



ARTS KPI's and Performance Measures Narrative Description

Version 3.0

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ARTS KPI's and Performance Measures Narrative Description

Table of Contents

1	ARTS Data Warehouse Performance Measures & KPIs	5
1.1	Performance Measurement and KPI Framework	5
1.1.1	Performance Measurement and KPI Subject Areas.....	5
1.1.2	Performance Measurement and KPI Measured Phenomena	6
1.1.3	Measured Properties and Characteristics of Phenomena	8
1.1.4	Why Performance Measurement and KPI Framework Is Important	8
1.2	Customer and Sales Performance Measures and KPIs Concepts	9
1.2.1	Customer Subject Area	9
1.2.2	Customer Oriented Strategic Measures	9
1.3	Sample Customer Oriented Measures & KPIs.....	33
1.3.1	Customer Oriented Tactical/Operational Measures.....	33
1.3.2	Channel Subject Area	41
1.3.3	Customer Activity Measures	44
1.3.4	Item Subject Area.....	48
1.3.5	Business Unit Subject Area	48
1.3.6	Promotion Subject Area	51
1.3.7	Geographic Location	52
1.4	Sample Inventory Performance Measures and KPI's.....	53
1.4.1	Business Unit.....	53
1.4.2	Item	60
1.4.3	Cross Dimension Inventory Performance Measures	61
2	Detailed Technical Implementation Notes and Sample SQL	70
3	Conclusion.....	124
3.1	Comments, Corrections and Feedback	124

Table of Figures

Figure 1: Historical Customer Net Profit Contribution Model	11
Figure 2: Simplified Customer Lifetime Value Equation	12
Figure 3: SQL Code Snippet for CLV Quintiles	14
Figure 4: Customer Segmentation Context Model	16
Figure 5: ODM 7 Snippet Showing Reference Tables for Controlled Vocabulary	18
Figure 6: Customer Dimension table	19
Figure 7: Conceptual Method for Defining Customer Segments.....	21
Figure 8: Customer Behavioral Segmentation – Detailed Methodology	25
Figure 9: RFM Behavioral Segment “Cube”	28
Figure 10: Sample Output from the RFM View With Behavioral Segmentation Comments.....	29
Figure 11: Comparable Sales By Quarter Example	48
Figure 12: Comparable Location Sales Over Time – Summarized To Higher Organization Levels	51
Figure 13: UNIT Inventory Velocity View of Inventory Fact Table for A Business Unit	53
Figure 14: Inventory Cost Velocity Analysis Based on Cost for A Business Unit.....	55
Figure 15: GMROI Example	62
Figure 16: Price Change Actions.....	64
Figure 17: ItemFact Temporary and Permanent Markup and Markdown Attributes	65
Figure 18: Conceptual Model of Retail Method of Inventory Accounting.....	67
Figure 19: More Detailed Retail Method of Inventory Model.....	68
Figure 20: Sample Gross Margin on Selling Area Model.....	69

ARTS KPI's and Performance Measures Narrative Description

Table of Sample Performance Measures & Queries

Sample Measure 1: Customer Reporting Period Average Transaction Value Per Business Unit	33
Sample Measure 2: Customer Reporting Period Average Transaction Value Chain-wide	34
Sample Measure 3: Customer Reporting Period Average Monthly Spend Per Business Unit	34
Sample Measure 4: Customer Reporting Period Average Monthly Spend Chain-wide	35
Sample Measure 5: Customer Reporting Period Monthly Transaction Count by Business Unit.....	35
Sample Measure 6: Customer Reporting Period Average Transaction Count Chain-wide	36
Sample Measure 7: Customer Reporting Period Average Monthly Spend By Tender Type By Business Unit	36
Sample Measure 8: Customer Reporting Period Average Monthly Spend by Tender Type Chain-wide.....	37
Sample Measure 9: Customer Reporting Period Monthly Average Transaction Count By Tender Type Chain-wide	38
Sample Measure 10: Customer Reporting Period Average Monthly Transaction Count by Tender Type By Business Unit	38
Sample Measure 11: Customer Reporting Period Average Tender Line Item Count Per Transaction By Business Unit.....	39
Sample Measure 12: Customer Retailer Spend Percent	40
Sample Measure 13: Reporting Period Average Transaction Count Per Weekday by Business Unit.....	41
Sample Measure 14: Chain-wide Average Net Sales Per Transaction by Customer and Channel for a Reporting Period	41
Sample Measure 15: Reporting Period Chain-wide Sales Percent by Channel	42
Sample Measure 16: Chain-wide Tender Type Percentage by Channel for Reporting Period	42
Sample Measure 17: Chain-wide Percent Transactions By Tender Type By Channel for Reporting Period.....	43
Sample Measure 18: Chain Wide Reporting Period Transaction Percent by Channel	43
Sample Measure 19: Customer Acquisition Rate.....	44
Sample Measure 20: Chain-wide Customer Profitability by Reporting Period	44
Sample Measure 21: Customer Utilization of Proprietary Credit Card Tender	45
Sample Measure 22: Chain-wide Net Sales By Channel – Customer Segment for a Reporting Period	45
Sample Measure 23: Chain-wide Average Gross Margin Per Retail Transaction	46
Sample Measure 24: Average UNIT Retail Price per Item for a Reporting Period on a Chain-wide Basis.....	46
Sample Measure 25: Monthly Average Net Sales by Tender Type and Tender Media for a Reporting Period.....	47
Sample Measure 26: Comparable Sales Current Year Quarter Just Completed Quarter to Same Quarter Last Year	50
Sample Measure 27: Business Unit Inventory Unit and Cost Velocity for One Reporting Period	57
Sample Measure 28: Business Unit Inventory Velocity Over Multiple Periods.....	57
Sample Measure 29: Reporting Period Out of Stock Percent of Items Carried By Business Unit	58
Sample Measure 30: Item Out of Stock Period Count	59
Sample Measure 31: Inventory Freshness Example	60
Sample Measure 32: GMROI Performance Measure for Item, Business Unit for Contiguous Reporting Periods	63

ARTS KPI's and Performance Measures Narrative Description

Table of Technical Specification With Sample SQL

Technical Sample Specification 1: Customer Lifetime Value	70
Technical Sample Specification 2: Sample SQL Segmentation Code to Run Against ARTS DWM 3	72
Technical Sample Specification 3: Sample SQL To Create Customer Transaction Store Summary Table	75
Technical Sample Specification 4: RFM Sample View	77
Technical Sample Specification 5: Customer Average Trans. Value Per Business Unit for Reporting Period	79
Technical Sample Specification 6: Customer Reporting Period Average Transaction Value Chain Wide	81
Technical Sample Specification 7: Customer Average Monthly Spend Per Business Unit Within Reporting Period.....	83
Technical Sample Specification 8: Customer Average Monthly Spend Chain Wide.....	84
Technical Sample Specification 9: Customer Monthly Average Transaction Count by Business Unit	85
Technical Sample Specification 10: Customer Monthly Average Transaction Count Chain Wide	86
Technical Sample Specification 11: Customer Avg Monthly Spend by Business Unit by Tender Type	87
Technical Sample Specification 12: Customer Avg Monthly Spend By Tender Type By Business Unit	88
Technical Sample Specification 13: Customer Reporting Period Average Monthly Transaction Count by Tender Type By Business Unit	89
Technical Sample Specification 14: Customer Average Monthly Transaction Count by Tender Type by Business Unit.....	90
Technical Sample Specification 15: Average Tender Line Item Count Per Customer Per Transaction per Business Unit.....	91
Technical Sample Specification 16: Percent Tender Type Spend By Customer Chain Wide	92
Technical Sample Specification 17: Comparable Quarterly Sales By Business Unit	93
Technical Sample Specification 18: Business Unit Inventory Unit and Cost Velocity.....	95
Technical Sample Specification 19: Business Unit Inventory Velocity Over MULTIPLE Reporting Periods	98
Technical Sample Specification 20: Item Out of Stock Period Count	100
Technical Sample Specification 21: Item Out of Stock Count	102
Technical Sample Specification 22: Inventory Freshness.....	104
Technical Sample Specification 23: Gross Margin Return on Investment.....	105
Technical Sample Specification 24: Average Business Unit Transaction Count Per Weekday for Reporting Period	108
Technical Sample Specification 25: Average Net Sales Per Transaction by Customer and Channel for Reporting Period	109
Technical Sample Specification 26: Chain-wide Percent Net Sales by Channel for Reporting Period.....	110
Technical Sample Specification 27: Chain-wide Percent Tender Type By Channel For Reporting Period.....	111
Technical Sample Specification 28: Chain-wide Percent Transactions By Channel for Reporting Period	112
Technical Sample Specification 29: Transaction Count Percent by Channel Chain-wide for Reporting Period	113
Technical Sample Specification 30: Customer Acquisition Rate	114
Technical Sample Specification 31: Customer Longevity	115
Technical Sample Specification 32: Chain-wide Customer Profit By Reporting Period.....	116
Technical Sample Specification 33: Chain-wide Usage of Proprietary Credit/Debit Tender as Percent	117
Technical Sample Specification 34: Chain Wide Net Sales By Channel – Customer Segment for a Reporting Period	119
Technical Sample Specification 35: Chain Wide Average Gross Margin Per Retail Transaction	121
Technical Sample Specification 36: Chain-wide Average UNIT Retail Price and Gross Margin for Reporting Period	122
Technical Sample Specification 37: Chain-wide Monthly Average Sales by Tender Type & Brand for Reporting Period	123

ARTS KPI's and Performance Measures Narrative Description

1 ARTS Data Warehouse Performance Measures & KPIs

There are several thousand possible performance measures and KPI's that could be derived from the ARTS DWM-3. The number of variations is due to the variety of different retail business models and related information requirements. With this in mind, this discussion of Performance Measures and KPI's will present sample measures and KPI's that retailers can use as defined here or as a basis to develop their own.

This document presents performance measures and KPI's as a "finished" collection of result values and derivation methods. Many of the tactical operational measures discussed later are derived using basic SQL code. The higher-level measures are different. They typically require an initial effort to explore, analyze and validate macro level performance measures and KPIs.

This document does not deal with the processes used to specify, design and implement higher level performance measures and KPI's. The processes used to create performance measures and KPI's involves data exploration, statistical analysis and validation – at activities that fall under the rubric of data mining. Data mining is an important topic and will be addressed in future work.

Up to this point we have treated performance measures and KPI's as a single kind of quantitative attribute. Now it is time to differentiate them. A *performance measure* is a quantitative characteristic that describes customer and/or retailer behavior and is a result of business process execution.

A *key performance indicator (KPI)* is a performance measure that has a target value attached to it. A KPI is always expressed as a performance measure (actual) as compared to a target (desired) value. KPI's are used to assess whether a retail business is performing well or poorly. Performance measures are used to monitor activity levels and outcomes. This difference is important because retailers have hundreds of performance measures. Of those hundreds of performance measures a small number are typically designated as KPI's. The determination of which performance measures become KPI's is a function of what measures the retailer decides are important to monitoring and controlling the execution of their business strategy.

Our discussion of performance measures and KPI's is centered on how to derive them from the ARTS DWM 3. There is a different, higher-level perspective that looks at these individual measures and organizes them into a system of metrics that support a retailer's business strategy. ARTS will address this higher level system of performance measures in a future document.

1.1 Performance Measurement and KPI Framework

1.1.1 Performance Measurement and KPI Subject Areas

Performance measures and KPI's exist to measure and assess different aspects of a retail business. For retailers one way to organize performance measures and KPIs is around *subject areas* that are important to the business. In the ARTS Data Warehouse model the following subject areas are offered as examples for retailers to consider:

ARTS KPI's and Performance Measures Narrative Description

- **Consumer** – the organizations and individuals that purchase products and services that a retailer sells, but not from that retailer
- **Customer** – the organizations and individuals that purchase, or in the past have purchased products and services from the retailer
- **Item** - the goods and services offered by the retailer
- **Business Unit** – the organizational units inside the retail enterprise that serve customers directly, acquire and store goods, deliver services and provide support to the business
- **Geographic Location** –the physical place where a retailer conduct business. This is different from business unit (and business unit group) which are organizational views of the business. Often business unit groups happen to be aligned with geography – but they are intended to describe the retailer organization which is why there is a separate geographic subject area
- **Promotion** – the initiatives a retailer undertakes to make consumers aware of their goods and services and to stimulate demand for them through discounts, advertising and targeted offers. In the ARTS DWM3 promotional offers that are executed at the point of sale are explicitly modeled. Future releases of the ARTS DWM will extend coverage of promotion to include broader subject areas like campaigns and programs that establish the context for promotional offers.
- **Channel** – the touch points and methods a retailer uses to exchange information , products and services with its customers.
- **Worker** - the front-line employees or contractors that directly interact with customers, suppliers and who provide support administrative and logistical services to the front-line workers
- **Supplier** – the organizations and individuals that sell products and services to the retailer so it can sell them to its customers

The data warehouse subject areas are based on the dimensional tables in the ARTS Data Warehouse Model.

This list is intended to provide an example of the kinds of subject areas used to organize performance measures and KPI's. Retailers can use it as a starting point in defining subject areas that fit their specific business strategy and organization.

In the ARTS DWM 3 discussion of performance measures and KPIs we will limit our coverage of subject areas to samples for Customer, Item, Business Unit and Channel subject areas. Future releases of the ARTS Data Warehouse Model Narrative will extend this list to other subject areas.

1.1.2 Performance Measurement and KPI Measured Phenomena

Subject areas identify and name business areas that are quantitatively characterized by different performance measures and KPI's. They define what a measurement is about. Performance Measurement and KPI *phenomena* identify and define the consumer and customer behaviors, item movement, business unit activity volumes, inventory fluctuations, and other actions that are measured. Like the subject areas, the performance measurement and KPI phenomena listed here are examples that

ARTS KPI's and Performance Measures Narrative Description

retailers may use or extend to meet their specific requirements. The measured phenomena are based on the fact tables in the data warehouse.

The phenomena being measure in the ARTS Data Warehouse Model include the behaviors and activities related to:

- **Sales/Returns** – Customer purchases/returns of products and services;
- **Conversions** – Consumer to customer and other state changes in customers and other party role assignment types;
- **Shopping** - Customer browsing, comparing and examining products and services up to the point where they choose to make the purchase;
- **Payment** – Customers method of paying for the products and services offered by the retailer;
- **Customer Order** – The activities involved in placing/taking and processing orders for products and services that will be delivered and settled at a future point in time;
- **Order Fulfillment** – Activities involved in obtaining, picking, packing and preparing products for shipment to a customer to satisfy an order;
- **Delivery** – Activities involved in transporting the product from the retailer's inventory location to a customer;
- **Purchase Order Management** – Retailer placement of purchase orders with vendors and related activities;
- **Inventory Movement** – The periodic summarization and memorialization of on hand balances and cumulative inventory in and out flows for a reporting period;
- **Receiving** – Retailer unloading, inspecting and accepting merchandise into its inventory;
- **Transfer** – Moving merchandise from one business unit location to another;
- **Inventory Adjustment** – Correcting inventory counts and values;
- **Physical Inventory** – Counting inventory ;
- **Advertising** - - specification, design and execution of communications aimed at helping grow awareness and interest in the retailer as well as demand for its products and services; and
- **Price change** – permanent and temporary modifications to retail prices usually for the purpose of increasing sales.

As note, these are sample performance measurement and KPI phenomena. Retailers can use these as a starting point to define others that are more appropriate for their business. The ARTS samples represent high-level views of a retail business. Retailers may extend the ARTS samples by decomposing the high-level ARTS phenomena into more detailed elements.

ARTS KPI's and Performance Measures Narrative Description

1.1.3 Measured Properties and Characteristics of Phenomena

Performance measurement casts observable facts as quantities of some kind. These quantities typically are used to indicate:

- **Magnitude** – The size of something , how big or small it is?
- **Frequency** – How often something occurs over a defined time period?
- **Volume** – How many instances of an entity are there?
- **Duration** – How long does something last or remain in a consistent state?
- **Rate** – How much does the amount of value change in relation to a different kind of value? This includes ratios of things like item counts per time period, transaction counts per customer, etc.

These elementary *measurement properties* establish the basic kinds of quantities associated with observable facts. They are often combined. For example sales per month is a combination of a volume and duration measurement and is itself a rate measurement.

1.1.4 Why Performance Measurement and KPI Framework Is Important

ARTS is providing a set of sample performance measures and KPIs. The framework for identifying, defining and describing performance measures is important because it provides a consistent method and structure for retailers to use in building on the ARTS samples.

ARTS KPI's and Performance Measures Narrative Description

1.2 Customer and Sales Performance Measures and KPI Concepts

1.2.1 Customer Subject Area

The goal of customer-centered performance measures and KPI's is to characterize customer behavior in quantitative terms. Quantitative terms look at gross sales, net sales, net profitability, payment patterns and other transaction-based numbers. By describing customer behavior in quantitative terms, retailers can compare the relative contribution customers make to the profitability of individual business units (stores), business unit groups and the enterprise as a whole.

The sample customer performance measures and KPI's presented here are tactical in nature. They are presented to illustrate how the data warehouse supports business analysis and reporting. As the ARTS Data Warehouse Model and narrative matures, additional more strategic measures and KPI's will be added.

1.2.2 Customer Oriented Strategic Measures

There are hundreds of different measures that are used to characterize customer behavior. One of the challenges to creating customer oriented measures is defining a framework that organizes them into a *coherent measurement system* that is integrated with the retailer's business strategy. In this document, we are dividing customer subject area measures into a strategic measurement set aimed that quantitatively characterizes customers at a macro level. This macro level set of measures describe customer behavioral patterns based on aggregated data. Examples of macro-level customer performance measures include customer lifetime value and customer behavioral segmentation. Macro level customer performance measures are derived using a combination of SQL and analytic tools like R or SAS.

In this document we are introducing some sample strategic customer measures as a point of departure for a more advanced treatment in future releases of the Data Warehouse. As noted earlier, all of the performance measures discussed in this document are samples designed to demonstrate how the ARTS DWM -3 model may be used to support analysis and reporting.

1.2.2.1 Customer Lifetime Value (Simplified Version)

Customer Lifetime Value (CLV) quantifies the past and potential future net profit that is/may be generated by an individual customer of the retail enterprise. It is a strategic measure that enables retailers to compare customers and rank them for further analysis. Ranking is important because it provides a way to decide how much effort to invest in the analysis process as well as subsequent customer relationship development initiatives.

CLV is a global enterprise KPI that enables retailers to present their customer equity position in familiar financial terms. Customers with very low or negative CLV's for the retailer should be considered for culling. Spending promotion and marketing resources is unlikely to yield a positive return (i.e. net profit). Customers with CLV's that are high or that demonstrate increases are a better place to invest promotion and marketing funds.

ARTS KPI's and Performance Measures Narrative Description

CLV, while based on similar quantitative models and analytic methods vary from one retail business to another. A grocery chain will evaluate CLV very differently from an aftermarket auto parts retailer or a high end fashion retailer. The approach taken by ARTS is to present some basic tenets of CLV and in future releases of the Data Warehouse Model Project provide worked examples of how retailers may calculate and use CLV as a high-level way to represent its customer equity.

The CLV is an aggregate financial value that concisely reflects the relative value of each customer to the retailer and can be used to grade customers for investment purposes. Investments in customers reflect spending on promotions and marketing aimed at retaining and growing customer net profit. The art and science of effective customer relationship management execution is to profitably sense, serve and satisfy customers in a way that keeps them coming back for more of what a retailer offers. CLV establishes a common KPI for the CEO, CFO and CMO to use in developing new customer acquisition, customer retention and customer cultivation strategies. As noted in section 1.2, customer relationship management when harnessed to CLV can be addressed a financial context that helps direct retailer promotion and marketing to consumer and customers with the highest potential return (net profit).

There are two complementary ways of looking at CLV:

- Historical customer net profit contribution (actual, fact based)
- Potential customer net profit (estimated, probability based)

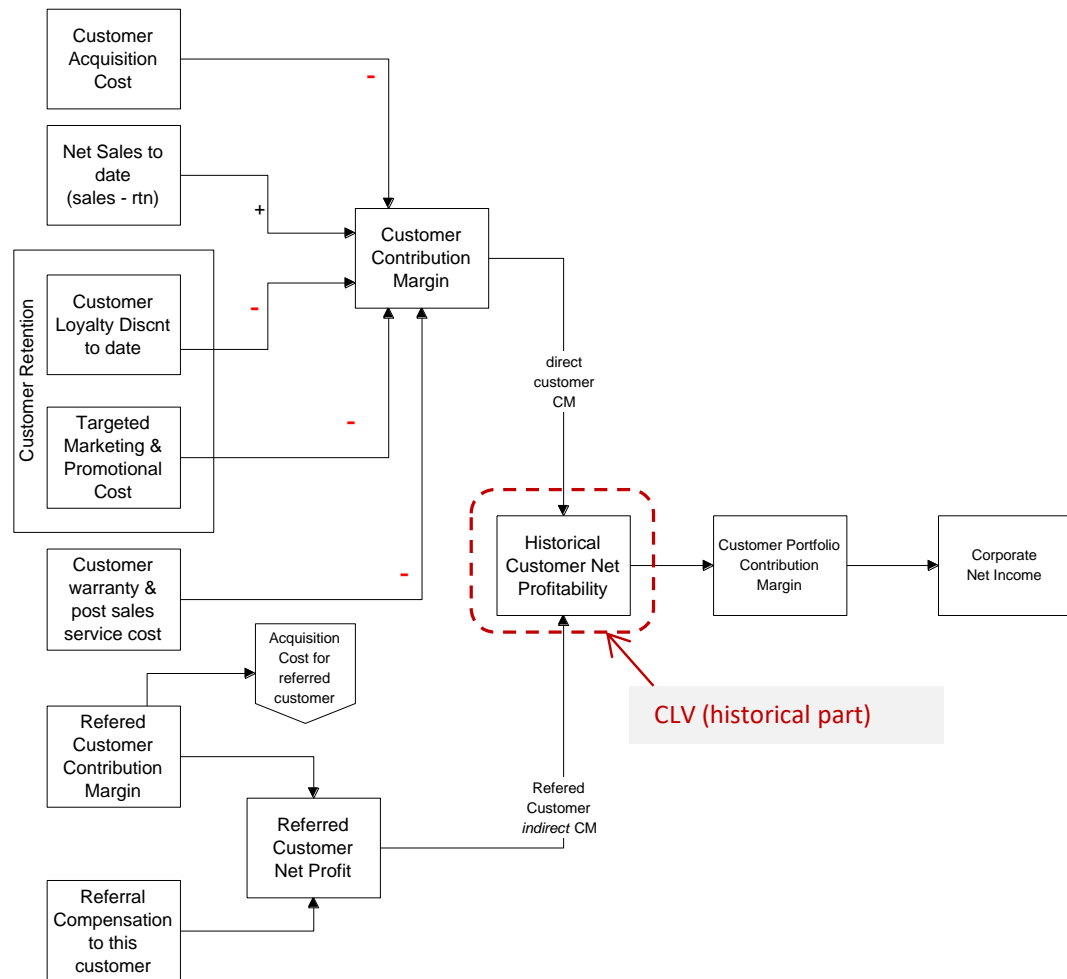
1.2.2.1.1 HISTORICAL CUSTOMER NET PROFITABILITY

Figure 1 illustrates a high-level method for deriving historical customer net profitability. It uses fact data from the SaleReturnFact table. Future releases of the ARTS Data Model will incorporate operational costs tied to specific customer services (e.g. product assembly, after sales support, warranty expense, special order expenses, gift wrap, etc.) that can be assigned to specific retail transactions and customer orders. The model in Figure 1 provides a complete accounting of a customer's net profit contribution to the retailer's net profitability from their initial purchase¹ through the current date.

¹ Customer lifetime value analysis frequently has to be truncated because the data available covers only a portion of the customer's "lifetime" relationship with a retailer. This is an aspect of CLV that will be addressed in future phases of the ARTS DWM 3 project which addresses the details of analyzing customer data. It is an important issue and requires special techniques to ensure that CLV's are comparable.

