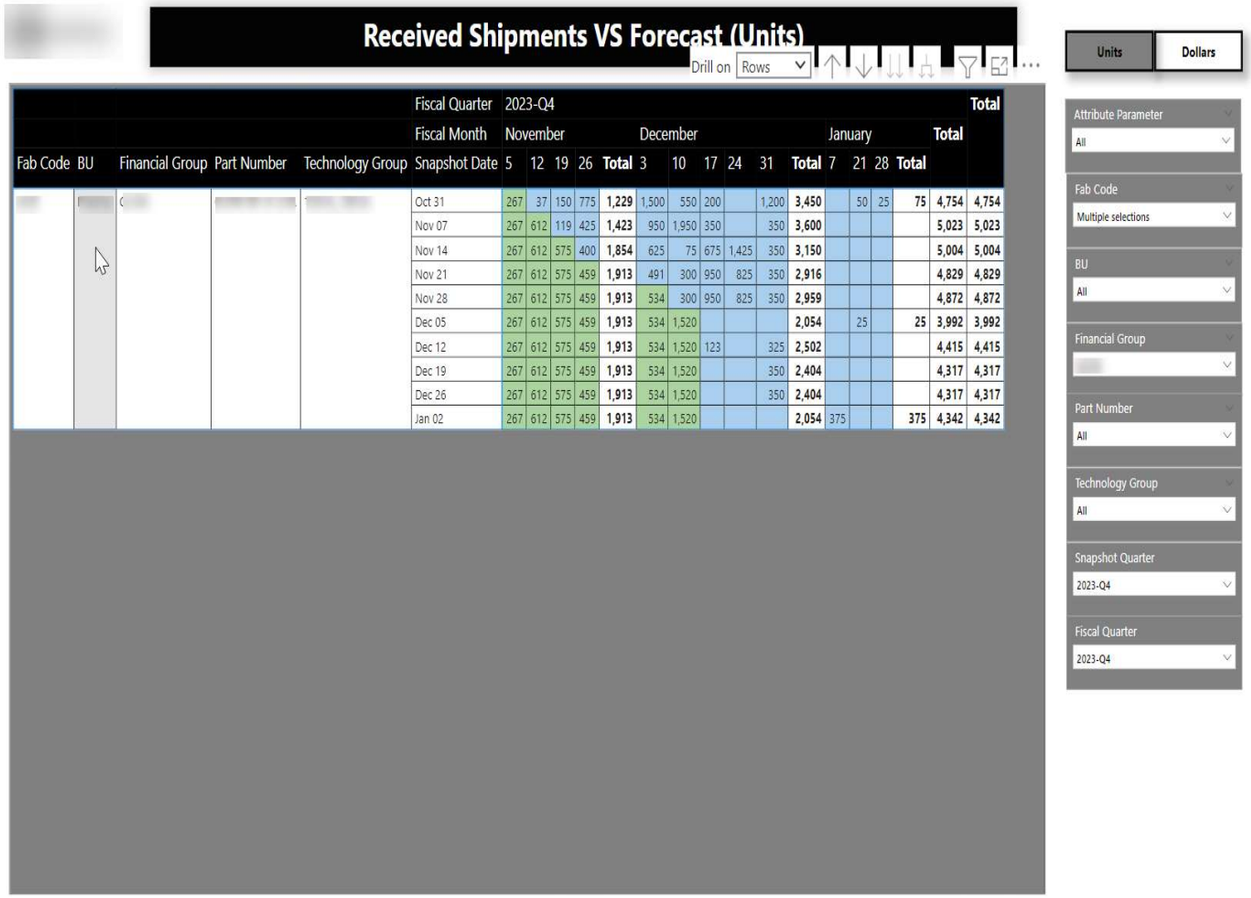
PriSoft
Inspired by Innovation. Competing on Analytics

SOW 6:
On the right hand side picture shows a matrix visuals which shows the forecasted and delivered of units.

The matrix shows the how much of unit is delivered and how much units is forecasted.

The colors are coded conditionally according to the values i.e., the green parts are the actual parts that are delivered and the blue parts are forecasted.

There is a buttons to show the dollar value of the matrix.
And a special feature is added i.e., **attribute parameter** to limit the dimension of the matrix visual.