ARTS KPI's and Performance Measures Narrative Description

Figure 1: Historical Customer Net Profit Contribution Model



Historical data of this nature may be used operationally to allocate rewards to customers, evaluate the effectiveness of past promotion and marketing initiatives, analyze past customer behavior changes, assign a customer to a higher or lower CLV strata and a lot more. As discussed later, historical data is the basis for a large number of operationally oriented KPI's and measures.

Historical data does not reflect what will happen in the future. Customer behavior will change. The question for the retailer is what aspects of that behavior will change, how much will it change and how will it alter customer net profitability.

These questions require looking into the future which is uncertain. When developing plans, budgets and operational initiatives retailers have to project customer net profitability into the future. The methodology used to develop a projection of future customer net profitability should use history as a basis but has incorporate uncertainty.

ARTS KPI's and Performance Measures Narrative Description

1.2.2.1.2 POTENTIAL CUSTOMER NET PROFITABILITY – FORWARD LOOKING CUSTOMER LIFETIME VALUE

The derivation of CLV can be a complex topic. Future releases of the ARTS Data Warehouse Project will discuss CLV in great detail and address different methods of handling uncertainty about customer life time tenures and variability in the net profit generated per customer per period. For now we will present a simplified CLV model to explain the basic concepts.

Figure 2 presents a highly simplified formula for calculating CLV. It contains the portfolio characteristics discussed earlier. As we develop the ARTS Customer KPI's we will be keeping the concept of CLV in mind.

Figure 2: Simplified Customer Lifetime Value Equation

$$CLV = m \left(\frac{r}{1 + i - r} \right) - ac$$

The variables in this formula are:

- CLV = Customer Lifetime Value
- m = margin or profit from a customer per period
- r = retention rate = Customers count period end ÷ (Customer count a period start + New customers added in period)
- i = discount rate
- ac = acquisition cost

Figure 2, the projected CLV has to account for uncertainty in three areas:

- Margin – margins will change over time the question is will they go up or down and by how much
- Retention Rate – Risk that an active customer stops buying from the retailer at some future point in time
- Discount Rate – Future value of margin based on the retailers cost of capital – means a dollar of gross margin received at some point in the future is worth less than a dollar of gross margin earned today

There are more granular models for CLV and more detail but they all are elaborations of this basic first model. This approach to CLV represents the financial case for new customer acquisition, existing customer retention and cultivation investments using criteria similar to that used in any capital business initiative.

The decomposition of CLV into a historical component and a future component provides retailers with different ways of analyzing customer value. The historical approach is based on known behavior and provides the time series data used to forecast future customer behavior. Some retailers may choose to use the historical customer value to design promotional initiatives.

ARTS KPI's and Performance Measures Narrative Description

Other retailers may take a different tack and look at the anticipated value of their customers. They may design promotional and customer relationship development initiatives around what they believe customers will contribute. The design approach in the ARTS DWM 3 gives retailers the option to choose either approach or to combine them.

This version of the ARTS DWM provides the fact tables to support the capture of net sales and net profitability of customer sales based on cost of goods sold.² It does not provide the facts needed to incorporate operational and administrative costs. Future releases of the ARTS DWM will add fact tables to reflect ancillary costs related to customer acquisition, retention and recovery.

1.2.2.1.3 CUSTOMER LIFETIME VALUE: PRELIMINARY VERSION FOR ARTS DWM 3

The derivation of CLV uses the [SaleReturnFact](#) table. This preliminary version is limited to historical customer lifetime value because that is all the underlying ODM supports. As noted future phases of the ARTS DWM 3 Project will address the forecasting component as well as the customer lifetime costs needed to derive a true measure of CLV.

Table 1: Customer Lifetime Value Example

Sample Performance Measure Business Specification	
Measure Name:	Customer Lifetime Value based on Net Profit (Sample Measure 15 in Spreadsheet)
Business Definition & Description	
Goal	Target promotion initiatives and investment toward customers that will respond in a way that increases corporate net profitability
Question	Who are our most valuable customers?
Description	Summed value of customer net profitability from their initial purchase through the current date
Subject	Customer
Observable Facts/Phenomena	Sale/Return Fact
Dimensions	Customer
Derivation/Formula	Calculate net profit for each line item, Sum net profit for each customer.
Output/Result	Monetary Value
Link to Technical Specification	#CustomerLifetimeValueBasedOnNetProfit

The view created in Table 1 is very basic. It returns just a life time value (as well as total net sales and cost) for each customer. SQL Server, Postgres and most databases have VERY USEFUL functions that quickly allow us to use this view to perform a preliminary segmentation of customers based on CLV.

² Cost of goods sold as used here is based on a weighted average cost for goods on hand. The receiving costs used to calculate weighted average cost may include transport, handling, insurance, customs and other costs in addition to the cost of the merchandise. The specific composition of inventory merchandise is up to each retailer based on their inventory accounting policy.

ARTS KPI's and Performance Measures Narrative Description

The query here illustrates using the NTILE function to break the population of customer into quintiles and assigning them to the first, second through fifth quintiles based on their lifetime net margin.

Figure 3: SQL Code Snippet for CLV Quintiles

```
-----  
-- Quick way to segment customers based on preliminary life time net profit  --  
-----  
select  
    ID_CT  
    ,ID_KY_CT  
    ,NM_CT_RPT  
    ,MO_CT_LT_NET  
    ,NTILE(5) OVER (ORDER BY MO_CT_LT_NET DESC) as CT_LT_QUINTILE  
FROM  
    VW_CT_LT_VL  
;  
-----  
-- End Preliminary customer Segmentation  --  
-----
```

This is a very simplistic way to segment customers but illustrates the kind of information you can derive from the ARTS DWM 3 with a little SQL. This kind of analysis when elaborated on and applied to retail transaction sale return facts in addition to net profit can be used by a retailer to organize customers into a number of different segments. For example, demand patterns expressed in item unit counts is a useful way to segment customers. It may be more useful in analyzing how customer demand patterns (and customer segments) impact a supply chain operation than monetary value.

The segments and criteria for assigning customers to them are determined by each retailer. There is no single standard way to break customers down into behavioral segments. Retailers should choose segmentation parameters based on their business strategy.

ARTS KPI's and Performance Measures Narrative Description

1.2.2.2 *Customer Behavioral Segmentation and Classification*

Customer segmentation is a method for aggregating customers that share properties and attributes and exhibit similar behavioral patterns. Its purpose is to help retailers compromise between designing awareness and demand generation initiatives tailored to each individual customer and broadcast initiatives that treat all customers the same. Segmentation allows retailers to realize economies of scale while still aligning their offerings with different customer needs and preferences.

1.2.2.2.1 SEGMENTATION MODELING PATTERN

There are two ways to segment customers. The first is based on inherent characteristic of the customers themselves. The second is based on customer behavior.

Customer segmentation based on inherent characteristics includes:

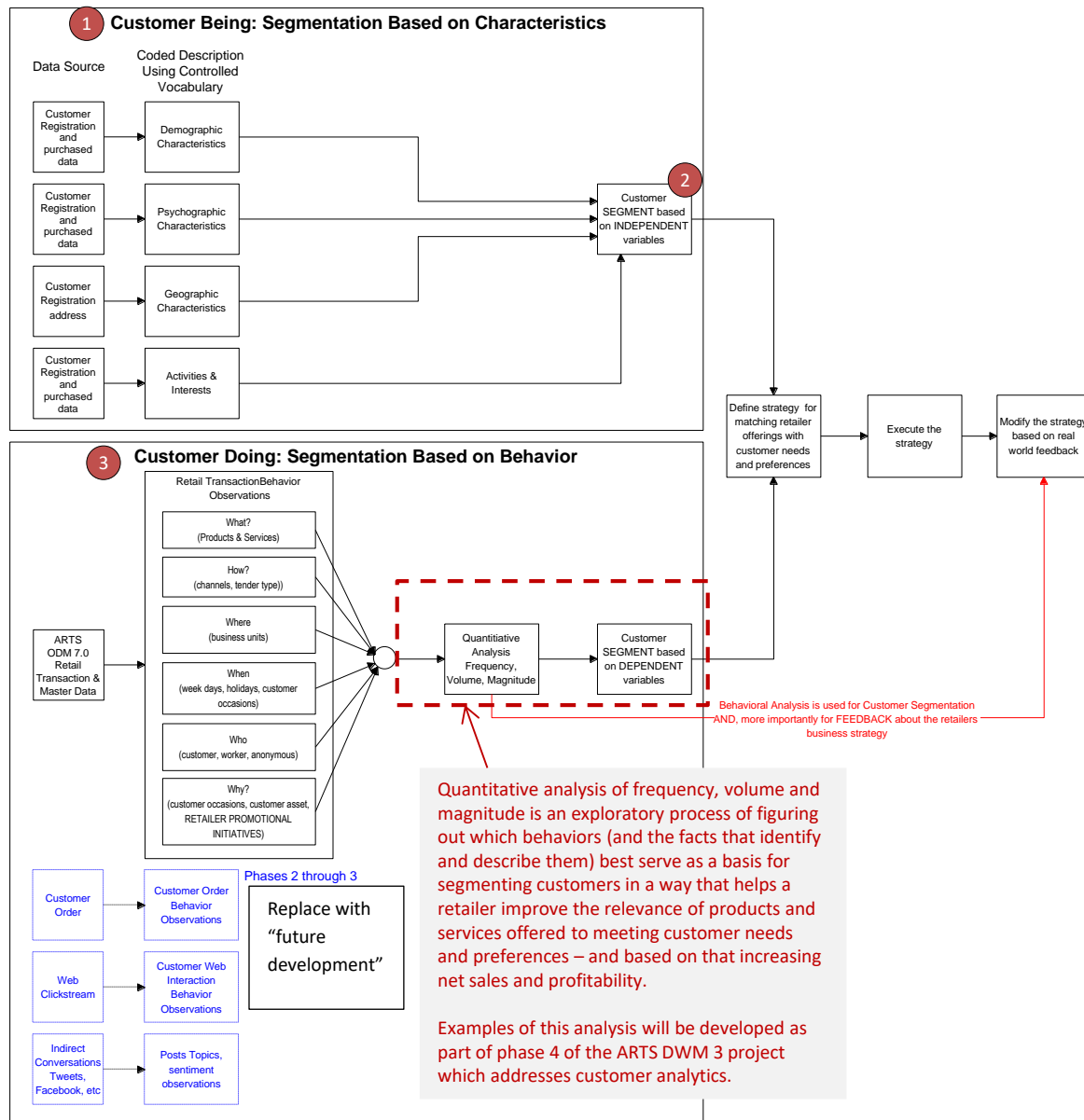
- Demographic characteristics that include properties like customer age, education level, race, religion, marital status and other socioeconomic information;
- Psychographic characteristics that include properties like life style, personal values and other information about what motivates customers to behave in certain ways;
- Geographic characteristics that include information about where customers live, shop and work and the political bodies that govern those places; and
- Customer activities and interests.

The second segmentation approach looks at customer behavior. It is based on observing customer actions, classifying those actions, counting classified actions and identifying consistent patterns that are shared by significant numbers of customers to warrant establishing a segment. In the current DWM project phase this involves delving into retail transactions and related master data to extract customer behavior. Behavioral segmentation looks at retail transaction related action frequency, volume and magnitude and places these facts into context. Context means attributing facts to items, customers, business units, channels, reporting periods, holidays and other dimensional information.

Figure 4 presents a high-level model of the segmentation modeling patterns used as part of developing the ARTS Data Warehouse Model. The blue dashed blocks represent future DWM project phase segmentation behavioral analysis. One important aspect of behavioral segmentation is that it is composed of the same kinds of measures used as feedback to evaluate the effectiveness of business strategy. So the measures developed for customer behavioral segmentation are in most instances the same as those used to measure business performance. The main difference is that customer behavioral segmentation attempts to classify customers based on ranges of performance measure values.

ARTS KPI's and Performance Measures Narrative Description

Figure 4: Customer Segmentation Context Model



The model in Figure 4 is divided into two broad kinds of segmentation. The first kind **1** segments customer based on inherent characteristics *independent* of customer behavior. The second kind **3** segments customers based on their behavior and is *dependent* upon observations made of that behavior

1.2.2.2.2 CUSTOMER SEGMENTATION ON INHERENT CHARACTERISTICS

The independent characteristics of customers are classified and counted to derive customer segments **2**. The methodology here is to assign a predefined set of values (a controlled vocabulary) to each customer characteristic and do count the number of customers that share a given value for each characteristic. This process recasts *individual customer* qualitative characteristics into *customer population* quantitative characteristics.

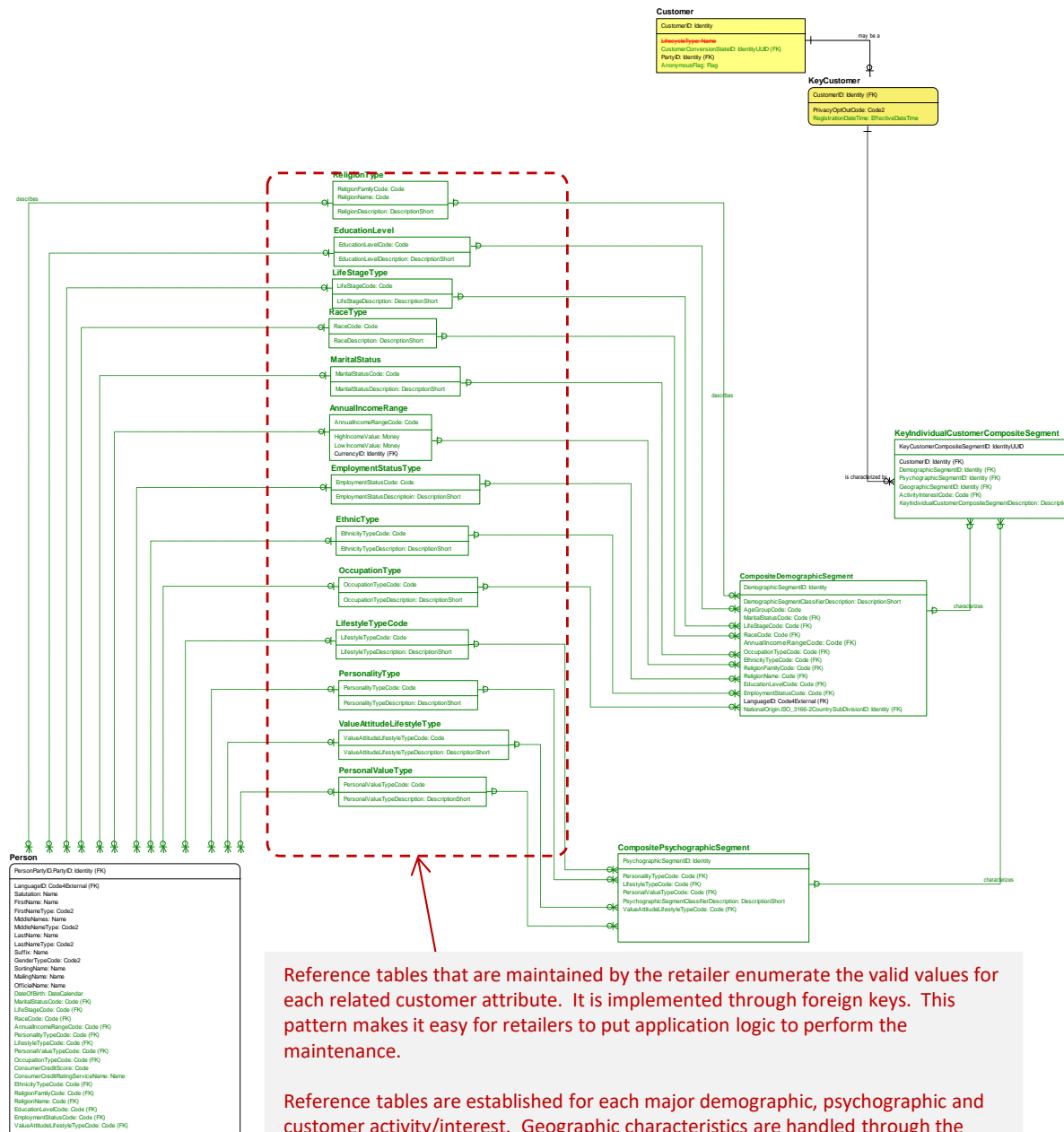
ARTS KPI's and Performance Measures Narrative Description

The ARTS ODM 7 uses a *controlled vocabulary* for defining customer characteristic-based segments. Controlled vocabularies are implemented using lookup tables that assign value lists to specific customer attributes. The reference tables' content (value lists) are populated by retailers based on their specific business requirements. This data is maintained as part of the operational model because values are applied when customers are added or changed.

Figure 5 shows a piece of the ARTS ODM that uses reference tables to implement a controlled vocabulary for customer demographic and psychographic segments. The controlled vocabulary is implemented in the operational model because that is where data is maintained and it ensures that the ODM and DWM are using the same enumerated value lists in describing customers. This is a substantial advantage to using an integrated ARTS ODM – DWM foundation for retail applications because it eliminates the overhead of building ETL conversion logic. Code values are consistently created and applied across all data in the retail enterprise.

ARTS KPI's and Performance Measures Narrative Description

Figure 5: ODM 7 Snippet Showing Reference Tables for Controlled Vocabulary



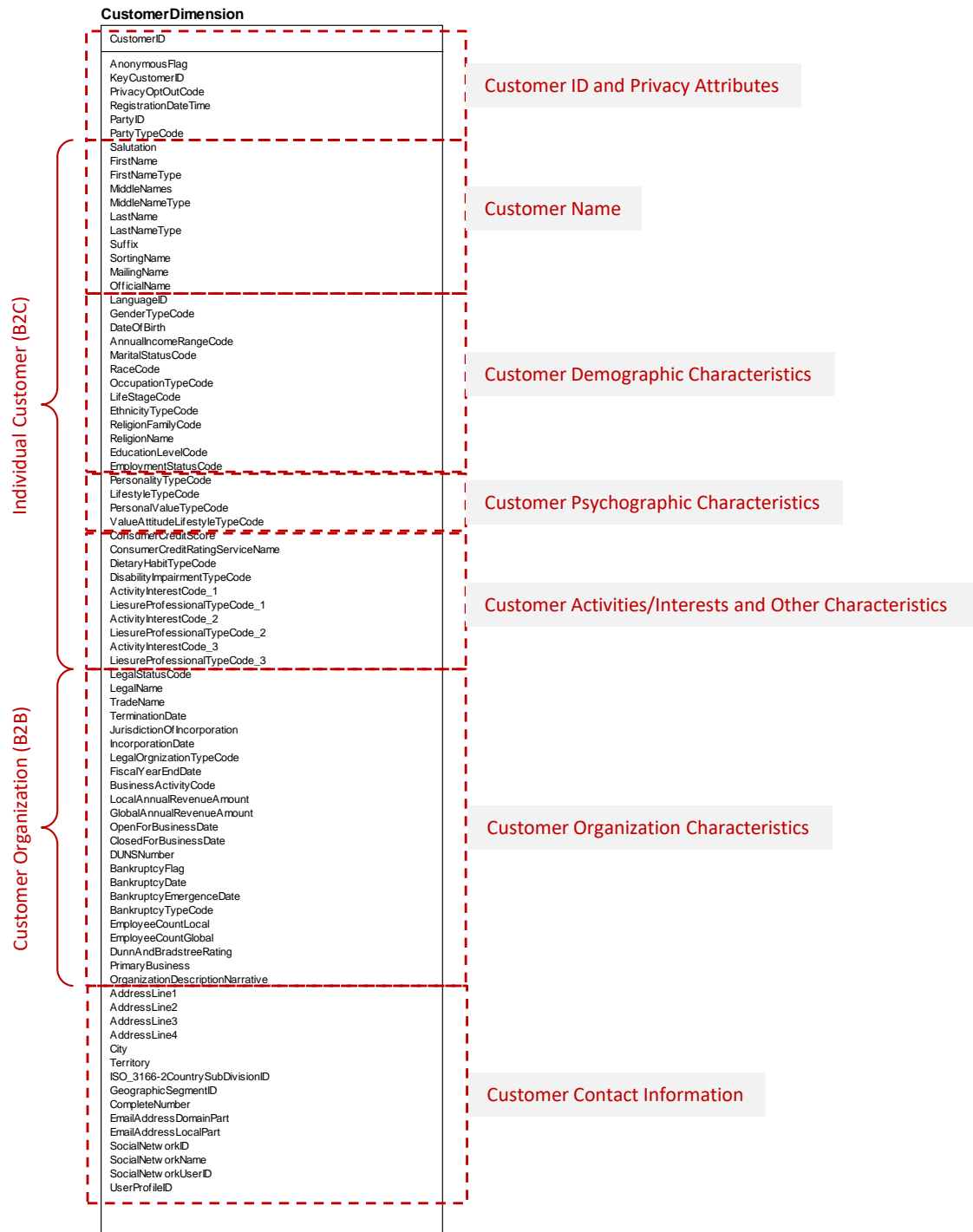
Reference tables that are maintained by the retailer enumerate the valid values for each related customer attribute. It is implemented through foreign keys. This pattern makes it easy for retailers to put application logic to perform the maintenance.

Reference tables are established for each major demographic, psychographic and customer activity/interest. Geographic characteristics are handled through the geographic location outrigger tables in the data warehouse.

ARTS KPI's and Performance Measures Narrative Description

Customer segmentation based on inherent characteristics is supported in the ARTS DWM 3 in the **CustomerDimension** table as illustrated in

Figure 6: Customer Dimension table



ARTS KPI's and Performance Measures Narrative Description

The **CustomerDimension** table has a number of commonly used demographic, psychographic, activities and interests attributes that are used to characterize customers³. This table also includes attributes relevant to organizations as well as individuals. Like all data warehouse tables, it is built from a flattened view of ODM 7 third normal form database.

Retailers may choose how to apply the segmentation attributes provided in the ARTS DWM 3. They may segment customers using each individual attribute. Alternatively, they may choose to combine two or more characteristics into a single named segment. As long as each of the characteristic columns is being collected and stored in the database, retailers can choose how to combine them.

As a rule, the more detailed kinds of data a retailer collects, the more flexibility it has in how it adapts that data for segmenting its customers. The different columns used to describe customers for segmentation may be null which means they are optional. Retailers decide what customer characteristics they will collect and how to use them to segment their customers.

There are constraints and limits imposed on a retailer's segmentation of customers based on inherent characteristics that include:

- Implementing data collection and validation procedures for the segmentation tables, columns and values in the operational application systems;
- Deciding on the enumerated values used for each characteristic (implemented as look up tables in the ODM). ARTS provides some samples but does not currently prescribe value lists. It is up each retailer to choose the value used to populate ODM reference tables;
- Legal and regulatory constraints on the kind of data that may be collected about individuals and organizations. Some of the customer characteristics in the ARTS DWM 3 may be prohibited for collection by retailers because of privacy laws; and
- Cultural norms and sensitivities may preclude asking customers certain kinds of questions related to one or more of the ARTS designated customer characteristics.

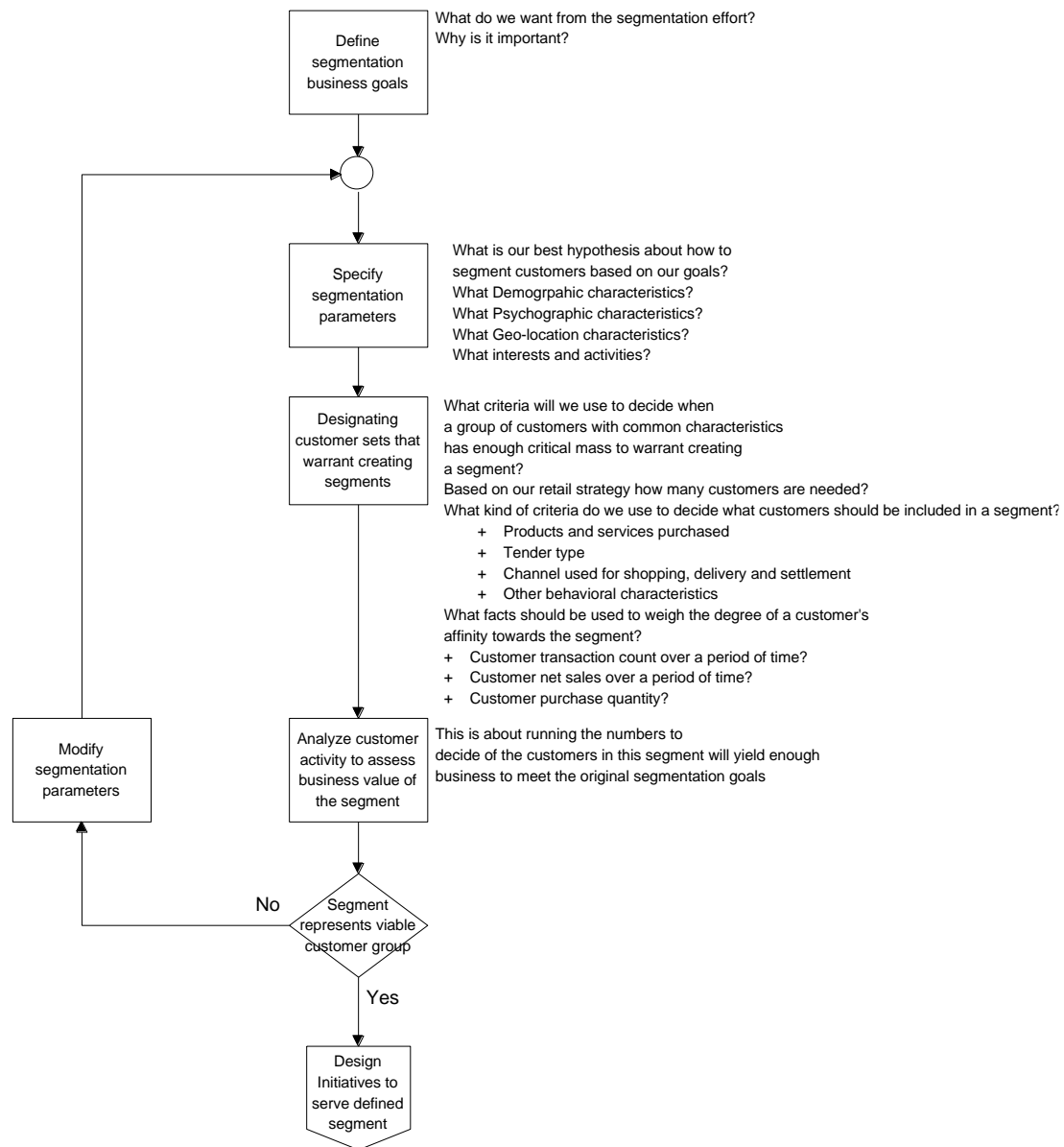
The retailer has the option to segment each customer individually or to lump all customers into a single segment or any number of levels in between. ARTS DWM 3 does not impose any limitations on how granular a segment must be as long as it is based on the POPULATED attributes in the customer dimension table. Retailers can choose a segmentation level of granularity based on their product/service range, targeted consumers, pricing and promotion strategies and experience.

The development of customer segments is an exploratory process as illustrated in Figure 7. The process is different from running queries to count customers that have similar characteristics. It involves defining business goals and defining criteria that a retailer uses to create actionable customer segments.

³ The ARTS ODM 7 also has a set of entity-attribute-value (EAV) tables that enable retailers to add their own demographic, psychographic, geographic, activity, interest and other inherent characteristics to customers. So retailers may expand on those shown here. Some work is required to extract the supplemental EAV attribute values and transfer them into the ARTS DWM 3 model. See Subject Area 10418 – Customer Segment Independent Characteristics in the ARTS ODM 7 ERWIN model.

ARTS KPI's and Performance Measures Narrative Description

Figure 7: Conceptual Method for Defining Customer Segments



The ARTS DWM 3 provides a rich set of facts and dimensions to support retailer creation of customer segments. It is important to note that this approach to customer segmentation is aimed at providing a foundation for the design and execution of business initiatives that increase a retailer's profitability by tailoring their offerings, pricing, promotions, shopping and delivery channels, etc. to meet the needs of the customer segment.

ARTS KPI's and Performance Measures Narrative Description

1.2.2.2.1 Sample Use Case for Applying Customer Segmentation

Table 2 presents a use case that illustrates the steps represented in Figure 7.

Table 2: Use Case for Customer Segmentation

Sample Process Step	Description
Define Segmentation Business Goals	Identify and determine if there is a customer segment (or segments) within our current customer base that would buy a new line of private label sportswear that we want to add to our product lineup.
Define Segmentation Parameters	<p>Our strategy for defining a “private label sportswear customer segment” begins by examining inherent customer characteristics and the items they have purchased in the past.</p> <p>Our initial pass will use the following inherent characteristics to classify customers:</p> <ul style="list-style-type: none">• Marital status• Annual Income Range• Life Stage• Education Level• Occupation Type• Employment Status• Lifestyle type• Personal Value Type• Race• Ethnic Background• Primary Activity or Interest• Secondary Activity or Interest• Tertiary Activity or Interest <p>This is an iterative process. We will be adding filter conditions as we develop a better understanding of current customer purchasing volumes and patterns.</p> <p>The second segmentation parameter is to look for customers that have purchased activewear products from us in the past. This involves looking at our SalesReturnFact table and measuring the absolute and relative volume of activewear purchase customer have made over a time period.</p>
Designating Customer Sets that Warrant Creating Segments	The first rough set of parameters in the prior step provides an initial list of ALL customers (and their characteristics) that have purchased activewear. This aggregates their activity in a way that can help determine which customers have purchased enough activewear items (based on transaction count, quantity of activewear items and net sales value) to warrant including them in a segment. This step creates an aggregation row set that quantifies customer activewear purchases and combines that aggregated with customer demographics. This view is the basis for “running the numbers” to pick and choose which customers will be considered for segmentation, what segment or segments will be created and how many customers fit into a segment.
Analyze customer activity to assess business value of segment	This step involves running the numbers and engaging merchants and buyers in deciding which groupings of customers constitute a viable segment based on the original business goal. This is a process that involves judgment and uses the ARTS DWM 3 and queries to collect, filter and aggregate fact data and customer dimensional data to support decision making. This process is iterative and may involve multiple runs of the select and aggregate queries as merchants and buyers refine their understanding of customers and purchase patterns of behavior.
Link to Technical Example using SQL	#VW_SGMT_ACTVWR_SMPL

A worked sample SQL script is available at the link shown in Table 2.

ARTS KPI's and Performance Measures Narrative Description

1.2.2.2.3 CUSTOMER SEGMENTATION ON BEHAVIOR

Behavioral customer segmentation requires data exploration and analysis as part of identifying, naming and defining customer segments. While segmentation of customer characteristics involves simple matching and counting processes, behavioral segmentation requires a more complex analytic process.

In the current DWM development phase this process starts with the ARTS ODM Retail Transaction and related contextual master data. It involves decomposing retail transactions into single definable facts that can be counted, aggregated and compared. These single facts are aggregated into *volume* measures (how many), *frequency* measures (how often during a period) and *magnitude* measures (how big). Additionally the facts may be combined to derive *rates* (ratios) and *durations* (elapsed times). These five types of facts are combined mathematically to derive quantitative characteristics of customer behavior.

The aggregations are performed along two core dimensions:

- Customer (individual customer whether a key customer or an anonymous customer)
- Reporting period (defined by the retailer but composed of calendar periods down to business day level)

The fact data is maintained at 9 core aggregation levels:

- Retail Transaction Level;
 - ✓ Sale Return Line Item Level:
 - Retail Price Modifier Level:
 - Customer Loyalty Points Redeemed⁴;
 - Customer Loyalty Points Earned;
 - ✓ Price Modification Line Item (transaction-level discount):
 - Customer Loyalty Points Redeemed;
 - ✓ Tender Line Item Level:
 - Customer Loyalty Points Earned;

Each of these aggregation levels has one or more dimensions associated with it. The dimensions establish a context that defines the product/service, channel, business unit, calendar, tender type, retailer promotion and other situational attributes.

⁴ The ARTS ODM maintains a many to many relationship between a price modifier and loyalty program for tracking points redeemed in exchange for discounts. The many to many relationship allows retailers to associate discounts to more than one loyalty program. For example, a customer may receive a \$.02 per gallon discount on gasoline purchase and redeem points tied to their Brand A loyalty program as well as the Retailers in house loyalty program. This structure is designed to support the complex loyalty and promotion program designs implemented by retailers – particularly grocery retailers. The many to many relationship is the basis for placing Customer Loyalty Points Redeemed at a lower level of granularity than the Retail Price Modifier Level.

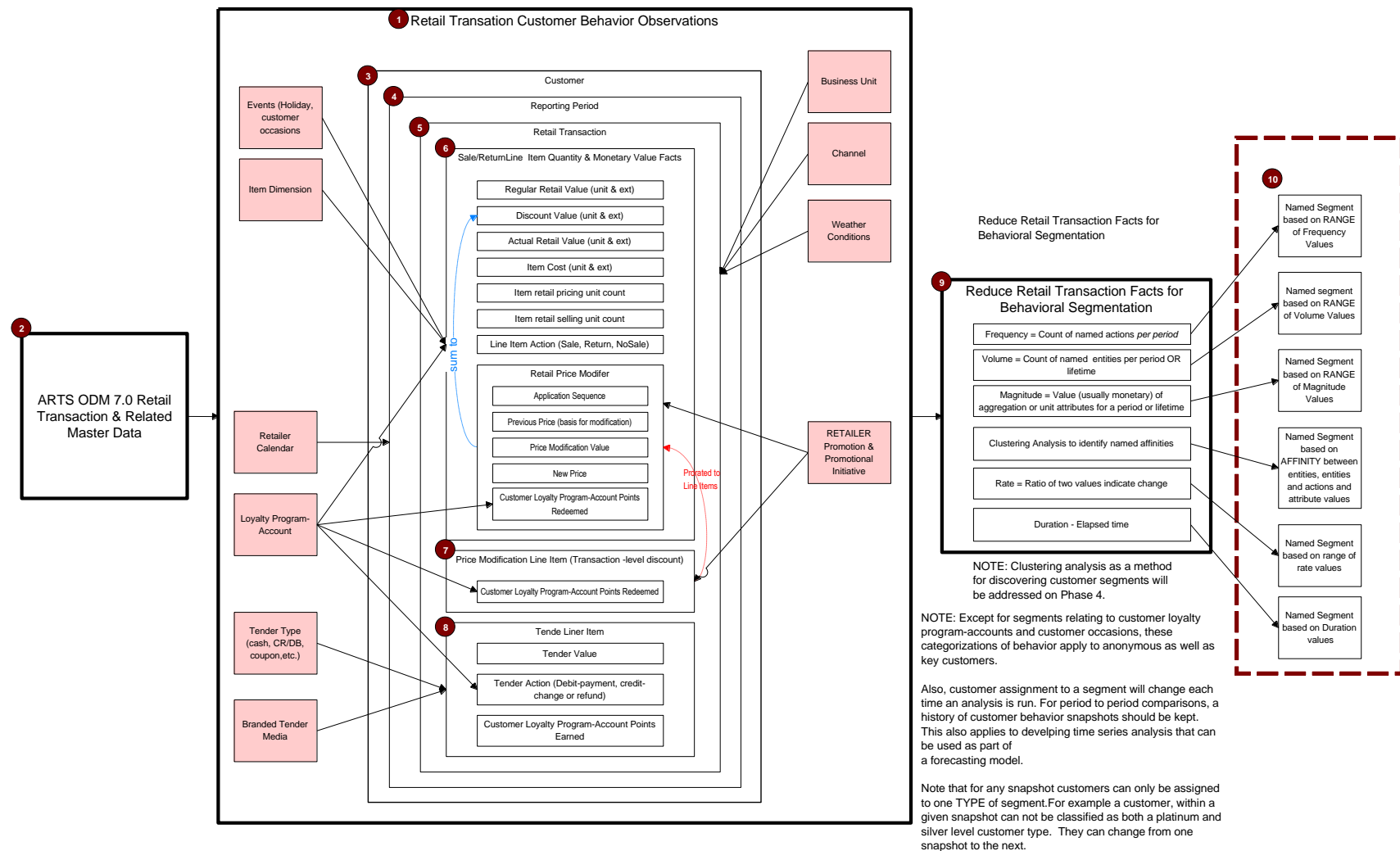
ARTS KPI's and Performance Measures Narrative Description

Figure 8 presents a model for how behavioral segmentation is performed. The behavioral observations are reduced to facts, as noted earlier, that can be aggregated into volume, frequency and magnitude measures. Based on clustering and pattern matching analytics, this collection of volume, frequency and magnitude measures is organized into named value ranges. These named value ranges become the dimensions for segmenting customer behavior. The methods for performing clustering and pattern matching to derive customer behavior segments will be addressed in future phases. In the current phase we are concerned with defining the place holders for them

.

ARTS KPI's and Performance Measures Narrative Description

Figure 8: Customer Behavioral Segmentation – Detailed Methodology



We will present some basic examples of customer behavior segments. There are hundreds of different segmentation strategies that can be applied. Data mining and exploration is the process of identifying the segments that can be used by a retailer to target merchandising, pricing, promotion, channel and other go to market strategies to yield the best results. We will explore data mining and exploration methods through worked examples in Phase 4. For now we are dealing with defining the data structures that contain the data used in those data mining and exploration processes.

ARTS KPI's and Performance Measures Narrative Description

As indicated by ❶ in Figure 8, we are analyzing customer behavior in order to distill a set of named patterns used for segmenting customers. It begins with the retail transaction data modeled in ❷ the ARTS ODM 7. The detail information is grouped (and summarized) by Customer, Reporting Period, Retail Transaction, Sale Return Line Item, Tender Line Item and Price Modification Line Item.

The shaded blocks represent different dimensions used to establish the context for customer behavior segmentation. The Customer block ❸ identifies a customer to be analyzed. The Reporting Period ❹ defines time intervals used to divide customer behavioral observations into a consistent time durations that will summarize detail transactions and facilitate time series modeling and analysis of the time periods. The Retail Transactions ❺ are the basic building blocks used to summarize data into reporting period subtotals (and sum reporting period subtotals in to customer totals).

Retail Transaction facts are made up of line items. With the ARTS DWM 3 there are three distinct types of fact line items. The first type is the Sale/Return line item ❻. This is a very important source of raw fact data used for characterizing customer behavior. It identifies the products and services purchased or returned. It includes the amount paid for the item, the quantity sold, the inventory cost, etc. It also contains one to five price modifiers (typically discounts) that may be applied to a retail transaction line item. This level of information enables a retailer to associate specific, current promotion offers to specific line items.

In addition to line item specific discounts, retail transactions often have transaction level discounts ❼ that apply to all (or a designated set) of line items. Sometimes these transaction level discounts are allocated or prorated to individual line items and sometimes they are taken against a department or other organization entity higher than an individual SKU.

Block ❽ is the tender line item that indicates what kinds of tender media are used to settle a transaction, their monetary value and special tender branding.

As a group blocks 6, 7 and 8 represent the components that make up a retail transaction and are relevant to analyzing customer behavioral patterns. In addition to the monetary and item unit values, these components also contain loyalty program points facts related to earning and redeeming points based on product and service purchases and discounts and rewards received by a customer. Customer loyalty program participation is an important aspect of analyzing and categorizing customer behavior.

All of the blocks in ❶ of Figure 8 deal with the data warehouse and constructing the queries to join, select and transform line item level information for subsequent data reduction ❾. Data reduction is the process of classifying, counting, summarizing and formatting fact data so it can be used in segmenting customers. It is important to understand that this process typically involves iteratively creating and running queries to discover basic patterns in the raw data. Pattern discovery relies on using basic descriptive statistics to identify means, standard deviations, modes, medians and data distribution models. This information is important because every retailer will have a different result based on their transaction data.

ARTS KPI's and Performance Measures Narrative Description

The basic descriptive statistics, combined with dimensions (like item, brand, price point, business unit, channel, tender type, etc.) form the basis for defining customer behavioral segments. The values associated with behavioral observations and dimensions are broken down into a set of discrete value ranges. Each value range is assigned an identity, a name and a description and becomes a customer behavioral segment¹⁰.

Behavioral segments, because they only consider customer actions are useful to categorize anonymous customers. There are hundreds of different kinds of behavioral segmentation derivable from the ARTS DWM-3. Each requires a different set of queries and analytic methods. The Recency-Frequency-Monetary Value sample discussed here will be supplemented in future phases of the ARTS DWM 3 Project.

1.2.2.2.4 BEHAVIORAL SEGMENTATION SAMPLE: RECENCY-FREQUENCY-MONETARY VALUE (RFM)

Recency-Frequency-Monetary Value (RFM) is a traditional customer behavioral segmentation method and is presented here as a sample. RFM analysis is useful to the retailer because:

- Customers who purchased products and services from a retailer recently are more likely to make another purchase soon;
- Customers who frequently make purchases are more likely to make more purchases;
- Customers who purchase higher values tend to spend more money.

RFM is a more operationally oriented measure than net profitability (see Figure 3). There are other more sophisticated methods for segmenting customers for marketing and promotion purposes but RFM is a good starting point to highlight how the ARTS DWM 3 supports behavioral segmentation.

In this sample RFM behavioral segmentation model a stored summary table is used instead of the raw `SalesReturnFact` table to simplify the query logic. The link, [#VW DW3 STRD SMRU CT RP TRN](#) presents the SQL to create customer-transaction stored summary table. This is a prerequisite to the RFM queries and is a good example of the kind of intermediate structures used in data warehouses to speed up performance. In these ARTS samples we are using basic SQL code to create stored summary tables. Microsoft has a proprietary language and supplementary tool set in their Analysis Services product that supports the creation of data cubes. Data cubes are essentially stored summary tables with lots of dimensions and support for multi-level drill down. Because most data cube tools and languages are proprietary, ARTS does not use them in its sample SQL code.

Recency, as modeled here, is the count of calendar days between a cutoff date (which we set to 2013-07-01 in our sample query) and the highest date a customer purchased something that is prior to the cutoff date. In evaluating recency, the lower they date count the better. A high date count means the customer has lost interest or turned to a competitor.

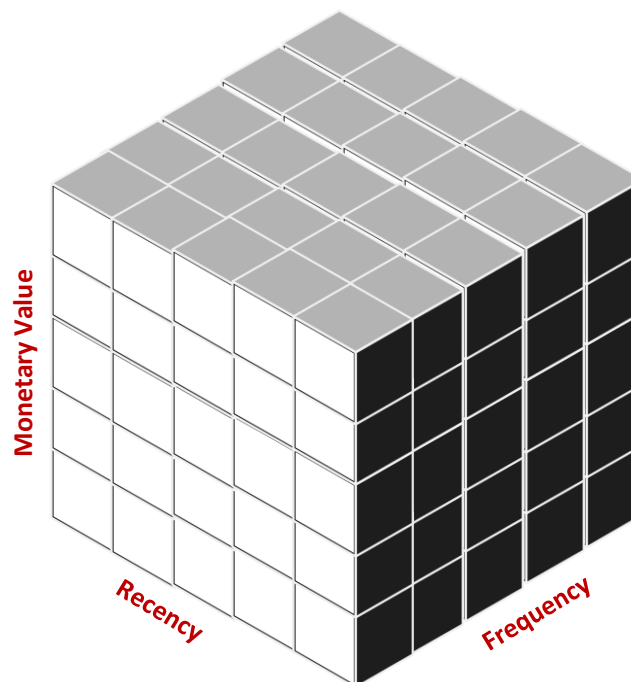
Frequency as modeled here is the number of days between transactions. Like recency, a lower the number is better. Low number of days between transactions means the customer is returning often which means more opportunities to sell products and services.

ARTS KPI's and Performance Measures Narrative Description

Monetary value as modeled here is the average net margin generated by each customer transaction. It indicates the relative magnitude of customer purchase. For monetary value, a higher the number is better.

The values for recency, frequency and monetary dimensions are *continuous* – they can assume any positive value. To organize these continuous variables into categories we use a quintile function. The concept of customer RFM behavioral segmentation is built around three dimensions: recency, frequency and monetary value. This sample RFM analysis divides each of the three dimensions into five pieces (quintiles) that will be used to categorize customers. The three dimensions and five pieces together form a 5 by 5 by 5 cube. Each cell in the cube defines an RFM behavioral segment as illustrated in Figure 9. There are a total of 125 distinct RFM bins for classifying customer behavior.

Figure 9: RFM Behavioral Segment “Cube”



We use the customer store summary table created earlier and use a quintile function to take each dimension and divide it into 5 segments. So, as shown in the cube the customer recency measures are evaluated using a quintile function and placed into one of its 5 bins. The customer frequency measures are evaluated using a quintile function and placed into one of its 5 bins. The customer average transaction net profit is evaluated using the quintile function and placed into one of the monetary dimension's 5 bins.

The customer's RFM bin is a cell address like 3,2,2 (where recency quintile is 3, frequency quintile is 2 and monetary quintile is 2). The details for implementing this RFM Behavioral Segmentation are presented as an SQL view definition at the following link: [#VW_DW3_RFM_BEHAVIORAL_SEGMENT](#)

ARTS KPI's and Performance Measures Narrative Description

Table 3: Translating Quintile Values into Named Behavior

Quintile Value	Recency	Frequency	Monetary
1	CURRENT	FREQUENT	HIGH SPENDER
2	RECENT	STEADY	ABOVE AVERAGE SPENDER
3	TIMELY	NEEDS REMINDER	AVERAGE SPENDER
4	LOSING STEAM	LOSING INTEREST	BELOW AVERAGE SPENDER
5	LAGGARD	SLOTH	THRIFTY

Table 3 shows how the quintile values derived from the RFM view can be assigned different labels when naming customer behavior traits. The use of names makes the characterizing of RFM behavior more intuitive.

Figure 10 illustrates the output from the RFM view and includes annotations that reference the names shown in Table 3.

Figure 10: Sample Output from the RFM View With Behavioral Segmentation Comments

Customer	Recency (days)	Freq (days)	Monetary (\$)	Recency Bin (1-5)	Freq Bin (1-5)	Monetary Bin (1-5)
ID_CT	RECENCY	FREQ	AVG_SPEND	RECENCY_QUINTILE	FREQ_QUINTILE	SPEND_QUINTILE
10048	13.00	42	\$ 309.27	2	1	1
10037	36.00	34	\$ 294.00	3	1	1
10021	122.00	49	\$ 293.31	5	3	1
10028	4.00	55	\$ 279.44	1	4	1
10082	68.00	46	\$ 270.92	4	2	1
10065	51.00	44	\$ 257.37	4	2	1
10005	29.00	47	\$ 255.19	3	3	1
10084	43.00	44	\$ 249.66	3	2	1
10041	91.00	47	\$ 243.68	5	3	1
10085	5.00	53	\$ 243.00	1	4	1
10056	7.00	57	\$ 241.47	1	5	1
10064	97.00	46	\$ 239.08	5	2	1
10019	54.00	61	\$ 235.90	4	5	1
10099	13.00	42	\$ 235.84	2	1	1
10092	15.00	44	\$ 235.70	2	2	1
10025	12.00	40	\$ 235.16	2	1	1
10010	40.00	50	\$ 234.89	3	3	1
10001	7.00	46	\$ 234.00	1	2	1
10015	49.00	56	\$ 233.81	4	4	1

This customer is a laggard in terms of recency. They are a "Needs Reminder" in terms of frequency. They are a big spender in terms of their average Net profit.

These two are high performance customers in terms of recency, frequency and monetary values.

This customer is "Losing steam" in terms of recency. They are a laggard in terms of frequency. However they are a big spender.

This worked example of using recency, frequency and monetary quintiles to segment customer behavior illustrates how to derive useful insight from the ARTS DWM 3 model.

As mentioned earlier there are hundreds of possible behavioral segments. This sample shows how the ARTS DWM 3 can be used to derive customer behavioral segments and make them meaningful to the business community.

ARTS KPI's and Performance Measures Narrative Description

1.2.2.2.5 BEHAVIORAL SEGMENTATION BASED ON PRODUCT/SERVICE

Customers may be grouped around products and services they purchase in two ways. The first way is for the retailer to pre-designate product categories, brands and SKUs used to group customers based on their purchase history. The second way is to explore customer purchases and through data mining procedures discover customer segments. Retailers typically use both approaches.