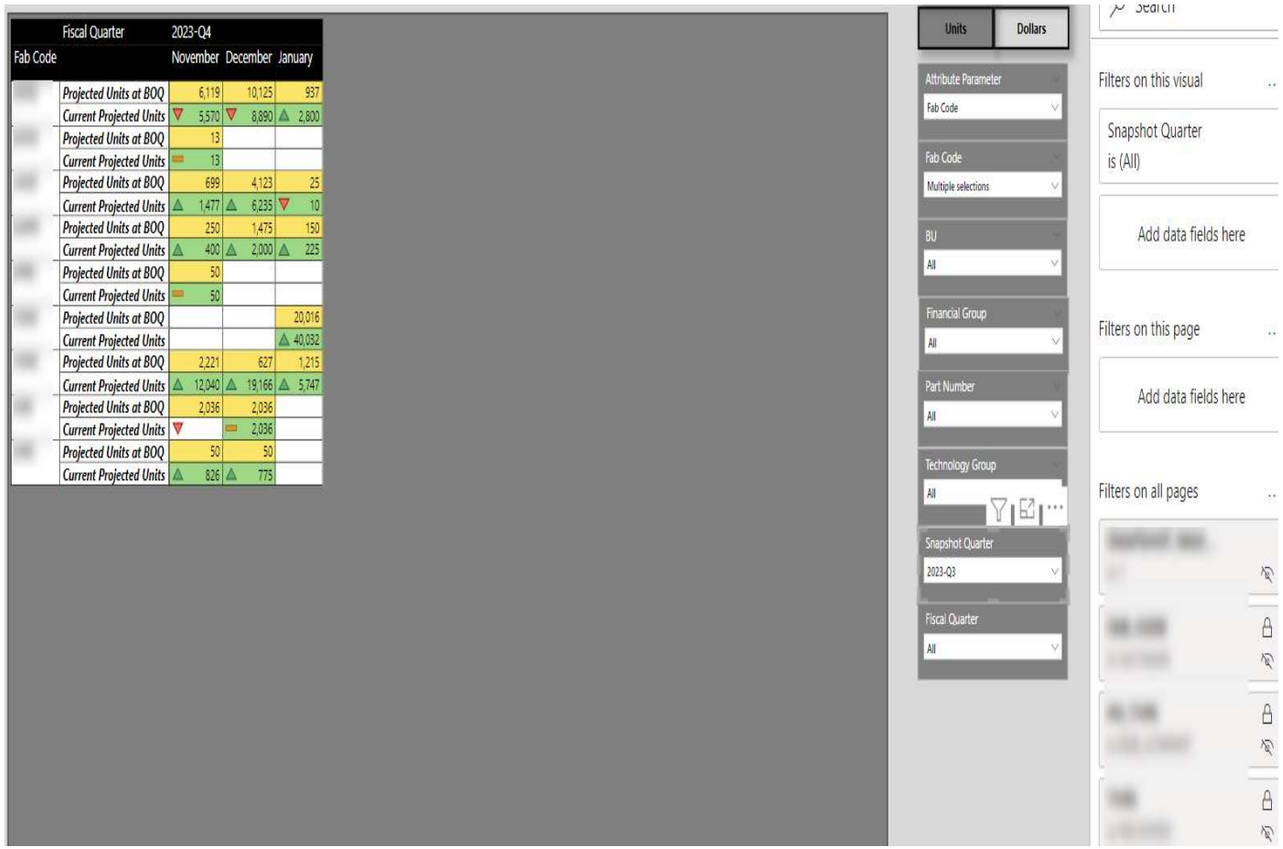
Fab Code	BU	Financial Group	Part Number	Technology Group	Fiscal Quarter	2023-Q4															Total	
					Fiscal Month	November					December					January					Total	
					Snapshot Date	5	12	19	26	Total	3	10	17	24	31	Total	7	21	28	Total		
					Oct 31	267	37	150	775	1,229	1,500	550	200		1,200	3,450		50	25	75	4,754	4,754
					Nov 07	267	612	119	425	1,423	950	1,950	350		350	3,600					5,023	5,023
					Nov 14	267	612	575	400	1,854	625	75	675	1,425	350	3,150					5,004	5,004
					Nov 21	267	612	575	459	1,913	491	300	950	825	350	2,916					4,829	4,829
					Nov 28	267	612	575	459	1,913	534	300	950	825	350	2,959					4,872	4,872
					Dec 05	267	612	575	459	1,913	534	1,520				2,054		25		25	3,992	3,992
					Dec 12	267	612	575	459	1,913	534	1,520	123		325	2,502					4,415	4,415
					Dec 19	267	612	575	459	1,913	534	1,520			350	2,404					4,317	4,317
					Dec 26	267	612	575	459	1,913	534	1,520			350	2,404					4,317	4,317
					Jan 02	267	612	575	459	1,913	534	1,520				2,054	375			375	4,342	4,342

SOW 7:
On the right hand side picture shows a matrix visuals which shows the first commit and the last commit of the products delivery.