1.2.2.2.5.1 *Pre-Designated Customer Behavioral Segmentation Based On Product/Service*

Each retailer has a certain range of products, services and brands they carry. The more specialized a retailer (in terms of product/service breadth and depth) the more defined its overall product/service category based customer segmentation will be.

The pre-designated product/service categories (as well as brand and possibly SKU) used to segment customers are specified in a summary query which rolls transaction counts, units sold counts, net sales value, and net profit into totals by customer, by product category. The row set returned from that query constitutes a rough version of the customer-product category segment. By rough, we mean that the retailer may apply filters such as a minimum customer count, minimum net profit value or other threshold to determine which customer-product groups have reached a critical mass and warrant the designation as a customer segment. Once defined, customers that are members of that segment may be targeted with promotions, advertising and other initiatives designed around their predisposition to purchase the target category.

The summary facts like total transactions, total units sold, and total net profit may be supplemented by additional kinds of measures such a purchase frequency, purchase recency, etc. It is up to the retailer to decide how to assign measurements to qualify customer behavior. There are many different ways to apply volume, magnitude, frequency and duration measures to describe customer behavior based on the things they buy. The key point here is that the retailer predetermines the product/service dimensional elements to be used.

1.2.2.2.5.2 *Exploratory Customer Behavioral Segmentation Based on Products/Services*

With this exploratory approach to product/service oriented customer segmentation the retailer does not pre-specify a product/service category. Here, the retailer applies data mining methods to explore and discover segments based on measured customer-product/service interaction patterns.

In this kind of behavioral segmentation, items are typically grouped into named sets of SKUs based on a merchandise hierarchy (which is ARTS' implementation of product category), brand, climate or some other item attribute. The named sets of SKUs may be constructed using one or more item attributes. For example combining a product category with a brand is a useful way to classify purchasing behavior. The category indicates what the customer buys. The brand indicates the customer's preference for name recognition, image, value, performance and other traits associated with brands.

In ARTS, product/service categories are implemented as merchandise hierarchies. ARTS allows a retailer to define as many different merchandise hierarchies as they want. Within each hierarchy, retailers may designate as many classification levels as they want (usually no more than 9 levels). Each merchandise hierarchy and hierarchy level may have as many merchandise hierarchy groups as required. The

ARTS KPI's and Performance Measures Narrative Description

hierarchy groups (which are named collections of items/SKU's within a merchandise hierarchy at a given hierarchy level) can be used as a basis for deriving customer behavioral segments. Because these groupings are tied to different hierarchy levels, retailers can segment customers on a macro level (using higher merchandise level groups) or micro level (using low level merchandise hierarchy groups or item/SKUs).

By combining items, merchandise hierarchy groups and brands, retailers can derive several thousand different ways to segment customers based on what they buy. This is independent of all of the other behavioral and inherent characteristics used for customer segmentation.

Choosing the best product/service based customer behavior segmentation method involves exploring the `SaleReturnFact` table data values to identify merchandise hierarchy groups and brands that:

- Are purchased by a sufficient number of different customers over a designated reporting periods that make it worthwhile for the retailer to pursue
- Based on their attributes allow a retailer to reasonably ascribe an associated behavioral characteristic to its purchase by a customer. For example, using a premium branded, high fashion product can be associated with higher spending customers who expect personalized service.
- Provide the basis to create disjoint named segments of individual customers – segmentation only works if the retailer can distinguish customers from other customers that are not in a particular segment. If customers can be in multiple segments for a given segmentation scheme, that scheme is not really suitable as a segmentation tool

Designating item based customer behavior segments involves common sense associative thinking about customers, products and behavior as well as data exploration to discover underlying relationships that are usually apparent. The analytic techniques for this data exploration will be addressed in future phases of the ARTS DWM 3 Project.

1.2.2.2.6 BEHAVIOR SEGMENTATION BASED ON CHANNELS AND BUSINESS UNITS SHOPPING ACTIVITY

Customer behavior segmentation may be characterized by where, when and how customers shop. Typically retailers have relatively few channel-business unit combinations compared to product/service categories. Accordingly, it is practical for a retailer to pre-designate channel-business unit combinations for classifying customer shopping preferences.

Like product/service category, this involves summarizing customer retail transaction data into transaction counts, units sold counts, net sales value, and net profit into totals by customer, by business unit-channel. The row set returned from that query constitutes a rough version of the customer-business unit-channel segment. Retailers may refine this rough version by adding thresholds and other filters to determine when there are enough customers exhibiting a preferred business unit-channel shopping preference to make creating a segment a practical investment for the retailer.

1.2.2.2.7 BEHAVIOR SEGMENTATION BASED ON TENDER TYPES USED IN TRANSACTION SETTLEMENT

Customer behavior segmentation may be characterized by which tender types (and branded tender media) they use in paying for their purchases. As with all customer behavior based segmentation,

ARTS KPI's and Performance Measures Narrative Description

different retailers will find different behavioral patterns important to their business. For example a grocery retailer will be keenly interested in electronic benefit transfer (EBT) tender activity of its customers. An auto parts retailer, on the other hand, has little or no interest in EBT since (under normal business conditions), it cannot be used to purchase auto parts.

Tender segmentation can be pre-designated (like business units-channels) because there are relatively few accepted tender types. Customer tender-based behavioral segments can be counted without the need to do exploratory data mining.

Customers using co-branded tender media may be enrolled in a loyalty program offered by the credit/debit card provider which represents a member-ship based segment. The co-branding, if it involves the retailer, can be tied to a retailer's loyalty program which means the customer has a loyalty account. Customer using these kinds of media are willing to share more information with the retailer.

Cash paying customers (or customers that use money orders or traveler checks) are often less willing to share information. That means that retailers have to depend on their behavioral characteristics to understand their preferences and needs. One of the key reasons why the ARTS DWM 3 emphasizes customer behavioral segmentation is that it allows retailers to learn a lot about anonymous customers (as well as identified customers).

These are very basic kinds of customer segmentation by payment method. It is common for retailers to mix and match customer behavioral segments into compound segments. For example, customer business unit- channel and customer product categories can be combined to highlight customer shopping preferences correlation with particular product/service categories.

ARTS KPI's and Performance Measures Narrative Description

1.3 Sample Customer Oriented Measures & KPIs

1.3.1 Customer Oriented Tactical/Operational Measures

The macro level customer performance measures are built from lower level, more granular measures that define and describe customer behavior at the retail transaction (and in the future interaction⁵) level. These lower level performance measures are called tactical/operational measures.

There are many, many tactical/ operational customer oriented measures. These are used to track transaction-level behavior of customers. They serve as a way to continuously monitor customer purchasing activity and monetary value levels so retailers can act to improve service and net profitability.

1.3.1.1 Customer Average Transaction Value By Business Unit

This customer measure looks at the average value (based on net sales) of customer transactions by store for a retailer designated reporting period.

Sample Measure 1: Customer Reporting Period Average Transaction Value Per Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Average Transaction Value Per Business Unit for a Reporting Period (sample measure 1)
Business Definition & Description	
Goal	Grow average customer sales per business unit
Question	What is the average value of customer purchase by business unit for a reporting period?
Description	Average value of each customer's purchases by business unit (store) for a reporting period
Subject	Customer
Spreadsheet Ref.	Line 10
Observable Facts/Phenomena	Sales>Returns
Dimensions	Customer Reporting Period Business Unit Transaction
Derivation/Formula	Sum NetSales grouping by Customer, Business unit and Period / Retail Transaction Count grouping by Customer, Business Unit and Reporting Period
Output/Result	Monetary Value
Link to Technical Specification	#CustomerAvgTrxValPerBusUnitRptPer

⁵ Interaction as used here is a general term. It incorporates any direct conversation between a retailer and a consumer or customer. Specific types of interaction and dimensions will be developed in phase 2 of the ARTS DWM 3 Project.

ARTS KPI's and Performance Measures Narrative Description

1.3.1.2 Customer Average Transaction Value – Chain Wide

This is very similar to the previous measure. Here the customer average transaction value is across the entire chain not by store. This is a good example of taking a performance measure and applying it at a higher level. In this case customer purchasing behavior is looked at from an enterprise versus store point of view.

Sample Measure 2: Customer Reporting Period Average Transaction Value Chain-wide

Sample Performance Measure Specification	
Measure Name:	Customer Average Transaction Value (chain wide) for a Reporting Period (sample measure 2)
Business Definition & Description	
Goal	Grow average chain wide sales for each customer
Question	What is the average value of customer purchases for the entire chain for a reporting period?
Description	Average value of each customers purchases for a reporting period. This average is for ALL business units and so is a chain wide figure.
Subject	Customer
Spreadsheet Ref	Line 14
Observable Facts/Phenomena	Sales/Returns
Dimensions	Customer Reporting Period Transaction
Derivation/Formula	Sum Net Sales grouping by Customer and reporting period / Retail Transaction Count grouping by Customer and Reporting Period
Output/Result	Monetary Value
Link to Technical Specification	#CustomerAvgTransValueChainWideRptPrd

1.3.1.3 Customer Average Monthly Spend Per Business Unit

This measure breaks a customer average down into monthly monetary values within a reporting period. So it presents a more granular picture of customer purchasing behavior. This measure presents customer purchases by business unit.

Sample Measure 3: Customer Reporting Period Average Monthly Spend Per Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Sale per Business Unit per Month within a Reporting Period (sample measure 3)
Business Definition & Description	
Goal	Increase customer recurring purchases by store on a month to month basis
Question	What is the customer average spend (net sales) per business unit per month for a reporting period?
Description	Customer net sales by business unit by month by reporting period
Subject	Customer
Spreadsheet Ref	Line 2
Observable Facts/Phenomena	Sales/Returns
Dimensions	Customer Reporting Period Calendar Month (within reporting period) Business Unit Transaction
Derivation/Formula	Sum Net Sales grouping by Customer, Reporting Period, Month, Business Unit / Retail Transaction Count grouping by Customer, Reporting Period, Month, Business Unit
Output/Result	Monetary Value
Link to Technical Specification	#CustomerAvgMonthlySpendPerBusUnit

ARTS KPI's and Performance Measures Narrative Description

1.3.1.4 Customer Average Monthly Spend Chain Wide

This measure looks at the monthly average customer net sales on a chain wide basis.

Sample Measure 4: Customer Reporting Period Average Monthly Spend Chain-wide

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Sales (chain wide) (sample measure 4)
Business Definition & Description	
Goal	Increase customer recurring purchases chain wide on a month to month basis
Question	What is the chain wide customer average spend (net sales) on a monthly basis
Description	Customer chain wide monthly sales by reporting period
Subject	Customer Sales
Spreadsheet Ref	Line 19
Observable Facts/Phenomena	Sales/Returns
Dimensions	Customer Reporting Period Calendar Month (within reporting period) Transaction
Derivation/Formula	Sum Net Sales grouping by Customer, Reporting Period, Month / Retail Transaction Count grouping by Customer, Reporting Period, Month
Output/Result	Monetary Value.
Link to Technical Specification	#CustomerAvgMonthlySpendCHAINWIDE

1.3.1.5 Customer Monthly Average Transaction COUNT, By Business Unit

In this performance measure the units are a count of transactions not monetary value. It is a useful way to look at customer shopping frequency and activity level independently of the money they spend. This is a useful way to distinguish between customers that shop often but spend little versus the less frequent shopper who stocks up and spends a lot of money.

Sample Measure 5: Customer Reporting Period Monthly Transaction Count by Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Monthly Average <i>Transaction Count</i> by Business Unit (sample measure 5)
Business Definition & Description	
Goal	Increase the number of shopping trips (that yield sales) customers make to each business unit on a monthly basis.
Question	How many times per month are customers making purchases from a business unit?
Description	The count of purchases a customer makes per month by business unit over a duration of one or more reporting periods based on their retail transactions.
Subject	Customer
Spreadsheet Ref	Line 3
Observable Facts/Phenomena	Sales/Returns
Dimensions	Customer Reporting Period Month Business Unit Transaction
Derivation/Formula	Count Retail Transactions grouping by Customer, Reporting Period, Month, Business Unit, Transaction / Month count in Reporting Period
Output/Result	Transaction Count
Link to Technical Specification	#CustomerMonthlyAvgTransactionCountByBusU

ARTS KPI's and Performance Measures Narrative Description

1.3.1.6 Customer Monthly Average Transaction COUNT Chain Wide

This measure is similar to 1.3.1.5. The difference is that here, transaction count is for all stores in the chain.

Sample Measure 6: Customer Reporting Period Average Transaction Count Chain-wide

Sample Performance Measure Specification	
Measure Name:	Customer Monthly Average Transaction Count – CHAIN-WIDE (sample measure 6)
Business Definition & Description	
Goal	Increase the number of shopping trips (that yield sales) customers make to any business unit on a monthly basis.
Question	How many times per month are customers making purchases from any business unit in our chain?
Description	The count of purchases a customer makes per month, chain-wide over a duration of one or more reporting periods based on their retail transactions.
Subject	Customer
Spreadsheet Ref	Line 20
Observable Facts/Phenomena	Sales>Returns transaction
Dimensions	Customer Reporting Period Month Transaction
Derivation/Formula	Count Retail Transactions grouping by Customer, Reporting Period, Month, Transaction / Month count in Reporting Period
Output/Result	Transaction Count
Link to Technical Specification	#CustomerMonthlyAvgTransCountCHAINWIDE

1.3.1.7 Customer Tender Spend Preference By Business Unit

This measure introduces tender as a basis for characterizing customer behavior over the course of a reporting period. All of the preceding customer performance measures used sales and returns. Here, we are looking at how customers pay for the products and services they purchase and the monetary values involved in settling a transaction are split among different tender types.

Sample Measure 7: Customer Reporting Period Average Monthly Spend By Tender Type By Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Spend by Month, by Business Unit, by Tender Type, by Tender Media Brand for one or more Reporting Periods based on payment (tender) – (sample measure 7)
Business Definition & Description	
Goal	Grow customer purchase payments using retail proprietary credit card versus 3 rd party credit/debit cards and other tender media for each business unit
Question	How much do customers spend on our products and service per month by store and tender type for one or more reporting periods?
Description	The average spend (based on tender value), by tender type for each customer at each store per month for one or more reporting periods.
Subject	Customer
Spreadsheet Ref	Line 30
Observable Facts/Phenomena	Payment/Tender
Dimensions	Customer Reporting Period Month Business Unit Tender Type Tender Media Brand Transaction

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Spend by Month, by Business Unit, by Tender Type, by Tender Media Brand for one or more Reporting Periods based on payment (tender) – (sample measure 7)
Derivation/Formula	Sum tender amounts by customer, business unit, tender type, tender credit/debit card, co-branded tender for a reporting period and divide by the number of months in that reporting period.
Output/Result	Monetary Value that reflects monthly spend by tender type by month by store for each customer
Link to Technical Specification	#CustAvgMthlySpndByBusUntTenderType

1.3.1.8 Customer Tender Spend Preference Chain-wide

This measure is the same as the preceding one except that it looks at the average tender value for ALL stores in the chain.

Sample Measure 8: Customer Reporting Period Average Monthly Spend by Tender Type Chain-wide

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Spend by Month, by Tender Type, by Tender Media Brand, Chain Wide for one or more Reporting Periods based on payment (tender) (sample measure 8)
Business Definition & Description	
Goal	Grow customer purchase payments using retail proprietary credit card versus 3 rd party credit/debit cards and other tender media for the chain as a whole (all business units)
Question	How much do customers spend on our products and service per month and tender type for one or more reporting periods on a chain wide basis?
Description	Customer average spend (based on tender values) per month per tender type and tender media brand for one or more reporting periods
Subject	Customer
Spreadsheet Ref	Line 29
Observable Facts/Phenomena	Payment/Tender
Dimensions	Customer Reporting Period Month Tender Type Tender Media Brand Transaction
Derivation/Formula	Sum Tender Amount grouping by Customer, Reporting Period, Month, Tender Type, Tender Media Brand / Count Retail Transactions grouping by Customer, Reporting Period, Month, Tender Type, Tender Media Brand
Output/Result	Monetary Value
Link to Technical Specification	#CustAvgMthlySpdnByTenderTypeChainWide

ARTS KPI's and Performance Measures Narrative Description

1.3.1.9 Customer Tender Spend Preference Based on Activity (Transaction Count) Chain Wide

This measure transitions from monetary values to transaction counts. The purpose is to look at tender type usage frequency over the course of a reporting period. The transaction count is grouped by customer, reporting period, and month.

Sample Measure 9: Customer Reporting Period Monthly Average Transaction Count By Tender Type Chain-wide

Sample Performance Measure Specification	
Measure Name:	Customer Monthly Average Transaction Count By Tender Type, Tender Media Brand, Chain-wide, for one or more reporting periods (sample measure 9)
Business Definition & Description	
Goal	Grow customer purchase payments using retail proprietary credit card versus 3 rd party credit/debit cards and other tender media for the chain as a whole (all business units)
Question	How many times on average do customers pay for purchases using different tender types per month over a reporting period?
Description	Count of the average number of transactions customers complete and pay for with different tender types and tender media brands per month, chain-wide for one or more reporting periods
Subject	Customer
Spreadsheet Ref	Line 31
Observable Facts/Phenomena	Payment/Tender Fact
Dimensions	Customer Reporting Period Month Tender Type Tender Media Brand Transaction
Derivation/Formula	Count Transaction grouping by Customer, Reporting Period, Month, Tender Type, Tender Media Brand / Count Retail Transactions grouping by Customer, Reporting Period, Month, Tender Type, Tender Media Brand for a reporting period
Output/Result	Transaction Count
Link to Technical Specification	#CustAvgRptPrdMthlyTrnCntByTndrByBusUn

1.3.1.10 Customer Average Monthly Transaction Count by Tender Type – Business Unit

As in the previous measure (1.3.1.9), customer tender utilization frequency is averaged for each month in a reporting period. The difference is in this measure, the customer's activity is looked at on per store basis.

Sample Measure 10: Customer Reporting Period Average Monthly Transaction Count by Tender Type By Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Transactions Count By Tender Type, Tender Media Brand and Business Unit (sample measure 10)
Business Definition & Description	
Goal	Increase customer use of retailer proprietary credit debit card
Question	What are the average transaction counts for each tender type by store?
Description	Transaction count grouped by customer, business unit tender type, tender media brand for a reporting period
Subject	Customer
Spreadsheet Ref	Line 32
Observable Facts/Phenomena	Payment/Tender Fact
Dimensions	Customer Reporting Period Month Tender Type Tender Media Brand

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Transactions Count By Tender Type, Tender Media Brand and Business Unit (sample measure 10)
	Transaction Business Unit
Derivation/Formula	Count the transactions by customer, business unit, tender type, tender media brand for a reporting period (or periods) and divide that count by the number of months in the reporting period (or periods)
Output/Result	Transaction Count
Link to Technical Specification	#CustAvgMthlyTransCOUNTByTndrTypByBusUn

1.3.1.11 Average Tender Line Item Count per Transaction by Customer, by Business Unit for a Reporting Period

This performance measure is looking at the average number of tender line items in a transaction, by customer and business unit over the course of a reporting period. It does not require distinguishing between tender types. For example if a customer pays for an item in US dollars and Euros, that constitutes two line items even though they are both CASH tender types. Transactions with more than a single tender line item are called split-tender transactions because the settlement amount (i.e. the amount paid by a customer for a sale) is divided between two or more tender line items.

Sample Measure 11: Customer Reporting Period Average Tender Line Item Count Per Transaction By Business Unit

Sample Performance Measure Specification	
Measure Name:	Average Tender Line Item Count Per Customer, Per Transaction, per business unit for a reporting period (sample measure 11)
Business Definition & Description	
Goal	Reduce split tender
Question	What is the average count of tender line items used by each customer purchase (retail transaction) by business unit for a reporting period?
Description	This is an average tender line item count aimed at assessing the split tender payment experience by customer and by store for a reporting period.
Subject	Customer
Spreadsheet Ref	Line 1
Observable Facts/Phenomena	Payment/Tender Fact
Dimensions	Customer Reporting Period Business Unit Tender Line Item Transaction
Derivation/Formula	Count TenderLineItem grouping by Customer, by reporting period, by Business Unit / Count Transactions grouping by Customer, by Reporting Period, by Business Unit
Output/Result	Tender Line Item Count
Link to Technical Specification	#AvgTndrLtmCntPerTrnByBusUn

ARTS KPI's and Performance Measures Narrative Description

1.3.1.12 Customer Retailer Spend Percent

This performance measure is an initial estimate of a retailer's "wallet share" of customers' total purchases made using a specific credit card. This is not a complete measure of wallet share but represents a starting point. This measure uses a fact table that is NOT derived from the ARTS ODM because it is coming from a credit/debit card company. The credit/debit card company aggregates a customer's sales from all purchases from all retailers where the card was used to pay for products and services. That information is typically sold to retailers to perform a percent spend type of analysis.

Note that PCI compliance means that matching the credit/debit card customer with the retailer's customer ID cannot use the card number. For purposes of this illustration we are assuming that the credit/debit card company provides a last name, first name, zip code and phone number to use in matching a card to a customer.

Sample Measure 12: Customer Retailer Spend Percent

Sample Performance Measure Specification	
Measure Name:	Percent tender type, tender media brand spend by customer on a chain wide basis for a reporting period (sample measure 12)
Business Definition & Description	
Goal	Expand customer usage of retail co-branded credit card (these are co-branded but still may be used to shop at other retailers since they are not proprietary credit cards)
Question	What percent of our customers debit/credit card reporting period spend is spent with us versus other retailers.
Description	Customer percent of tender spend by tender type, tender media brand for a reporting period – chain-wide
Subject	Customer
Spreadsheet Ref	Line 22
Observable Facts/Phenomena	Customer payments by tender type over a reporting period and purchased customer total spend data by credit/debit card for a reporting period.
Dimensions	Customer Reporting Period Debit/Credit Card (Tender Type) Tender Media Brand
Derivation/Formula	Sum the credit debit card purchases by tender type, card type, tender media brand for each customer for a reporting period (chain-wide) and divide by the customer reporting period total supplied by an outside service and stored in the sample credit/debit card total customer spend table.
Output/Result	The percentage of customer spend for a given credit/debit card spent at the retailer
Link to Technical Specification	#PctTndrTypByCustChainWide

ARTS KPI's and Performance Measures Narrative Description

1.3.2 Channel Subject Area

The goal of Channel-centered analysis initially is to assess which shopping venues customers prefer and which generate the greatest net profit. Initially the channel subject area will be limited to summarization based on retail transaction facts. In the future it will be extended to include customer orders, customer correspondence and non-transaction correspondence between retailers and customers.

The average transaction count per business unit per weekday for a reporting period illustrates one type of performance measure that can be used to evaluate store staff scheduling to ensure that it is adequate.

Sample Measure 13: Reporting Period Average Transaction Count Per Weekday by Business Unit

Sample Performance Measure Specification	
Measure Name:	Average transaction count per business unit per weekday for a reporting period. (Measure 4 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Match staffing level to retail traffic by business unit
Question	What is the volume of sales per business unit per day for a reporting period?
Description	Weekday transaction count
Subject	Business Unit
Spreadsheet Ref	Line 4
Observable Facts/Phenomena	Sales transaction count
Dimensions	Business Unit Reporting period Week day
Derivation/Formula	Sum sales transaction counts by week day and divide by count of week day in the reporting period
Output/Result	Average transaction count by week day for reporting period
Link to Technical Specification	#TechnicalSampe24

When comparing channel strategies, retailers may evaluate customer sales patterns to develop an understanding of channel preferences. The average sale per transaction viewed by channel for each customer is a useful measure of channel preference.

Sample Measure 14: Chain-wide Average Net Sales Per Transaction by Customer and Channel for a Reporting Period

Sample Performance Measure Specification	
Measure Name:	Average net sale per transaction by customer, by channel for a reporting period on a chain-wide basis. (Measure 5 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Improve cross channel sales for our customers
Question	What channels are customers using the most on a chain-wide basis
Description	This is a measure of average sale per transaction by customer and channel
Subject	Channel and Customer
Spreadsheet Ref	Line 5
Observable Facts/Phenomena	Sales
Dimensions	Reporting Period Customer ID Channel
Derivation/Formula	Summed net sales by customer and channel for a reporting period divided by the transaction count for each customer
Output/Result	Average transaction monetary value by channel for each customer
Link to Technical Specification	#TechnicalSample25

ARTS KPI's and Performance Measures Narrative Description

As retailers introduce new channels it becomes important to measure the portion of sales flowing through those channels. One measure that is useful is a reporting period sales percent breakout by channel type.

Sample Measure 15: Reporting Period Chain-wide Sales Percent by Channel

Sample Performance Measure Specification	
Measure Name:	Percent as ratio of net sales by channel over total net sales for a reporting period. (Measure 6 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Improve balance of sales across different channels
Question	What is the chain-wide sales value by channel?
Description	Chain-wide net sales by channel for a reporting period
Subject	Chain
Spreadsheet Ref	Line 6
Observable Facts/Phenomena	Sales
Dimensions	Reporting Period Channel
Derivation/Formula	Sum net sales and net margin by channel and divide by total net sale and net margin chain wide for a reporting period
Output/Result	Percentage of chain-level net sales by channel for a reporting period
Link to Technical Specification	#TechnicalSample26

In addition to looking at sales by channel, it is useful to consider how tender types vary from channel to channel as shown in the following sample measure. In this sample, the apportioned value is the aggregated monetary value of transaction tenders.

Sample Measure 16: Chain-wide Tender Type Percentage by Channel for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Percent of tender (sales) by channel for reporting period (Measure 7 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Increase customer use of proprietary credit card to pay for purchases across all channels
Question	How are customers paying for items purchased through different channels?
Description	
Subject	Channel and Tender Type
Spreadsheet Ref	Line 7
Observable Facts/Phenomena	Tender amount
Dimensions	Reporting Period Channel Tender Type
Derivation/Formula	Sum tender applied to transaction by channel and tender type for reporting a period, divide by total tender applied for reporting period on a chain-wide basis.
Output/Result	Percentage of total tender by tender type and channel for a reporting period
Link to Technical Specification	#TechnicalSample27

ARTS KPI's and Performance Measures Narrative Description

Transaction *tender* volume can be viewed in terms of transaction counts in lieu of monetary value. This is important for staff scheduling which is driven by activity volume versus monetary value. The next sample measure looks at different tender type frequency as a percent of total transaction count for a reporting period.

Sample Measure 17: Chain-wide Percent Transactions By Tender Type By Channel for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Percent of transaction (count) by channel for a reporting period (Measure 9 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Increase customer use of proprietary credit card to pay for purchases across all channels
Question	How are customers paying for items purchased through different channels?
Description	Percentage of transactions paid for by tender type and channel chain-wide for a reporting period
Subject	Channel
Spreadsheet Ref	Line 9
Observable Facts/Phenomena	Transaction count
Dimensions	Reporting Period Tender Type Channel
Derivation/Formula	Sum transaction count by channel and divide by total transaction count for a reporting period.
Output/Result	Percentage
Link to Technical Specification	#TechnicalSample28

The following measure looks at the percentage of retail transactions by channel for a reporting period. It is a chain-wide measure.

Sample Measure 18: Chain Wide Reporting Period Transaction Percent by Channel

Sample Performance Measure Specification	
Measure Name:	Reporting Period, Chain-wide Transaction Percent By Channel
Business Definition & Description	
Goal	Improve balance of sales across different channels
Question	What percent of transaction count is handled through different channels?
Description	Channel percentage of transaction count
Subject	Channel
Spreadsheet Ref	Line 8
Observable Facts/Phenomena	Transaction Count
Dimensions	Reporting Period Channel
Derivation/Formula	Transaction count by channel divided by total transaction count for a reporting period. Chain wide measure
Output/Result	Percentage of transaction count for each channel
Link to Technical Specification	#TechnicalSample29

ARTS KPI's and Performance Measures Narrative Description

1.3.3 Customer Activity Measures

New customer acquisition is important for retailers. The next sample measure presents the percentage of retail transactions attributable to new customers.

Sample Measure 19: Customer Acquisition Rate

Sample Performance Measure Specification	
Measure Name:	Customer Acquisition Rate (Measure 13 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Increase the amount of sales generated from new customers
Question	What is the portion of our sales generated from new customers for a reporting period?
Description	Reporting percentage of customers that are new (did business for the first time in the reporting period)
Subject	Customer
Spreadsheet Ref	Line 13
Observable Facts/Phenomena	Unique customer's sales transactions
Dimensions	Customer (registration date) Reporting Period
Derivation/Formula	Count newly registered customers for a reporting period and divide it by total retail transaction customer count (distinct customers) during the reporting period
Output/Result	Percent of customers that re new (based on customer counts)
Link to Technical Specification	#TechnicalSample30

Like many of these basic measures, new customer percentage of transaction count can be augmented by different dimensions like business unit, channel, region, etc. to compare different parts of the retail enterprise.

The next measure changes from a focus on activity volume to profitability. This is looking at gross margin by customer.

Sample Measure 20: Chain-wide Customer Profitability by Reporting Period

Sample Performance Measure Specification	
Measure Name:	Customer Profit by Reporting Period on a Chain-wide basis (Measure 17 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Lift gross margin for all customers across the chain
Question	What is the gross margin per customer across the chain for a reporting period?
Description	Customer gross margin across the chain for a reporting period. This is a query that can be used to build other queries
Subject	Customer
Spreadsheet Ref	Line 17
Observable Facts/Phenomena	Gross margin on sales
Dimensions	Customer Reporting Period
Derivation/Formula	Sum net margin for each customer and divide by transaction count on a chain-wide basis for a reporting period.
Output/Result	Summarized Gross Margin \$
Link to Technical Specification	#TechnicalSample32

ARTS KPI's and Performance Measures Narrative Description

This measure tracks the proportion of customers using the retailer's proprietary credit card to all credit/debit cards used to settle transactions on a chain-wide basis for a reporting period.

Sample Measure 21: Customer Utilization of Proprietary Credit Card Tender

Sample Performance Measure Specification	
Measure Name:	Customer utilization of proprietary CR/DB card as a percent of their total use of all CR/DB card during a reporting period on a chain-wide basis (Measure 23 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Increase utilization of proprietary credit card for purchase payment by customers
Question	What percentages of customers are using our proprietary credit card to pay for purchases?
Description	Percent of proprietary credit card usage based on overall use of debit/credit cards for tender
Subject	Tender type – proprietary credit card
Spreadsheet Ref	Line 23
Observable Facts/Phenomena	Percent of proprietary credit card based on total debit credit card usage by customers for a reporting period (on a chain-wide basis)
Dimensions	Reporting Period Tender Type- Credit-Debit Type (to indicate our proprietary card) Credit Debit Branded Media
Derivation/Formula	Percent of tender count using proprietary credit card out of total credit/debit card use
Output/Result	Percentage based on count
Link to Technical Specification	#TechnicalSample33

The next sample measure combines channel and customer segment analysis of net sales for the chain for a reporting period. This illustrates how different dimensions may be combined to study sales patterns. It also illustrates how customer segmentation can be implemented in a query using the collection of attributes in the DW3_DIM_CT table.

Sample Measure 22: Chain-wide Net Sales By Channel – Customer Segment for a Reporting Period

Sample Performance Measure Specification	
Measure Name:	Net sales percent by Channel, by customer segment for a reporting period on a chain-wide basis (Measure 24 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Improve diversity of channels used by our customers
Question	What percent of sales are different customer demographics using to shop our online and bricks and mortar stores?
Description	Determine how sales to different customer segments, through different channels are apportioned for the whole chain over a reporting period
Subject	Customer Segment-Channel Sales
Spreadsheet Ref	Line 24
Observable Facts/Phenomena	Net Sales
Dimensions	Reporting Period Customer Segment Channel
Derivation/Formula	Sum net sales by channel and customer segment divide by total sales – over a reporting period on a chain-wide basis
Output/Result	Percentage of chain wide net sales by customer segment AND channel for a reporting period
Link to Technical Specification	#TechnicalSample34

ARTS KPI's and Performance Measures Narrative Description

The next performance measure is very basic averaging of a retailer's *gross margin* (or profit) on net sales for the entire chain for a reporting period. This is a useful way to track market basket growth (or decline) on a comparative reporting period basis.

Sample Measure 23: Chain-wide Average Gross Margin Per Retail Transaction

Sample Performance Measure Specification	
Measure Name:	Average profit (gross margin on net sales) per retail transaction for a reporting period on a chain-wide basis (Measure 26 from August Measure)
Business Definition & Description	
Goal	Grow per transaction gross margin
Question	What is the typical gross margin (on net sales) per transaction?
Description	Average gross margin per transaction
Subject	Gross margin on net sales
Spreadsheet Ref	Line 26
Observable Facts/Phenomena	Gross Margin
Dimensions	Reporting Period
Derivation/Formula	Sum gross margin and divide by transaction count
Output/Result	Average gross margin (profit before G&A expenses) per transaction
Link to Technical Specification	#TechnicalSample35

The next measure presents the average price per item (SKU) sold by a retailer during a reporting period. This is useful as a way to track purchasing trends over time. An increasing average unit retail value suggests that customers may be moving up scale (particularly if the average gross margin discussed earlier is increasing).

Sample Measure 24: Average UNIT Retail Price per Item for a Reporting Period on a Chain-wide Basis

Sample Performance Measure Specification	
Measure Name:	Average UNIT retail price (actual price paid by customers for an item) and profit chain-wide for a reporting period. (Measure 27 and 28 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Increase the value of individual items purchased in a market basket
Question	What is the average unit retail price paid by our customers for a reporting period on a chain-wide basis?
Description	Average UNIT price for an individual item purchased by customers
Subject	Unit Retail Price (per retail selling unit)
Spreadsheet Ref	Lines 27 and 28
Observable Facts/Phenomena	Average Unit Retail Selling Price
Dimensions	Reporting Period
Derivation/Formula	Sum net sales, count total number of individual items (SKU's) and divide it into summed net sales
Output/Result	Average unit retail price
Link to Technical Specification	#TechnicalSample36

ARTS KPI's and Performance Measures Narrative Description

The next measure tightens the measurement focus related to tender to look at the average monthly spend for all customers by tender type and tender media brand for a reporting period.

Sample Measure 25: Monthly Average Net Sales by Tender Type and Tender Media for a Reporting Period

Sample Performance Measure Specification	
Measure Name:	Monthly average net sales by tender type and tender media brand for a reporting period on chain-wide basis (Measure 29 from Sample Performance Measure Specification Spreadsheet)
Business Definition & Description	
Goal	Diversify tender types used by customers to pay for merchandise
Question	What tender types and brands are customer using?
Description	Presents an aggregate average tender amount by tender type and tender media brand per month in a reporting period. This is a chain-wide measure
Subject	Tender
Spreadsheet Ref	Line 29
Observable Facts/Phenomena	Tender
Dimensions	Reporting Period Tender Type Tender Credit/Debit Type Tender media brand
Derivation/Formula	Sum tender amount by tender type and tender type brand for a reporting period and divide by the months in a reporting period.
Output/Result	Average tender value per month by tender type and media brand
Link to Technical Specification	#TechnicalSample37

ARTS KPI's and Performance Measures Narrative Description

1.3.4 Item Subject Area

The goal of item-centered performance measures and KPI's is to quantify and assess the relative value a retailer's portfolio of products and services return to its customers and to itself. This includes looking at net profitability, potential for growth, competitive positioning, etc. The Item Subject Area of the data warehouse supports retailer merchants, buyers, visual merchandisers and store operations decision makers in selecting, pricing, distributing and displaying products and services in a way that optimizes overall profitability of the retailer.

1.3.5 Business Unit Subject Area

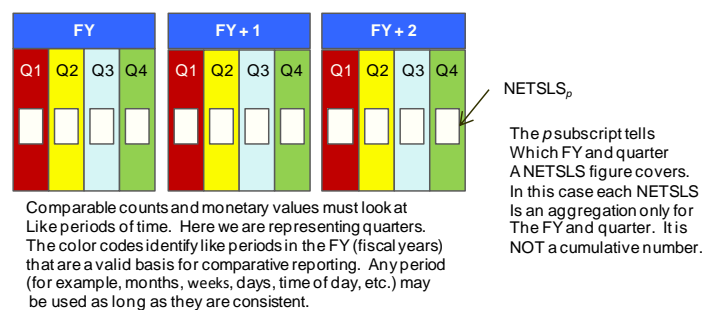
Business Unit centered performance measures and KPI's are designed to help retailers assess the relative net sales of different retail stores (business units). This includes bricks and mortar stores as well as ecommerce, web-based stores. Business unit identifies a retailer organization/place that sells merchandise and is different from a channel which defines a touch point and method of exchanging information and products with a customer. A given business unit may interact with its customers through multiple channels. For example, an electronics retailer store can fulfill and settle orders for in-store customers as well as web customers. The electronics retailer store is a business unit. In this scenario a customer order can flow through two distinct channels (ecommerce or bricks and mortar showroom) with fulfillment settlement attributed to one store.

Business Unit analysis is also present as part of the Inventory Performance Measure and KPI's and is one area where customer and sales as well as inventory data marts are joined to assess the inventory handling efficiency and profitability of a business unit.

1.3.5.1 Business Unit Sales by Comparable Period

The comparable sales key performance indicator is a period to period comparison of net sales⁶. The comparable sales key performance indicator is considered to be a measurement of productivity in revenue used to compare sales of retail stores that have been open for a year or more. Historical sales data allows retailers to compare this year's sales in their store to the same period last year. Comparable sales always represent sales for the same relative time period in the years being compared. The time periods compared may be quarters, months, fiscal weeks or even business days as long as they are the same from one year to the next. This concept is illustrated in Figure 11 which uses quarters.

Figure 11: Comparable Sales By Quarter Example



⁶ Net sale = Gross Sales - Returns

ARTS KPI's and Performance Measures Narrative Description

Comparable net sales, as the name suggests, is a measure of periodic change between net sales. The change may be expressed in monetary value, retail unit counts or as a percentage. The source for all item and service sales quantities and monetary values in the ARTS DWM 3 is the [SalesReturnFact](#) table. That table, as noted earlier, is a line item level detail. This means that a sales and returns are captured on different instances (or rows) of a [SaleReturnFact](#) table. By summing line items to a transaction or higher dimensional level, positive sales values are added to negative return values yielding net sales. Retailers will generally use actual retails to measure comparable net sales. The [SalesReturnFactExtendedAmount](#) column provides the actual retail sale or return (treated as a negative value) for a line item.

Comparable sales can be calculated at different summarization levels along different dimensions depending on what items, item categories, time periods, business units or business unit group a retailer chooses. For the purposes of this illustration the comparable net sales are summarized to a business unit level so the retailer can look at store-level performance for comparable periods.

1. Calculate net sales for each period as $\text{NETSLS}(p) = \text{ExtendedAmount for SALES}(p) - \text{ExtendedAmount for RETURNS}(p)$
2. Calculate the monetary value of the difference between NETSLS for two like periods as $\text{VARIANCE} = \text{NETSLS}(p+1) - \text{NETSLS}(p)$.
3. Calculate the percentage difference as:

$$\text{VARIANCE\%} = (((\text{NETSLS}(p+1) - \text{NETSLS}(p)) / \text{NETSLS}(p)) * 100$$

In this example, the [ExtendedAmount](#) (which is coming from the Sale/Return Fact entity) is a summed figure. The rollup dimensions will vary depending on what kind of reporting is required. As noted, there are many different ways to summarize [ExtendedAmount](#) before using it in these formulas.

The same concept reflected in the formulas for comparable net sales can be applied to units which may be called comparable unit net sales. Instead of measuring net sales in monetary terms, retail unit counts are used. Retailers find it useful to look at comparable sales in monetary terms to measure financial performance and retail unit terms to measure operational performance.

Comparable sales are widely used when publically held retailers report results to Wall Street. Comparable sales are considered a key measure of success. A consistent period to period increase in comparable sales indicates that the retailer is growing. A consistent period to period decrease indicates that the retailer is losing ground.

In the ARTS data warehouse model, comparable sales can be broken down and analyzed on a single store basis or a location aggregation level basis. Comparable sales may also be presented by item or some aggregation level of item (using the merchandise classification hierarchy). So from a very elementary collection of facts (i.e. sales) a number of different observations can be made about the retail businesses performance from year to year. The way the comparable sales function arguments are aggregated will depend on the decision makers' frame of reference.

ARTS KPI's and Performance Measures Narrative Description

Period to period comparable sales is a deceptively simple calculation. When extended to include different combinations of time frames, selling locations, items (and item hierarchy levels) the simple calculation becomes a powerful way to measure and monitor retail business performance at many levels.

Sample Measure 26: Comparable Sales Current Year Quarter Just Completed Quarter to Same Quarter Last Year

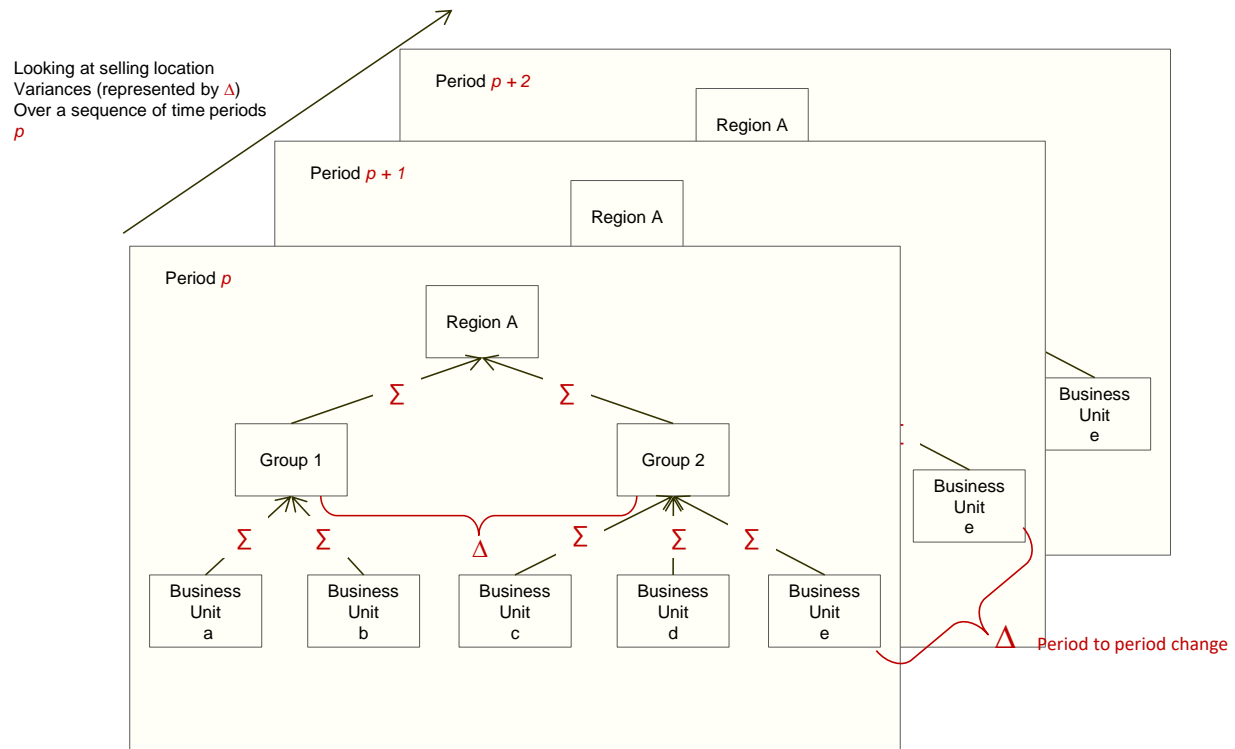
Sample Performance Measure Specification	
Measure Name:	Comparable quarterly sales 2012 versus 2011 by Business Unit (sample measure 13)
Business Definition & Description	
Goal	Grow sales top line (net sales before G&A) by 15% per year for all business units
Question	What sales growth or decline are we experiencing by completed quarter for this year versus last year.
Description	This is a business unit level comparison of sales this year versus last year by quarter. We are using the year 2012 in our example
Subject	Business Unit
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Net Sales from SaleReturnFact table.
Dimensions	Business Unit Reporting Period (assume it's a quarter OR could be a calendar quarter). Either way we will summarize line items for the period into a total net sales.
Derivation/Formula	
Output/Result	Net Sales Monetary Value for this year completed quarter BY Business Unit Net Sales Monetary Value for same quarter last year BY Business Unit
Link to Technical Specification	#ComparableQuarterlySales

By joining from [BusinessUnitDimension](#) table to the [BusinessUnitGroupDimension](#) outrigger table, a retailer can summarize the comparable numbers at higher, grouped store levels. They can summarize at any level supported in the [BusinessUnitGroupDimension](#) tables [BusinessUnitGroupHierPath](#). One base measure can be summed into additional measures that apply to higher level organizational units and used to evaluate regions, store groups as well as individual stores.

ARTS KPI's and Performance Measures Narrative Description

Figure 12 illustrates this multi-level summarization of comparable sales.

Figure 12: Comparable Location Sales Over Time – Summarized To Higher Organization Levels



This three dimensional view allows retailers to quantify how selling locations perform relative to one another over time. The aggregation of business units into business unit groups allows different, higher-level organization units to be compared over time. It is important when designing comparative period reporting to use consistent organization levels. For example it would not be appropriate to evaluate store-level comparative sales against a region. Consistency of organization levels is important for comparative period reporting. Most publically owned retailers report an average store-level year-to-year comparative sales analysis in their annual reports.

The period to period time dimension coupled with business unit organization (at different levels) can identify parts of the retail enterprise that are leaders and parts that are falling behind. For retailers with stores in a number of different climate zones this becomes very important because sales differences may be a function of the rate at which seasons change. For example snow blower sales in Minnesota are likely to be higher in October than sales in Virginia. This kind of analysis (using very basic measures) helps retailers define selling patterns and with some additional analysis understand why those patterns occur.

1.3.6 Promotion Subject Area

Promotion centered performance measures and KPI's are designed to help retailers assess the relative effectiveness of business development campaigns, promotion initiatives and promotional offers. It includes identifying and quantifying sales and assessing how changes in sales are related to (or can be

ARTS KPI's and Performance Measures Narrative Description

explained by) different actions taken by the retailer. Retailers design and execute promotions based on a hypothesis that it will yield a positive result for the business. The promotional subject area encompasses the metrics derived from real world consumer and customer behavior to enable retail decision makers to decide if their hypothesis is right or wrong and how far off it is (positive or negative). This feedback will help retailers revise and improve the design and execution of their promotion strategy.

Promotion centered performance measures will be addressed in a future release of the ARTS DWM because additional work is required to build out the operational data model entities and attributes to create structures to hold cost and more descriptive information about promotions.

1.3.7 Geographic Location

Geographic location centered performance measures and KPI's help retailers assess the performance of their business based on where they do business. While business units and business unit groups may be organized around geographic areas like regions, territories, etc. this is not an ARTS requirement. Business units and business unit groups are intended to be organizational entities that define how a retail enterprise is decomposed into subsidiary organization units for reporting and administration.

Because of this and because mapping and GIS based analysis require the availability of geographic location data the ARTS DWM 3 incorporates a set of geographic location outrigger tables connected to customer and business unit. The geographic location dimension incorporates a hierarchy for geographically based drill down and roll up using frameworks provided by census organizations. The analysis by geographic location is the ARTS basis for integrating performance measures and KPIs into mapping and GIS data presentation.

ARTS KPI's and Performance Measures Narrative Description

1.4 Sample Inventory Performance Measures and KPI's

1.4.1 Business Unit

Business unit performance can be assessed from many different vantage points. In this set of sample measures, the emphasis is on inventory movement both in units and in monetary terms.

1.4.1.1 Inventory Velocity Measurement – By Business Unit

This set of measures is concerned with the *rate* at which items move through the retail enterprise. The measures may apply to a single store or group of stores. They may apply to a single item or any group of items. The context is determined by the dimensions used to select data for inclusion in the inventory analysis. In this discussion of inventory measures, we deliberately avoid qualifying measures by item and location dimensions to concentrate on the essential measurement calculations and their association with the ARTS DWM fact entity types.