The matrix shows the how much of units they had committed to deliver very firstly. And how much is given till now.

The colors are coded conditionally according to the values i.e., the green parts are the current committed units they have delivered and the yellow parts are they had committed very firstly.

There is a buttons to show the dollar value of the matrix.
And a special feature is added i.e., **attribute parameter** to limit the dimension of the matrix visual.



Backlog RSD, CSD Pushouts/ Pull Ins

SOW 8:
On the right hand side picture shows a matrix visuals which shows the RSD and CSD pull-ins or push-outs.

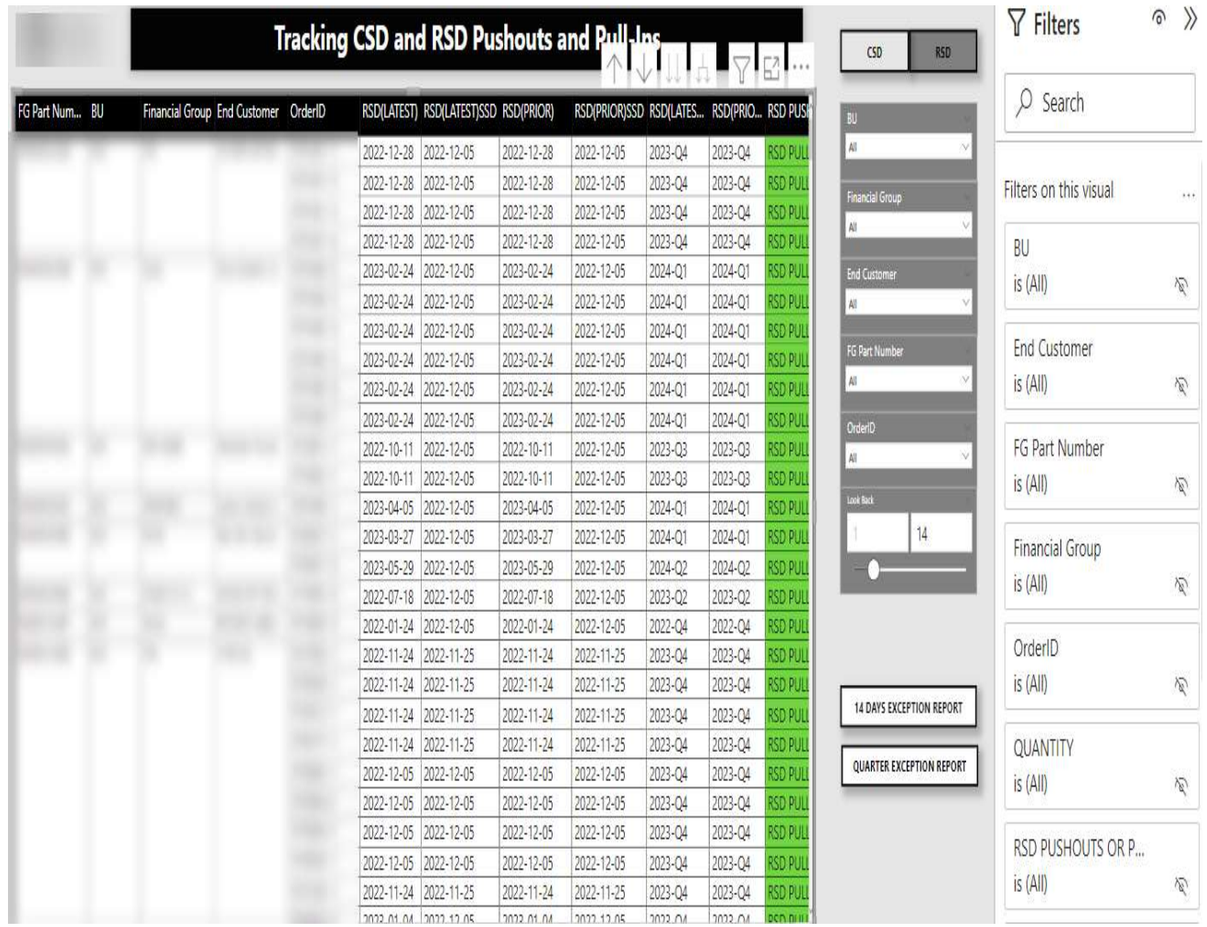
The matrix shows the tracking of RSD/CSD changes.

If the RSD/CSD changes between a certain days that should be a RSD/CSD pushouts

The colors are coded conditionally according to the values
i.e., the green parts are the pull-ins and red for the pushouts.

There is a buttons to switch between RSD and CSD matrix.

You can lookback to the days show that you can see the changes.



THANK YOU