Figure 13: UNIT Inventory Velocity View of Inventory Fact Table for A Business Unit

In Flows (from Inventory Fact)					Out Flows (from InventoryFact and Sale/ReturnFact)					
ReportingPeriodID	BeginningUnitCount	ReceivedUnitCount	TransferredInUnitCount	ReturnUnitCount	ReturnToVendorUnitCount	TransferOutUnitCount	SalesQuantity	EndingUnitCount	1 Avg Inventory UNITS	2 Inventory Turnover UNITS
1	100	100	10	5	5	5	150	55	77.5	1.9
2	55	100	0	0	5	0	130	20	37.5	3.5
3	20	150	0	0	0	0	130	40	30	4.3
4	40	150	0	2	2	0	125	65	52.5	2.4
5	65	150	0	1	0	0	100	116	90.5	1.1
6	116	100	0	2	0	0	95	123	119.5	0.8
		750	10	10	12	5	730			
Average Inventory (UNITS) for 6 Periods 3 74.14286 units										
Inventory Turnover(UNITS) for 6 Periods 4 9.85 times										
Periods of inventory onhand in 6th period 5 1.01 periods										

Figure 13 illustrates how the Inventory Fact and Sale/Return Fact entity types can be used to support measuring inventory velocity reporting. This illustration uses retail units as its basis.

The light-green cells headers reflect reporting period⁷ data that is taken from the **InventoryFact** entity and **SalesReturnFact** entity (either directly or as summed data). There are two calculated attributes by period. The first **1** is Avg Inventory UNITS. This is the average unit count on hand for the **ReportingPeriodID**. It is calculated as follows:

$$\text{Avg Inventory Units} = (\text{BeginningUnitCount} + \text{EndingUnitCount}) / 2$$

⁷ Reporting Periods are delimited by beginning and ending calendar periods. Retailers should identify, define and coordinate their reporting periods and calendar periods before populating the data warehouse. For purposes of this example we are treating reporting periods as “generic” time intervals to simplify its explanation.

ARTS KPI's and Performance Measures Narrative Description

The second calculated reporting period attribute is ② Inventory Turnover UNITS. Inventory turnover is a count of the number of times the average inventory unit count is sold during the reporting period. It is an important indication of sale velocity – in this instance based on retail selling units. Its formula is:

$$\text{Inventory Turnover UNITS} = \text{SalesQuantity} / \text{Avg Inventory Units}$$

Together, the Avg Inventory Units and Inventory Turnover UNITS tell a retailer how fast an item is moving. This information is in UNITS so it will be different from inventory velocity based on cost. It is a good way to compare item velocity, selling location velocity, period-to-period velocity, etc. Because it is expressed in units, it represents a physical measure of performance.

In addition to intra-period measures it is also useful to derive inter-period information. Figure 13 presents two figures covering the six reporting periods. Here the measures look at a contiguous set of reporting periods. The number of periods can be any number determined by the individual doing the analysis.

The first figure ③ is the Average Inventory Units for the entire 6 reporting time interval. It is calculated as follows:

$$\text{Average Inventory Units} = (\text{Sum(BeginningUnitCount for the 6 periods) + EndingUniCount for period 6}) / (\text{Periods} + 1)$$

In this example, the “Periods + 1 figure is 7. This provides an average on-hand inventory for the 6 period interval which is used in the next calculation.

The ④ Inventory Turnover (UNITS) is a measure of the number of times the 6 period average inventory is sold over the 6 period time interval. It is an important indicator of how well a retailer (or a specific item, location, category, etc.) is performing. A low value may indicate that there is too much inventory. A high number may indicate insufficient inventory. The “right” value depends on the item type, retailer merchandising business rules, market demand and a host of other factors.

The formula for Inventory Turnover (UNITS) is

$$\text{Inventory Turnover} = \text{Sum(SalesQuantity for 6 periods)} / (\text{③ Average Inventory Units})$$

It is possible for inventory on hand balance to go to zero which is a stock-out condition. Inventory on hand balances should not go negative in calculating inventory turnover. Instead additional attributes to support back orders should be added. In this model (which as noted earlier is a work in progress) back order attributes are not represented. Future versions (that incorporate ODM support for customer orders) will incorporate backorders.

A useful alternative measure of inventory is weeks supply on-hand. It is a measure of the number of weeks’ worth of inventory a retailer has to cover average weekly sales over a period of time. In Figure 13 the weeks are replaced by periods for ease of presentation. The ⑤ Periods of Inventory On-hand are calculated as follows:

$$\text{Periods of Inventory On-hand} = \text{EndingUnitCount for period 6} / \text{Average (SalesQuantity for periods 1- 6)}$$

ARTS KPI's and Performance Measures Narrative Description

The “right” value will depend on supply chain reliability, fluctuations in customer demand, retailer inventory carrying capacity and other factors. The figure illustrated here provides a measure of actual periods on-hand based on historical information derived from the DWM and ODM.

By qualifying inventory unit count velocity measures by business unit retailers can compare and contrast their performance at a physical level of product movement. This is a useful way to look at business results for retail enterprises that deal with different currencies and situations where currency values fluctuate widely.

1.4.1.2 Inventory Velocity Measurement Cost by Business Unit

This next set of performance measures extends the model shown in Figure 13 by incorporating inventory costs. The basic analytic method is the same, but the inclusion of cost changes the physical frame of reference of retail units to a financial frame of reference. Both perspectives are very critical and complement one another.

The unit costs used to translate the item unit counts in Figure 14 are given in the ODM and reflected in the **EndingAverageWeightedCost** for a period. Note that the **EndingAverageWeightedCost** for a period p is the **BeginningAverageWeightedUnitCost** for period p + 1. The ODM supplies this figure to the DWM as a “given value”.

The method of analysis for analyzing inventory velocity based on cost is the same as that used to measure retail UNIT velocity (as illustrated in Figure 13).

Figure 14 translates the analysis of inventory velocity into cost. The light green column headings indicate attributes taken directly from the Inventory Fact entity. The other attributes are simply extended costs (units multiplied by unit cost).

Figure 14: Inventory Cost Velocity Analysis Based on Cost for A Business Unit

		In Flows (from Inventory Fact)			Out Flows (from InventoryFact and Sale/ReturnFact					
ReportingPer iodID	BeginningCost	Cumulative eceivedCost Amount ¹	Transferred In Cost	Return Cost	Return to Vendor Cost	Transfer Out Cost	Cost of Goods Sold	Ending Cost	Average Inventory Cost	Inventory Turnover at Cost
1	500.00	500.00	50.00	25.00	25.00	25.00	750.00	275.00	387.50	1.9
2	275.00	500.00	-	-	25.00	-	650.00	100.00	187.50	3.5
3	100.00	720.00	-	-	-	-	638.86	181.14	140.57	4.5
4	181.14	720.00	-	9.76	9.76	-	610.00	291.14	236.14	2.6
5	291.14	720.00	-	4.86	-	-	486.15	529.85	410.50	1.2
6	529.85	500.00	-	9.76	-	-	463.60	576.01	552.93	0.8
		3,660.00	50.00	49.38	59.76	25.00	3,598.61			
<div><div>Average Inventory (COST) for 6 periods Inventory Turnover (COST) for 6 periods Periods of inventory on-hand in 6th period</div><div>\$ 350.45 10.27 times 0.96</div><div>Additive Facts</div></div>										

NOTES 1. CumulativeReceivedCostAmount is the cumulative amount **WITHIN** a period.

ARTS KPI's and Performance Measures Narrative Description

The different costs labeled with ① are derived by multiplying the unit counts in the same column positions as Figure 13 by the `EndingAverageWeightedCost` read from the `InventoryFact` entity. The `EndingAverageWeightedCost` value is a calculated value in the ODM and is a moving average calculation based on item receipts. The Ending Cost for a `ReportingPeriodID` ② is calculated as:

$$\text{Ending Cost} = (\text{Beginning Cost} + \text{CumulativeReceivedCostAmount} + \text{Transferred in Cost} + \text{Return Cost}) - (\text{Return to Vendor Cost} + \text{Transfer Out Cost} + \text{Cost of Goods Sold})$$

This calculation is the same used for retail units except the values are expressed as monetary costs. The Average Inventory Cost ③ for a reporting period is calculated as:

$$\text{Average Inventory Cost} = (\text{Beginning Cost} + \text{Ending Cost}) / 2$$

The Inventory Turnover at Cost ④ for a reporting period is calculated as:

$$\text{Inventory Turnover at Cost} = \text{Cost of Goods Sold} / \text{Average Inventory Cost}$$

Inventory Turnover is the number of times average inventory is sold for a reporting period. It is the velocity measure that indicates to a retailer how fast merchandise is moving through their inventory. It is a critical measure because inventory turnover (along with gross margin) is the basis for retail profitability. As discussed earlier, these calculations can be applied to different aggregations of items and locations using selection and summarization criteria applied to the dimension entity types in the DWM.

The Average Inventory Cost for 6 Periods ⑤ is calculated as:

$$\text{Average Inventory Cost for 6 Periods} = (\text{Sum}(\text{Beginning Cost for 6 periods}) + \text{Ending Cost for period 6}) / (\text{Periods} + 1)$$

The Inventory Turnover (COST) for 6 Periods ⑥ is calculated as:

$$\text{Inventory Turnover(COST) for 6 Periods} = \text{Sum}(\text{Cost of Goods Sold for 6 periods}) / \text{Average Inventory Cost for 6 Periods}$$

This figure reflects the number of times the average inventory cost is sold during the six reporting periods. It is an aggregate measure that looks at a block of contiguous reporting periods.

Periods of Inventory on hand in 6th period ⑦ measures, in cost, how many periods of inventory are on-hand to meet demand. It is calculated as:

$$\text{Periods of Inventory on-hand in 6}^{\text{th}} \text{ period} = \text{Ending Cost for period 6} / \text{Average (Cost of Goods Sold for periods 1-6)}$$

This figure may be used to analyze inventory carrying costs over time so that a retailer can examine service level (based on retail units) and cost (based on cost).

The analytic methods presented in Figure 14 can be applied to the retail valuation of inventory. The methodology is similar except for the determination of retail unit price. The derivation of a retail unit price over time is complicated by the application of permanent and point of sale (temporary)

ARTS KPI's and Performance Measures Narrative Description

markdowns. For decision making about inventory velocity, service levels and similar issues, the unit and cost analysis are more useful to managing inventory levels and cost.

Sample Measure 27: Business Unit Inventory Unit and Cost Velocity for One Reporting Period

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Unit and Cost Velocity for ONE or more reporting periods (sample measure 14)
Business Definition & Description	
Goal	Fine tune store sales plans based in part on historical inventory velocity
Question	What is the inventory rate of movement through each business unit for a reporting period?
Description	Composite measure (three results) presenting average on hand count and cost and inventory turnover in units and cost
Subject	Business Unit
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Inventory Movement which is reflected in the InventoryFact (DW3_FACT_INVENTORY) table.
Dimensions	Business Unit Reporting Period Note: Item as used here provides a direct link from the InventoryFact table to the ItemDimension table. The query for this measure can be extended to access the MerchandiseHierarchyDimension to aggregate data to a merchandise category. Business unit likewise provides a direct link from the InventoryFact table to the BusinessUnitDimension table. This query can be extended to access the BusinessUnitGroupDimension table to aggregate data to business unit group levels. In this specific sample we are limiting selves to Item and BusinessUnit detailed level to focus on the derivation of the measures.
Derivation/Formula	Refer to the earlier narrative – it explains exactly how the measures are derived.
Output/Result	This measure yields three inventory velocity result values: Inventory Turnover Average Inventory Cost for 6 periods Inventory Turnover FREQUENCY COUNT of turnover occurrences for 6 periods Periods of Inventory On Hand PERIOD COUNT
Link to Technical Specification	#BusinessUnitInvtyUnitCostVelocity

Sample Measure 27 presents a single reporting period view for calculating inventory velocity. Sample Measure 28 extends that single reporting period across multiple reporting periods and summarizes the view defined in Sample Measure 27 to a business unit level.

Sample Measure 28: Business Unit Inventory Velocity Over Multiple Periods

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Velocity Over MULTIPLE Reporting Periods
Business Definition & Description	
Goal	Fine tune store sales plans based in part on historical inventory velocity
Question	What is the inventory rate of movement through each business unit for a contiguous set of reporting periods?
Description	This query builds on Sample Measure 27. In this query we sum inventory movements into reporting period sets and recalculate the non-additive average inventory and inventory turnover measures based on multiple reporting periods.
Subject	Business Unit
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Sales
Dimensions	Business Unit Reporting Period
Derivation/Formula	This performance measure uses the formulas defined in the narrative in detail
Output/Result	Business unit inventory summaries for a contiguous block of reporting periods The summaries include unit movement and costs

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Velocity Over MULTIPLE Reporting Periods
Link to Technical Specification	#BusUnInvtyVelocityMultRptPer

1.4.1.3 Inventory Service Level

Inventory service level represents the expected probability of not hitting a stock-out condition. It is expressed as a percentage of inventory count required to compute the safety stock level. Inventory service level reflects the need to balance the cost of carrying inventory with the opportunity cost of stock-out conditions.

Inventory velocity measures help retailers understand inventory movement and, indirectly service level. This next set of measures provides a more direct measure of service level.

1.4.1.3.1 ACTIVE INVENTORY OUT OF STOCK PERCENT BY PERIOD

Active inventory out of stock percent measures the portion of a retailer's items that encounter an out of stock condition during a reporting period. Out of stock conditions represent lost sales opportunities and can cause customers to shop at a competitor who has the items they want in stock.

Active inventory out of stock for a reporting period = $\text{Count}(\text{ItemID with EndingUnitCount} \leq 0) / \text{Count}(\text{ItemID}) * 100$

This formula makes several assumptions. First all items referenced in the **InventoryFact** entity are "active" items. Second the stock out condition is signified by a reporting period **EndUnitCount** that is a non-positive number. Third that reporting period refers to a business day. This provides a daily exception snapshot of where stock outs are occurring in a retailer's inventory.

Sample Measure 29: Reporting Period Out of Stock Percent of Items Carried By Business Unit

Sample Performance Measure Specification	
Measure Name:	Reporting Period Out of Stock Percent of Items Carried By Business Unit (sample measure 16)
Business Definition & Description	
Goal	Eliminate out of stock conditions for all business units
Question	Which stores are experiencing out of stock conditions and for what portion of their items for a reporting period?
Description	Percentage all items carried by a store that are out of stock at the end of a reporting period.
Subject	Business Unit
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Inventory Ending Unit Count which is reflected in the InventoryFact (DW3_FACT_INVENTORY) table.
Dimensions	<div>Item Business Unit Reporting Period</div> <p>Note: Item as used here provides a direct link from the InventoryFact table to the ItemDimension table. The query for this measure can be extended to access the MerchandiseHierarchyDimension to aggregate data to a merchandise category.</p> <p>Business unit likewise provides a direct link from the InventoryFact table to the BusinessUnitDimension table. This query can be extended to access the BusinessUnitGroupDimension table to aggregate data to business unit group levels.</p> <p>In this specific sample we are limiting selves to Item and BusinessUnit detailed level to focus on the derivation of the measures.</p>
Derivation/Formula	Active inventory out of stock for a reporting period = $\text{Count}(\text{ItemID with EndingUnitCount} \leq 0) / \text{Count}(\text{ItemID}) * 100$ for a business unit, for a reporting period

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Reporting Period Out of Stock Percent of Items Carried By Business Unit (sample measure 16)
Output/Result	PERCENTAGE of items (distinct SKU's) This is an aggregate measure for the BUSINESS UNIT reporting period. Item is used as a dimension in the calculation but not in the final result.
Link to Technical Specification	#ReportingPerOutOfStockPctItemsByBusUn

1.4.1.3.2 ITEM OUT OF STOCK PERIOD COUNT

The Item Out of Stock Period Count is a variation of the stock out percentage measure. The Item Out of Stock Period Count tells retailer how many reporting periods (business days) an item out of stock condition persists. This measure is by **ItemID** and by **BusinessUnit - InventoryLocation**. The measure may be aggregated to item summary levels and business units as COUNTS. This reflects the notion that we are counting out of reporting period inventory states, not item quantities or costs.

Item Out of Stock Period Count = Count (ReportingPeriodID where Item EndUnitCount <=0) By ItemID, BusinessUnit and InventoryLocation

This measure is a non-additive fact (see section 2.1.4.3 Non-additive Facts). This measure counts the number of days the **EndUnitCount** for an item at a business unit inventory location is zero or less.

Aggregating this count measure should be done with care. *The day count is only useful within the context of a specific item at a specific location.* Summing and reporting the information to a business unit group level will hide important exception information. This same “hiding” problem can occur when summarizing individual items to a hierarchy level.

Sample Measure 30: Item Out of Stock Period Count

Sample Performance Measure Specification	
Measure Name:	Item Out of Stock Period Count (sample measure 17)
Business Definition & Description	
Goal	Eliminate out of stock conditions for all business units
Question	By item (SKU) what is the duration of time that it is in an out of stock condition for each store?
Description	This measure tells the retailer how long they are out of stock for an item at a store.
Subject	Business Unit
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Inventory Ending Unit Count which is reflected in the InventoryFact (DW3_FACT_INVENTORY) table.
Dimensions	Item Business Unit Reporting Period
Derivation/Formula	Item Out of Stock Period Count = Count (ReportingPeriodID where Item EndUnitCount <=0) By ItemID, BusinessUnit and InventoryLocation
Output/Result	REPORTING PERIOD count
Link to Technical Specification	#OutOfStockPeriodCount

1.4.1.3.3 MEASUREMENTS OF INVENTORY FRESHNESS

Inventory freshness measures indicate how recently merchandise has been received and put into salable condition. For fashion items (or any item that is not replenished) this is an important measure of how much of their stock is new. New stock tends to sell at a higher gross margin than older stock. For non-

ARTS KPI's and Performance Measures Narrative Description

fashion merchandise that is replenished, receiving lead time is important to avoiding stock out conditions.

Days Since First Received = Julian(Today's Date) – Julian(FirstReceiptDate)

Days Since Last Received = Julian(Today's Date) – Julian(LastReceiptDate)

Today's date is read from the system date. The **FirstReceiptDate** and **LastReceiptDate** come directly from the **InventoryFact** entity. The Julian function is a placeholder to transform the dates so date arithmetic can be performed. Most RDBM's have functions that handle date arithmetic.

Both of these measures are typically supplemented by order and in transit day counts to provide a broader picture of inventory acquisition lead times. These supplemental measures will be addressed in future versions of the DWM.

Sample Measure 31: Inventory Freshness Example

Sample Performance Measure Specification	
Measure Name:	Inventory Freshness (sample measure 18)
Business Definition & Description	
Goal	Identify and eliminate losses attributable to out of date, stale merchandise that has to be given away or destroyed.
Question	How fresh is the merchandise in each store, by item?
Description	Freshness is a count of days since inventory is first received AND a count of days since inventory is last received.
Subject	Business Unit
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Inventory First Receipt and Last Receipt dates which are reflected in the InventoryFact (DW3_FACT_INVENTORY) table.
Dimensions	Business Unit Item
Derivation/Formula	Days Since Last Received = Julian(Today's Date) – Julian(LastReceiptDate) If there is no last receipt date (i.e. the item hasn't been restocked) then use Days Since First Received = Julian(Today's Date) – Julian(FirstReceiptDate)
Output/Result	Composite measure: Day count and freshness "rating" (see query)
Link to Technical Specification	#InventoryFreshness

1.4.2 Item

Item related performance measures may be derived using the same basic method discussed for Business Unit. The change is in the view each measure takes of the business. For items the focus is individual SKUs and on categories of SKU's. The technical implementation of item queries uses a different set of dimensions (expressed as group by clauses in SQL) from Business Unit.

The ARTS Data Warehouse Model Release 3 entities and attributes support a wide range of item centered performance measures.

Future releases of the ARTS Data Warehouse Model will add item-specific performance measures related to product mix, price elasticity, brand substitution and the like. The current phase of the ARTS Data Warehouse Model Release 3 initiative is concentrated on customer performance measures.

ARTS KPI's and Performance Measures Narrative Description

Accordingly this section will be expanded in future phases. As shown in the next section, there are many performance measures, like Gross Margin Return on Investment that apply to items as well as to business units and other dimensional entities.

1.4.3 Cross Dimension Inventory Performance Measures

There are a range of performance measures that can be qualified by more than a single dimension (e.g. group by business unit, by item, by supplier, etc.). One very widely used measure is Gross Margin Return on Investment (GMROI). It is a useful measure for evaluating business unit performance, item and merchandise category performance, supplier item performance, etc.

1.4.3.1 Gross Margin Return on Investment By Item

The measurements discussed up to this point have considered selling volume (in units and monetary terms) and inventory velocity. In this section we will address gross margin and related measures of the difference between selling price and cost of merchandise. Also, the inventory performance measures discussed in Figure 13 and Figure 14 presented unit counts and costs. They did not take into account the retail value of inventory.

All merchandise is assigned a retail price at the time it is purchased. This retail price is the original retail because it is assigned when an item is first brought in for sale. The difference between the original retail price and the cost of an item is its gross margin. Gross margin is basis for retailer profitability. Retailer profitability is managed by designing a business strategy that combines sales volume (units sold) and gross margin (the difference between unit sales price and unit cost).

Gross margin is the difference between gross sales less returns and the cost of goods sold for a given period. For financial reporting purposes gross margin is reported at the enterprise level. For internal merchandise analysis gross margin can be reported at more detailed levels.

Gross margin when combined with the inventory movement measures discussed earlier introduces a key retail merchandising performance measure – gross margin return on investment. Gross margin return on investment (GMROI) represents a useful combination of gross margin and inventory turns that measures a retailer's merchandising efficiency. The formulas for calculating gross margin return on investment (GMROI) for a 12 month reporting period are:

$$GMROI = \frac{\text{Gross Margin}}{\text{Net Sales}} \times \frac{\text{Net Sales}}{\text{Average Inventory at Cost}}$$

$$\text{Gross Margin} = (\text{Gross Sales} - \text{Returns}) - \text{Cost of Goods Sold}$$

$$\text{Average Inventory at Cost} = \frac{\text{Beginning Inventory} + \sum \text{Period End Inventory Value}}{13}$$

GMROI is one of several key merchandise performance metrics retailers use to measure profitability. It tells the retailer how many times over a year they get their stock investment returned with a given gross

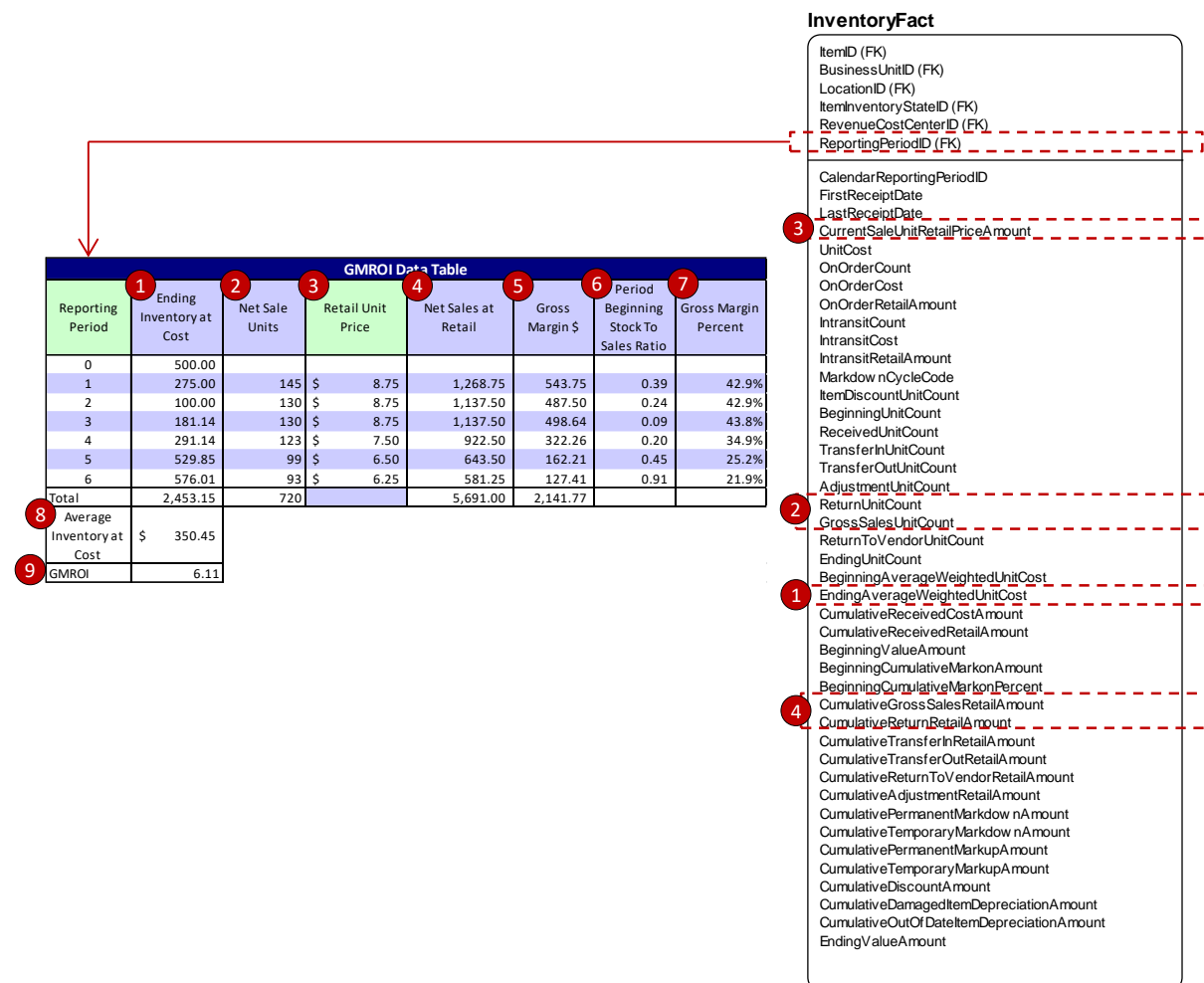
ARTS KPI's and Performance Measures Narrative Description

margin. It is a good way to compare and contrast different mixes of gross margin and volume across merchandise categories, retail selling locations, market regions, etc.

GMROI can be applied at the enterprise level using balance sheet and income statement figures or it can be scaled down to the individual stock keeping unit. Typically retailers use GMROI to analyze performance at some intermediate level (e.g. at the department or class level). The data warehouse structure provides a flexible mechanism to apply GMROI to different levels of merchandise granularity. This allows retailers to compare and contrast merchandise performance at different levels and use GMROI to fine tune their mix of high margin low turnover and low margin high turnover products.

Figure 15 illustrates the calculation of GMROI for 6 reporting periods (months in our example). It builds on the example presented in Figure 14. It shows where the variables used in calculating GMROI originate in the **InventoryFact** table.

Figure 15: GMROI Example



The 6 period time frame used in Figure 14 Inventory Cost Velocity Analysis Based on Cost is used in this example. This example reflects an Item-level analysis. Ending inventory at cost ① is taken from the

ARTS KPI's and Performance Measures Narrative Description

EndingAverageWeightedUnitCost attribute of the **InventoryFact** entity type. Net Unit Sales **2** is the difference between the **GrossSalesUnitCount** and the **ReturnUnitCount** both from the **InventoryFact** entity type. Retail Unit Price **3** is copied from the **CurrentSaleUnitRetailPrice** attribute of the **InventoryFact** table. The Net Sales at Retail **4** is the difference between the **CumulativeGrossSalesRetailAmount** and the **CumulativeReturnRetailAmount** for the period both provided in the **InventoryFact** table.

Gross Margin **5** is the difference between Net Sales at Retail and the Cost of Goods Sold calculated in Figure 14. Period Beginning Stock to Sales Ratio **6** is calculated by dividing prior period Ending Inventory at Cost by the current period Net Sales at Retail. The Sales to Stock Ratio tells how much stock a retailer has on hand to support period sales for a given period. Gross Margin **7** percent is the period's Gross Margin divided by Net Sales at Retail. The Average Inventory at Cost **8** is the sum of each period's Ending Inventory at Cost plus the beginning period inventory (Reporting Period 0) divided by the period count plus 1 (in our example 7 periods). The GMROI **9** is calculated by dividing the Gross Margin sum for the 6 periods by Average Inventory at Cost. The GMROI value of 6.11 indicates that this item is a fast moving (which is good) but at risk for stock outs (which is bad). GMROI will vary by retailer as well as from item to item. GMROI and all of the performance measures discussed here need to be calibrated to the retailer's business strategy to be used as key performance indicators.

Sample Measure 32: GMROI Performance Measure for Item, Business Unit for Contiguous Reporting Periods

Sample Performance Measure Specification	
Measure Name:	Gross Margin Return on Investment for Item and Business Unit for a Contiguous Block of Reporting Periods (sample measure 19)
Business Definition & Description	
Goal	Evaluate the relative mix of products across our business units and assess whether to keep or drop the lowest 20%
Question	What is the current GMROI for our actively sold items across all of our stores?
Description	Gross Margin Return on Investment by business unit, item for 6 reporting periods
Subject	Business Unit – Item
Spreadsheet Ref	Not in spreadsheet
Observable Facts/Phenomena	Sales
Dimensions	Business Unit Item Reporting Period
Derivation/Formula	See the formulas presented in the narrative.
Output/Result	GMROI value for each business unit item for 6 (in this example) reporting periods
Link to Technical Specification	#GrossMarginRtnOnInvest

1.4.3.2 Retail Price Management

Retail pricing measures identify, define and classify the differences between the price customers pay at the point of sale and the cost of goods sold.

Pricing decisions are complicated and vary by retailer. Pricing strategy is driven by a number of factors including:

- Supply and demand for a product;
- Merchandise type (fad vs. fashion vs. staple)

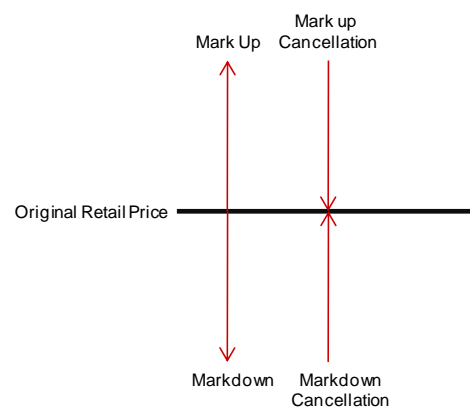
ARTS KPI's and Performance Measures Narrative Description

- Retailer assortment strategy (breadth vs. depth)
- Brand pricing power;
- Merchandise age;
- Vendor sponsored promotions;
- Seasonality of merchandise; and
- Competition;

As already discussed, retail profitability is a function of the quantity of merchandise sold and gross margin. In this section we will discuss some basic profitability measures that address retail price and cost from a retail accounting method perspective.

Retailers adjust retail prices through four price change actions as illustrated in Figure 16. All price changes are based from the original retail price.

Figure 16: Price Change Actions



In practice, retailers rarely use mark ups except to correct an erroneous original retail price or to provide compare at pricing. Like mark ups, mark up cancellations are rarely used except to correct mistakes or to reduce compare at pricing to the original price. Price changes may be taken permanently which causes a revaluation of inventory or at the point of sale which realizes the changed value only for items sold. Price changes taken at the point of sale are temporary in nature – that is they have a start and ending time. In most cases, a temporary point of sale price change is used to promote the sale of merchandise. In the retail method of accounting, mark ups, mark downs (and their cancellations) have to be tracked. The `ItemFact` table has attributes for temporary and permanent mark ups and markdowns.

ARTS KPI's and Performance Measures Narrative Description

Figure 17: ItemFact Temporary and Permanent Markup and Markdown Attributes

InventoryFact	
ItemID (FK)	
BusinessUnitID (FK)	
LocationID (FK)	
ItemInventoryStateID (FK)	
RevenueCostCenterID (FK)	
ReportingPeriodID (FK)	
CalendarReportingPeriodID	
FirstReceiptDate	
LastReceiptDate	
CurrentSaleUnitRetailPriceAmount	
UnitCost	
OnOrderCount	
OnOrderCost	
OnOrderRetailAmount	
InTransitCount	
InTransitCost	
InTransitRetailAmount	
MarkdownCycleCode	
ItemDiscountUnitCount	
BeginningUnitCount	
ReceivedUnitCount	
TransferInUnitCount	
TransferOutUnitCount	
AdjustmentUnitCount	
ReturnUnitCount	
GrossSalesUnitCount	
ReturnToVendorUnitCount	
EndingUnitCount	
BeginningAverageWeightedUnitCost	
EndingAverageWeightedUnitCost	
CumulativeReceivedCostAmount	
CumulativeReceivedRetailAmount	
BeginningValueAmount	
BeginningCumulativeMarkdownAmount	
BeginningCumulativeMarkupPercent	
CumulativeGrossSalesRetailAmount	
CumulativeReturnRetailAmount	
CumulativeTransferInRetailAmount	
CumulativeTransferOutRetailAmount	
CumulativeReturnToVendorRetailAmount	
CumulativeAdjustedRetailAmount	
CumulativePermanentMarkdownAmount	
CumulativeTemporaryMarkdownAmount	
CumulativePermanentMarkupAmount	
CumulativeTemporaryMarkupAmount	
CumulativeDiscountAmount	
CumulativeDamagedItemDepreciationAmount	
CumulativeOutOfDateItemDepreciationAmount	
EndingValueAmount	

Price Change Actions for a Reporting Period

Markdowns, because they change retail price directly impact a retailer's gross margin. Also, they need to be reflected in the derivation of the cost of goods sold for retailers using the retail method of accounting.

1.4.3.2.1 GROSS MARGIN PERCENT

Gross Margin is the difference between the retail price and cost of an item (or aggregation of items) at a particular point in time. Gross margin percent is the portion of total retail price over the cost multiplied by 100.

1.4.3.2.2 INITIAL MARKUP

The initial markup for an item or aggregation of items is the excess of the original retail value for the merchandise over the related cost for that merchandise. The initial markup percent is the excess divided by retail price.

For example Item A has an initial retail of \$49.99. It costs \$25. The initial markup is \$24.99. The initial markup percent is 99%.

The initial markup for an item is set when the item is first created and assigned a retail price.

1.4.3.2.3 MARKUP

Markup is the difference between the original retail plus any mark ups and the cost of merchandise. Markup may be applied to individual items or to classes of items.

ARTS KPI's and Performance Measures Narrative Description

An item with an initial retail of \$49.99, a subsequent mark up of \$3.00 and a cost of \$25 will have a markup of \$27.99. Unlike the initial markup, markup value may vary over time.

1.4.3.2.4 CUMULATIVE MARKUP

Cumulative markup for a period represents purchases at retail plus period beginning inventory plus mark ups minus purchases at cost and beginning inventory at cost. Cumulative markup is illustrated as follows:

Table 4: Cumulative Markup Example

Cumulative Markon Example	
Purchases At Retail	\$ 350.00
Beginnning Inventory at Retail	225.00
Markups (during period)	10.00
Purchases at Cost	200.00
Beginning Inventory at Cost	100.00
Cumulative Markup	\$ 285.00
Cumulative Markup Pct	49%

1.4.3.2.5 CUMULATIVE MARKUP PERCENTAGE

Cumulative Markup percentage for a period is the cumulative markup value divided by the sum of purchases at retail for the period plus the beginning inventory at retail plus mark ups. The cumulative markup percent is multiplied by the period ending inventory value at retail to derive the estimated cost of inventory for the retail method of accounting.

1.4.3.2.6 NET MARKUP

Net markup is cumulative markup less markdowns. Net markup is similar to gross margin, but more limited because it does not reflect purchase discounts and other cost adjustments.

1.4.3.2.7 MAINTAINED MARKUP

Over the course of a longer period of time, merchandise prices are changed. Markdowns, sales discounts and shrinkage all result in changes to the retail valuation of retail inventory between the assignment of the initial markup and the last reporting period. The original retail price is not expected to be the “lifetime” value of merchandise. It is however, management’s educated guess at the margin required to pay for inventory and operations and generate a reasonable profit. Maintained markup for a period is calculated using the following formula.

$$\text{Maintained Markup} = (\text{Original Retail} - \text{Markdowns}) - \text{Cost of Goods Sold}$$

1.4.3.2.8 POINT OF SALE MARKDOWNS

Point of sale markdowns represent temporary or promotional reductions in retail price (retail valuation of inventory) when an item is sold. Only items sold during the promotional period are marked down. Point of sale markdowns are an important tool to help manage the balance between item movement and gross margin.

ARTS KPI's and Performance Measures Narrative Description

1.4.3.2.9 INVENTORY SHRINK

Inventory shrink is the difference between the inventory on-hand value shown in the retailer's stock record and the actual inventory value based on a physical count. Inventory shrink and stock overages (excess inventory) may be caused by bookkeeping errors. Inventory shrink may also be caused by employee theft, shoplifting, damage to merchandise, etc. Shrinkage is not reflected in markup, cumulative markup, or the cost multiplier used to derive inventory cost in the retail method.

1.4.3.2.10 RETAIL METHOD FOR INVENTORY ACCOUNTING

Figure 18 provides a basic model of how the retail method of inventory accounting works

Figure 18: Conceptual Model of Retail Method of Inventory Accounting

Department or Class Level Inventory Valuation Using Retail Method			
Line	Item	Retail (RTL)	Cost (CST)
1	Beginning Inventory	\$ 39,000	\$ 22,000
2	Purchases	60,000	35,000
3	Total Inventory Available for Sale (line 1 RTL + line 2 RTL)	99,000	57,000
4	Markups	1,500	-
5	Markup Cancellations	500	-
6	Net Mark up (line 4 RTL - line 5 RTL)	1,000	-
1	7 Total Inventory Available for Sale with Net Markup (line 3 RTL + line 6 RTL)	100,000	57,000
2	8 Cost Complement (line 3 CST ÷ line 7 RTL)		0.570
3	9 Markdowns	2,400	-
	10 Markdown Cancellations	400	-
	11 Net Markdowns (line 9 RTL - line 10 RTL)	2,000	-
4	12 Sales	88,000	
	13 Ending Inventory (line 7 RTL - line 11 RTL -line 12 RTL)	\$ 10,000	\$ 5,700
	14 Ending Inventory Cost (line 12 RTL * line 8 Cost Complement)		

The retail method captures actual inventory cost of a period beginning inventory plus purchases for the period. It also captures the original retail value of beginning inventory and purchases. Next it adds markups, subtracts markup cancellations and arrives at a total inventory available for sale ①. The Cost Complement ② is the calculated by dividing the Cost (CST) Total inventory Available for Sale divided by the Retail (RTL) Total Inventory Available for Sale. The Cost Complement is the percentage of the retail inventory value used to derive the ending inventory cost.

Markdowns and Markdown Cancellations are netted (Net Markdowns) and subtracted from the retail value of the inventory ③. Because they change the retail valuation, but not the original purchase value at cost, markdowns and markdown cancellations are not used in calculating the Cost Complement. Markdowns and markdown cancellations occur after merchandise has been purchased so the markup for calculating the cost complement is locked in before markdown actions are taken.

ARTS KPI's and Performance Measures Narrative Description

Sales ④ reflect the major consumption of inventory. The Sales plus Net Markdowns are subtracted from the Total Inventory Available for Sale With Net Markup to yield the Ending Inventory retail value. The Ending Inventory at retail (RTL) is multiplied by the Cost Complement to arrive at the cost of the ending inventory.

Figure 19 expands the example presented in Figure 18 by adding provisions for shrink and sales discounts. Also, it illustrates how cumulative mark on and aggregate gross margin for a department, class or other aggregation of items is calculated.

Figure 19: More Detailed Retail Method of Inventory Model

Department or Class Level Inventory Valuation Using Retail Method			
Line	Item	Retail (RTL)	Cost (CST)
1	Beginning Inventory	\$ 39,000	\$ 22,000
2	Purchases	60,000	35,000
3	Total Inventory Available for Sale (line 1 RTL + line 2 RTL)	99,000	57,000
4	Markups	1,500	-
5	Markup Cancellations	500	-
6	Net Mark up (line 4 RTL - line 5 RTL)	1,000	-
7	Total Inventory Available for Sale with Net Markup (line 3 RTL + line 6 RTL)	100,000	57,000
8	Cost Complement (line 3 CST ÷ line 7 RTL)		0.570
9	Markdowns	2,400	-
10	Markdown Cancellations	400	-
11	Net Markdowns (line 9 RTL - line 10 RTL)	2,000	-
12	Net Sales	88,000	
13	Sales Discounts	2,200	
14	Shrinkage (estimated or actual)	4,500	
15	Total Inventory Consumption	96,700	
16	Ending Inventory (line 7 RTL - line 15 RTL)	\$ 3,300	\$ 1,881
17	Ending Inventory Cost (line 16 RTL * line 8 CST)		
Markup Calculations			
18	Cumulative Markup (line 7 RTL - line 7 CST)	43,000	
19	Cumulative Markup Percent (line 18 / line 7 RTL)	43%	
20	Maintained Markup (line 7 RTL - line 11 RTL - line 7 CST)	41,000	
21	Maintained Markup Percent (line 20 / line 7 RTL)	41%	
Retail Method Aggregate Gross Margin			
22	Cumulative Markup Percent (line 18)		43.0%
23	Markdown Percent (line 11 / line 7)	2.0%	
24	Sales Discount Percent (line 13 / line 7)	2.2%	
25	Shrinkage Percent (line 14 / line 7)	4.5%	
26	Sum of Retail Reductions (line 23 + line 24 + line 25)	8.7%	
27	Retail Reduction Summary reduced to cost (line 26 * line 8 CST)		5.0%
28	Aggregate Gross Margin for Department or Class (line 22 - line 27)		38.0%

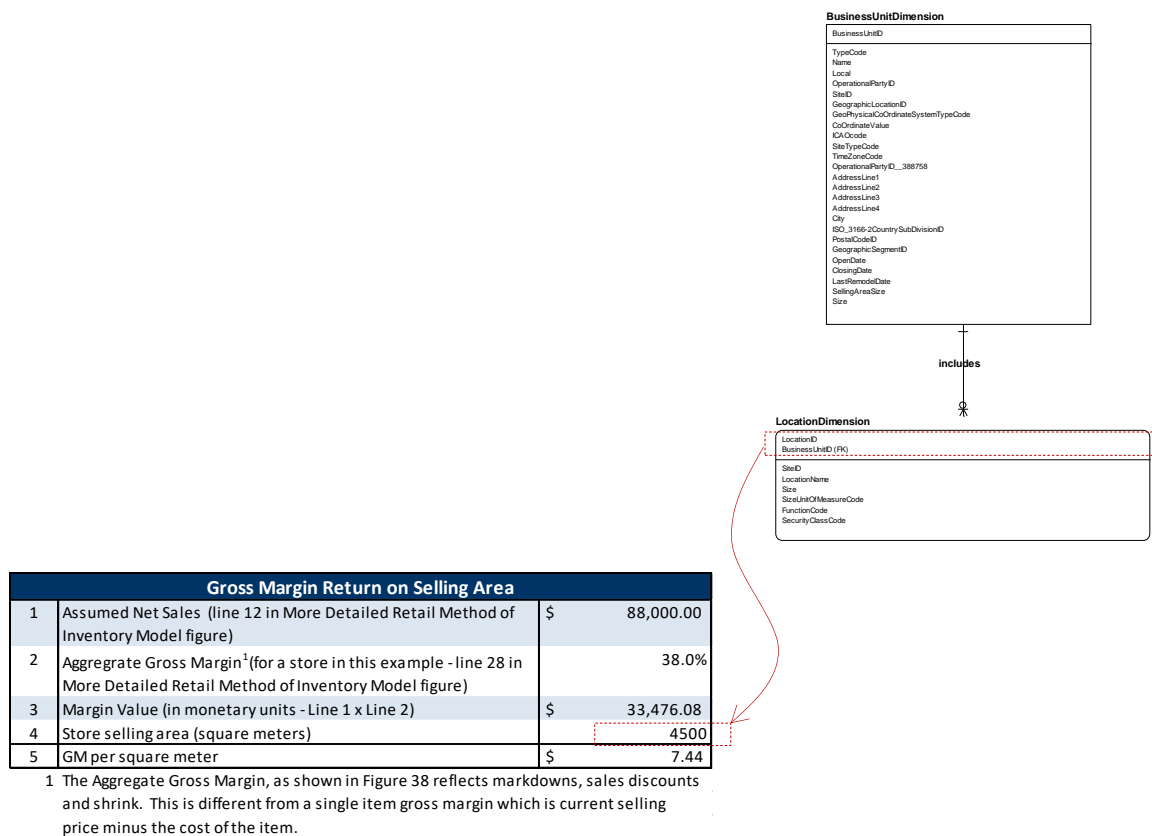
ARTS KPI's and Performance Measures Narrative Description

The measurements discussed to this point take into account item movement (both in terms of purchases and sales) item retail value and item cost. There are other measures that apply to how well a retailer is using their selling space and labor

1.4.3.2.11 GROSS MARGIN RETURN ON SELLING AREA (GMROS)

Store-based retailers have a large fixed cost in owned and leased sales space. One measure of retail business efficiency looks at gross margin return based on square footage or square meters of selling area. Figure 20 presents a sample model.

Figure 20: Sample Gross Margin on Selling Area Model



The data used to derive GMROS comes from calculated data in lines 12 and 18 shown in Figure 19. The Store selling area (line 4 in Figure 20) comes from the **LocationDimension** table's **LocationID** column. The figure as illustrated is for the selling area location in a store. The GMROS is a very useful way to evaluate different retail locations operating efficiency for a period. Its key advantage is that it associates gross margin to selling area which is a major fixed cost for retailers. Because it is looking at gross margin and not sales alone it is a more useful way to compare and contrast store performance. This sample is a good illustration of how performance measures are often derived from other performance measures.

ARTS KPI's and Performance Measures Narrative Description

2 Detailed Technical Implementation Notes and Sample SQL

This section of the ARTS Data Warehouse Key Performance Measures document provides a more technical presentation for each performance measure discussed in section 1. The technical presentation includes sample SQL code. *This section is designed to be linked to from the Business narrative in section 1. Backward links are provided at the end of each Technical Sample Specification.*

Technical Sample Specification 1: Customer Lifetime Value

Sample Performance Measure Technical Specification	
Measure Name:	Customer Lifetime Value based on Net Profit
Technical Implementation	
Stored Data Summary Tables	None
Fact Tables	DW3_FACT_SALE_RTN_BEHAVIOR
Dimension Tables	DW3_DIM_CT
Transformation Logic	Calculate net profit per line item and then sum all line item net profit for a each customer
SQL Code	<pre>-- Create View: VW_CT_LT_VL -- -- Preliminary model for Customer Lifetime Value - This version only sums -- retail transaction sale/return data since that is all the data available -- in the current data warehouse. Future versions will join to other fact -- tables related to operational and admin. costs as well as customer life -- cycle conversion information. -- --drop view VW_CT_LT_VL; create view VW_CT_LT_VL as with SLSRTN as (-- This subquery assembles and calculates LINE ITEM LEVEL net values to -- make the summarization mainline query simpler. This also helps in -- debugging. select ID_CT -- Customer ID ,DC_DY_BSN -- Business Day Date ,ID_TRN -- Transaction ,IC_LN_ITM -- Transaction Line Item ,MO_EXTND -- Extended actual amount ,QU_ITM_LM_RTN_SLS -- Quantity in retail selling units ,QU_UN -- Quantity in bulk units , -- Logic here handles bulk items and items sold in retail selling -- units. They have different ways handling quantity sold. The -- retail selling unit type items have to handle a "2 for" or -- "3 for" unit price that applies to sets of retail selling -- units. This carries over to the calculation of net margin , case when QU_ITM_LM_RTN_SLS is null and QU_UN > 0 then CP_INV * QU_UN -- Bulk item extended cost else (CP_INV/UN_INV_UPRQY) * QU_ITM_LM_RTN_SLS -- Retail Selling Unit ext cost end as MO_CST_INV_EXTND -- Inventory Cost , case when QU_ITM_LM_RTN_SLS is null and QU_UN > 0 then MO_EXTND - (CP_INV * QU_UN) else MO_EXTND - ((CP_INV/UN_INV_UPRQY) * QU_ITM_LM_RTN_SLS) end as NET_MRGN -- Line item net margin from DW3_FACT_SALE_RTN_BEHAVIOR where FL_CNCL = 0 -- Include only transactions that are NOT canceled AND FL_VD = 0 -- Include only transactions that are NOT voided AND FL_SPN = 0 -- Include only transactions that are NOT suspended AND FL_TRG_TRN = 0 -- Include only transactions that are NOT training transaction) -- We can append a bunch of different customer properties from DW3_DIM_CT but -- for this CLV example we'll just pull in party type and name. select SLSRTN.ID_CT -- Customer ID ,DW3_DIM_CT.ID_KY_CT -- Key Customer ID ,DW3_DIM_CT.CD_PRTY_TYP -- Party Type code (organization vs. person) ,DW3_DIM_CT.LN_PRS -- Person Last Name ,DW3_DIM_CT.FN_PRS -- Person First Name ,DW3_DIM_CT.MD_PRS -- Person Middle Name ,DW3_DIM_CT.NM_TRD -- Organization Trade Name</pre>

ARTS KPI's and Performance Measures Narrative Description

	<pre> ,case when DW3_DIM_CT.CD_PRTY_TYP = 'PERSON' then DW3_DIM_CT.FN_PRS + ' ' + DW3_DIM_CT.LN_PRS else DW3_DIM_CT.NM_TRD end as NM_CT_RPT -- Reporting name of customer ,SUM(SLSRTN.MO_EXTND) as MO_CT_LT_SLS -- Summed sales and returns based on actual retail ,SUM(SLSRTN.MO_CST_INV_EXTND) as MO_CT_LT_COGS -- Summed costs based on INVENTORY COST ,SUM(SLSRTN.NET_MRGN) as MO_CT_LT_NET-- Summed Net margin (difference between the two from SLSRTN join DW3_DIM_CT on SLSRTN.ID_CT = DW3_DIM_CT.ID_CT where DC_DY_BSN < '2013-07-01' group by SLSRTN.ID_CT ,DW3_DIM_CT.ID_KY_CT ,DW3_DIM_CT.CD_PRTY_TYP ,DW3_DIM_CT.LN_PRS ,DW3_DIM_CT.FN_PRS ,DW3_DIM_CT.MD_PRS ,NM_TRD ; ----- -- END Create View: VW_CT_LT_VL ----- </pre>
Remarks	
NOTE that initial date as cited in footnote 1 may actually be the first date data is available, not the customer's real first purchase date. So care must be exercised in using this kind of data since it's truncated.	

Link back to Business narrative: [#Table1CLV](#)

ARTS KPI's and Performance Measures Narrative Description

The Technical Sample Specification 2 is not a key performance indicator or measure. It is a sample of SQL code used to implement the customer segmentation use case summarized in Table 2.

Technical Sample Specification 2: Sample SQL Segmentation Code to Run Against ARTS DWM 3

```
-----
-- Create View: VW_SGMT_ACTVWR_SMPL                                     --
-----
-- Segmentation exploration and development sample where a retailer is --
-- evaluating which of its customers might be inclined to purchase a new --
-- private label line of sports apparel. In reviewing this sample keep in --
-- mind that it is a first version of a series used to explore customer data --
-- and define what will become one or several "activewear customer segments" --
-----
drop view VW_SGMT_ACTVWR_SMPL;
create VW_SGMT_ACTVWR_SMPL as

with CUST_SGMT_DIM AS
(
    -----
    -- Choose which customer Dimension table columns will be used to --
    -- assign each customer into a different grouping of customers. Note --
    -- this subquery is returning ALL customers with the columns selected --
    -- for this sample. This sample is about exploring to determine which --
    -- customers might be interested in our sports apparel and if so, how --
    -- we might group them to improve the targeting of our offers --
    -----
    select
        DW3_DIM_CT.ID_CT
        ,DW3_DIM_CT.CD_MRTL_STS
        ,DW3_DIM_CT.CD_ANN_INCM_RNGE
        ,DW3_DIM_CT.CD_LF_STG
        ,DW3_DIM_CT.CD_EDC_LV
        ,DW3_DIM_CT.CD_OCCPTN_TYP
        ,DW3_DIM_CT.CD_EMPLMT_STS
        ,DW3_DIM_CT.CD_LFSTYL_TYP
        ,DW3_DIM_CT.CD_PRSL_VL_TYP
        ,DW3_DIM_CT.CD_RC
        ,DW3_DIM_CT.CD_ETHNC_TYP
        ,DW3_DIM_CT.CD_ACTV_INTRST_1
        ,DW3_DIM_CT.CD_ACTV_INTRST_2
        ,DW3_DIM_CT.CD_ACTV_INTRST_3
    from
        DW3_DIM_CT
)
, ITM_ACTVWEAR_SGMT AS
(
    -----
    -- Choose additional dimensions used to further refine the customer --
    -- groupings. In this example, items that are part of the Google --
    -- Product Taxonomy "activewear" category are chosen. In this sample --
    -- we are interested in exploring customer segmentation related to --
    -- sports wear. This is also a good example of incorporating a --
    -- behavioral segmentation dimension (item) into a segment formulation --
    -- process. This query can be modified during exploration to look at --
    -- more or fewer product categories by changing the where clause --
    -- constants. The FN_REVSPLIT reorders the concatenate keys in the --
    -- dimension table which are stored from bottom to top left to right. --
    -----
    select
        ID_ITM
        ,NM_MRHC_FNC
        ,MRCHRC_ID_TREE_PTH
        ,MRHC_LVL_GP_NM_PTH
    from
        DW3_DIM_MDSE_HIER
    where
        NM_MRHC_FNC = 'GoogleProduct Taxonomy'
        and dbo.FN_REVSPLIT(MRHC_LVL_GP_NM_PTH,'|') like '%activewear%'
)
,SLSRTN as
(
    -----
    -- This subquery assembles and calculates LINE ITEM LEVEL net values --
    -- to make the summarization mainline query simpler. This also helps --
    -----

```

ARTS KPI's and Performance Measures Narrative Description

```
-- in debugging. It includes ITEM ID --
-----
select
    ID_CT -- Customer ID
    ,DC_DY_BSN -- Business Day Date
    ,ID_TRN -- Transaction
    ,IC_LN_ITM -- Transaction Line Item
    ,DW3_FACT_SALE_RTN_BEHAVIOR.ID_ITM -- Item ID
    ,MO_EXTND -- Extended actual amount
    ,QU_ITM_LM_RTN_SLS -- Quantity in retail selling
    ,QU_UN -- units
    ,QU_UN -- Quantity in bulk units
    -----
    -- Logic here handles bulk items and items sold in retail selling --
    -- units. They have different ways handling quantity sold. The --
    -- retail selling unit type items have to handle a "2 for" or --
    -- "3 for" unit price that applies to sets of retail selling --
    -- units. This carries over to the calculation of net margin --
    -----
    ,case
        when QU_ITM_LM_RTN_SLS is null and QU_UN > 0
            then CP_INV * QU_UN -- Bulk item extended cost
        else
            (CP_INV/UN_INV_UPRQY) * QU_ITM_LM_RTN_SLS -- Retail Selling Unit ext cost
        end as MO_CST_INV_EXTND -- Inventory Cost
    ,case
        when QU_ITM_LM_RTN_SLS is null and QU_UN > 0
            then MO_EXTND - (CP_INV * QU_UN)
        else
            MO_EXTND - ((CP_INV/UN_INV_UPRQY) * QU_ITM_LM_RTN_SLS)
        end as NET_MRGN -- Line item net margin
    ,case
        when ITM_ACTVWEAR_SGMT.NM_MRHC_FNC is NOT NULL then 1
        else 0
        end as ACTIVEWEAR_INDICATOR
from
    DW3_FACT_SALE_RTN_BEHAVIOR
join ITM_ACTVWEAR_SGMT
on DW3_FACT_SALE_RTN_BEHAVIOR.ID_ITM = ITM_ACTVWEAR_SGMT.ID_ITM

where
    FL_CNCL = 0 -- Include only transactions that are NOT canceled
    AND FL_VD = 0 -- Include only transactions that are NOT voided
    AND FL_SPN = 0 -- Include only transactions that are NOT suspended
    AND FL_TRG_TRN = 0 -- Include only transactions that are NOT training
    -- transaction
)
, AGGREG_SLS as
(
    -----
    -- In this sample the line item information is summarized to the --
    -- transaction level. Note that the ACTIVEWEAR_INDICATOR is used so --
    -- transaction item counts, net sales and net profit are calculated --
    -- for a whole order as well as for the activewear line items in the --
    -- order. --
    -----
    select
        SLSRTN.ID_CT
        ,SLSRTN.DC_DY_BSN
        ,SLSRTN.ID_TRN
        ,COUNT(IC_LN_ITM) as TR_LN_CNT -- Sale/Rtn Line Item Count
        ,SUM(ACTIVEWEAR_INDICATOR) as TR_ACTVWR_LN_CNT -- Activewear Line Item Count
        ,SUM(SLSRTN.QU_ITM_LM_RTN_SLS) as TR_QU_ITM_LM_RTN_SLS
        ,SUM(SLSRTN.MO_EXTND) as TR_MO_EXTND
        ,SUM(SLSRTN.NET_MRGN) as TR_NET_MRGN
        ,SUM(SLSRTN.QU_ITM_LM_RTN_SLS * ACTIVEWEAR_INDICATOR) as ACTVWR_QU_ITM_LM_RTN_SLS
        ,SUM(SLSRTN.MO_EXTND * ACTIVEWEAR_INDICATOR) as ACTVWR_MO_EXTND
        ,SUM(SLSRTN.NET_MRGN * ACTIVEWEAR_INDICATOR) as ACTVWR_NET_MRGN
    from
        SLSRTN
    where
        SLSRTN.DC_DY_BSN < '2013-07-01' and -- Our sample is using a period
        SLSRTN.DC_DY_BSN > '2012-12-31' -- from Jan through June 2013
    group by
        SLSRTN.ID_CT
        ,SLSRTN.DC_DY_BSN
        ,SLSRTN.ID_TRN
)
select
```

ARTS KPI's and Performance Measures Narrative Description

```
-----
-- Assemble aggregate fact data that is summarized to customer level to --
-- use as a basis for exploring potential thresholds for creating --
-- Activewear customer segments. In this sample the following summary --
-- facts are available for use in setting customer segmentation --
-- thresholds: --
-- + Customer Total Activewear Transaction Count --
-- + Percent of transactions that --
-----
AGGREG_SLS.ID_CT
-----
-- Customer transaction counts overall, for activewear and pct that have --
-- activewear line items --
-----
,COUNT(AGGREG_SLS.ID_TRN) as TOTTR_TR_CNT
,SUM(case when AGGREG_SLS.ACTVWR_NET_MRGN > 1 then 1 else 0 end) as ACTVWR_TR_CNT

,SUM(case when AGGREG_SLS.ACTVWR_NET_MRGN > 1 then 1 else 0 end) /
COUNT(AGGREG_SLS.ID_TRN) as PCT_ACTVWR_TOT_TR
-----
-- Customer total retail units purchased all items, total activewear --
-- retail units purchased and percent of total units that are active wear --
-----
,SUM(AGGREG_SLS.ACTVWR_QU_ITM_LM_RTN_SLS) as ACTVWR_QU_ITM_RTN_SLS
,case
    when SUM(AGGREG_SLS.TR_QU_ITM_LM_RTN_SLS) <> 0
    then SUM(AGGREG_SLS.ACTVWR_QU_ITM_LM_RTN_SLS)/SUM(AGGREG_SLS.TR_QU_ITM_LM_RTN_SLS)
    else 0.00
end AS PCT_QU_ACTVWR_PURCH -- Customer Activewear
-- Percent of total item count
-----
-- Customer total transaction net sales, net sales for activewear and pct --
-- of total sales for activewear. --
-----
,SUM(AGGREG_SLS.ACTVWR_MO_EXTND) -- Total Customer
-- Activewear Net Sales $
,case
    when SUM(TR_NET_MRGN) <>0 then
        SUM(AGGREG_SLS.ACTVWR_MO_EXTND) / SUM(AGGREG_SLS.TR_NET_MRGN)
    else 0.00
end AS PCT_MO_EXTND_ACTVWR -- Customer Active wear
-- percent of Net Sales $
-----
-- Append the demographic and psychographic characteristics selected --
-- earlier --
-----
,DW3_DIM_CT.CD_MRTL_STS
,DW3_DIM_CT.CD_ANN_INCM_RNGE
,DW3_DIM_CT.CD_LF_STG
,DW3_DIM_CT.CD_EDC_LV
,DW3_DIM_CT.CD_OCCPTN_TYP
,DW3_DIM_CT.CD_EMPLMT_STS
,DW3_DIM_CT.CD_LFSTYL_TYP
,DW3_DIM_CT.CD_PRS_L_VL_TYP
,DW3_DIM_CT.CD_RC
,DW3_DIM_CT.CD_ETHNC_TYP
,DW3_DIM_CT.CD_ACTV_INTRST_1
,DW3_DIM_CT.CD_ACTV_INTRST_2
,DW3_DIM_CT.CD_ACTV_INTRST_3
from
AGGREG_SLS
join DW3_DIM_CT
on AGGREG_SLS.ID_CT = DW3_DIM_CT.ID_CT
group by
AGGREG_SLS.ID_CT
,DW3_DIM_CT.CD_MRTL_STS
,DW3_DIM_CT.CD_ANN_INCM_RNGE
,DW3_DIM_CT.CD_LF_STG
,DW3_DIM_CT.CD_EDC_LV
,DW3_DIM_CT.CD_OCCPTN_TYP
,DW3_DIM_CT.CD_EMPLMT_STS
,DW3_DIM_CT.CD_LFSTYL_TYP
,DW3_DIM_CT.CD_PRS_L_VL_TYP
,DW3_DIM_CT.CD_RC
,DW3_DIM_CT.CD_ETHNC_TYP
,DW3_DIM_CT.CD_ACTV_INTRST_1
,DW3_DIM_CT.CD_ACTV_INTRST_2
,DW3_DIM_CT.CD_ACTV_INTRST_3
;
```

ARTS KPI's and Performance Measures Narrative Description

```
-- END View: VW_SGMT_ACTVWR_SMPL
```

[Link back to Table 2 #Table2](#)

The following query shows how a stored summary table is created for use in subsequent transaction-level aggregate queries and views.

Technical Sample Specification 3: Sample SQL To Create Customer Transaction Store Summary Table

```
-- Create View: VW_DW3_STRD_SMRU_CT_RP_TRN
--
-- Customer - Retail Transaction Stored Summary View
-- Summarize transaction line item count, net sales, inventory cost (COGS),
-- net margin, item quantity (retail selling units), bulk item quantity for
-- subsequent use in queries
--
-- drop view VW_DW3_STRD_SMRU_CT_RP_TRN;
create view VW_DW3_STRD_SMRU_CT_RP_TRN as
with SLSRTN as
(
    -- This subquery assembles and calculates LINE ITEM LEVEL net values to
    -- make the summarization mainline query simpler. This also helps in
    -- debugging.
    select
        ID_CT -- Customer ID
        ,DC_DY_BSN -- Business Day Date
        ,ID_TRN -- Transaction
        ,IC_LN_ITM -- Transaction Line Item
        ,MO_EXTND -- Extended actual amount
        ,QU_ITM_LM_RTN_SLS -- Quantity in retail selling units
        ,QU_UN -- Quantity in bulk units
        -- Logic here handles bulk items and items sold in retail selling
        -- units. They have different ways handling quantity sold. The
        -- retail selling unit type items have to handle a "2 for" or
        -- "3 for" unit price that applies to sets of retail selling
        -- units. This carries over to the calculation of net margin
        ,case
            when QU_ITM_LM_RTN_SLS is null and QU_UN > 0
            then CP_INV * QU_UN -- Bulk item extended cost
            else
                (CP_INV/UN_INV_UPRQY) * QU_ITM_LM_RTN_SLS -- Retail Selling Unit ext cost
            end as MO_CST_INV_EXTND -- Inventory Cost
        ,case
            when QU_ITM_LM_RTN_SLS is null and QU_UN > 0
            then MO_EXTND - (CP_INV * QU_UN)
            else
                MO_EXTND - ((CP_INV/UN_INV_UPRQY) * QU_ITM_LM_RTN_SLS)
            end as NET_MRGN -- Line item net margin
    from
        DW3_FACT_SALE_RTN_BEHAVIOR
    where
        FL_CNCL = 0 -- Include only transactions that are NOT canceled
        AND FL_VD = 0 -- Include only transactions that are NOT voided
        AND FL_SPN = 0 -- Include only transactions that are NOT suspended
        AND FL_TRG_TRN = 0 -- Include only transactions that are NOT training
        -- transaction
)
select
    ID_CT -- Customer ID
    ,DC_DY_BSN -- Business Day Date
    ,ID_TRN -- Transaction ID
    ,COUNT(IC_LN_ITM) as LN_ITM_COUNT -- Sale/Return Line Item Count
    ,SUM(MO_EXTND) as TRN_NET_SLS -- Total Net Sales
    ,SUM(MO_CST_INV_EXTND) as TRN_INVTY_CST -- Total Inventory Cost
    ,SUM(NET_MRGN) as TRN_NET_MRGN -- Trans. Net Margin
    ,SUM(QU_ITM_LM_RTN_SLS) as TRN_SL_UN_QTY -- Trans. Units Sold
    ,SUM(QU_UN) as TRN_BLK_UN_QTY -- Trans. Bulk Units Sold
```

ARTS KPI's and Performance Measures Narrative Description

```
from
  SLSRTN
group by
  ID_CT
  ,DC DY BSN
  ,ID TRN
;
-----
-- End Create VW_DW3_STRD_SMRY_CT_RP_TRN --
-----

-----
-- Create DW3_STRD_SMRY_CT_RP_TRN Table --
-----
SELECT * INTO DW3_STRD_SMRY_CT_RP_TRN
FROM VW_DW3_STRD_SMRY_CT_RP_TRN
;
-----
-- End DW3_STRD_SMRY_CT_RP_TRN Table --
-----
```

Return to business narrative link: [#SalesReturnTrxStoredSummary](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 4: RFM Sample View

```
-- Create View VW DW3 RFM BEHAVIORAL SEGMENT --
-- This sample view presents a way to segment customers based on the recency --
-- frequency and monetary value of their behavior. The data source for this --
-- query is the stored summary table DW3 STRD SMRY CT RP TRN. The view uses --
-- common table expressions to create three subqueries to handle summarizing --
-- recency, frequency and monetary value (which we are populating with --
-- average net margin). Each subquery is documented. The main query uses --
-- the NTILE function to assign the returned customer summary values to a --
-- quintile. The quintile values (1-5) represent bins along three dimensions --
-- which provide the values used to assign customers to RFM behavioral --
-- segments.
--
--drop view VW_DW3_RFM_BEHAVIORAL_SEGMENT
Create VIEW VW_DW3_RFM_BEHAVIORAL_SEGMENT as
with CT_RECENCY as
(
    -- Recency is the number of days from the cutoff date since the last --
    -- transaction was completed for the customer.
    select
        ID_CT
        ,DATEDIFF(dd,MAX(DC_DY_BSN),'2013-07-01') as RECENCY
    from
        DW3_STRD_SMRY_CT_RP_TRN
    where
        DC_DY_BSN < '2013-07-01'
    group by
        ID_CT
)
,CT_FREQ as
(
    -- Frequency is expressed as a transaction occurred every FREQ days --
    -- We calculate it for each customer so it can be returned to the --
    -- outer query for assignment to a quintile bucket for RFM behavioral --
    -- classification.
    select
        ID_CT
        ,MIN(DC_DY_BSN) as FIRST_PURCH_DATE
        ,COUNT(ID_TRN) as TRANS_COUNT
        ,FLOOR(DATEDIFF(dd,MIN(DC_DY_BSN), '2013-07-01') / COUNT(ID_TRN)) as FREQ
    from
        DW3_STRD_SMRY_CT_RP_TRN
    where
        DC_DY_BSN < '2013-07-01'
    group by
        ID_CT
)
,CT_MONETARY as
(
    -- The monetary value used in this sample is the NET MARGIN. This --
    -- could be replaced by NET SALES. Our example, however is congruent --
    -- with the earlier sample for customer lifetime value. Note that we are --
    -- using an AVERAGE TRANSACTION NET VALUE because simply summing the --
    -- net values is too closely correlated with frequency and we want to --
    -- draw a distinction. Average is a good indicator of customer spending --
    -- magnitude over time and will distinguish between frequent convenience --
    -- shoppers versus less frequent stock up shoppers
    select
        ID_CT
        ,AVG(TRN_NET_SLS) as AVG_SPEND
    from
        DW3_STRD_SMRY_CT_RP_TRN
    where
        DC_DY_BSN < '2013-07-01'
    group by
        ID_CT
)
```

ARTS KPI's and Performance Measures Narrative Description

```
)

select
  CT_RECENCY.ID_CT
, CT_RECENCY.RECENCY
, CT_FREQ.FREQ
, CT_MONETARY.AVG_SPEND
-----
-- Quintiles are returned as a number 1 through 5 to indicate the RFM bin --
-- each customer fits into. We have three sets of buckets. Each SET is a --
-- dimension (i.e. recency, frequency, monetary). The RFM analysis can be --
-- visualized as a 3D cube or a 5 x 5 x 5 array which in total has 125 bins. --
-- Each customer, based on this query is assigned to one of the 125 RFM bins --
-----
, NTILE(5) OVER (ORDER BY CT_RECENCY.RECENCY) as RECENCY_QUINTILE
, NTILE(5) OVER (ORDER BY CT_FREQ.FREQ) as FREQUENCY_QUINTILE
, NTILE(5) OVER (ORDER BY CT_MONETARY.AVG SPEND DESC) as SPEND_QUINTILE
from
  CT_RECENCY
join CT_FREQ
on CT_RECENCY.ID_CT = CT_FREQ.ID_CT

join CT_MONETARY
on CT_RECENCY.ID_CT = CT_MONETARY.ID_CT
;
-----
-- END Create View VW_DW3_RFM_BEHAVIORAL_SEGMENT --
-----
```

Link back to business narrative: [#CustomerRFMBusinessNarrative](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 5: Customer Average Trans. Value Per Business Unit for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Customer Average Transaction Value Per Business Unit for a Reporting Period (sample measure 1)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSTRN
Fact Tables	Not used directly – using presummarized fact
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	<p>FOR ONE PERIOD: Sum net sales and net margin by customer and business unit for a reporting period, divide by transaction count for the reporting period.</p> <p>FOR MULTIPLE PERIODS: Sum net sales and net margin by customer and business unit for a set of reporting periods, divide by transaction count for the reporting periods.</p>
SQL Code	<pre> -- Query - Average net sales and net margin by customer and business unit -- over one reporting period. (Sample Measure 1) -- select DW3_STRD_SMRY_CT_SLSTRN.ID_CT ,DW3_STRD_SMRY_CT_SLSTRN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NT_SLS) as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSTRN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NT_SLS)/COUNT(DW3_STRD_SMRY_CT_SLSTRN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NET_MRGN)/COUNT(DW3_STRD_SMRY_CT_SLSTRN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSTRN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSTRN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' group by DW3_STRD_SMRY_CT_SLSTRN.ID_CT ,DW3_STRD_SMRY_CT_SLSTRN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ; -- Query - Average net sales and net margin by customer and business unit -- over multiple reporting periods. -- select DW3_STRD_SMRY_CT_SLSTRN.ID_CT ,DW3_STRD_SMRY_CT_SLSTRN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NT_SLS) as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSTRN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NT_SLS)/COUNT(DW3_STRD_SMRY_CT_SLSTRN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSTRN.MO_NET_MRGN)/COUNT(DW3_STRD_SMRY_CT_SLSTRN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSTRN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSTRN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and ID_PRD_RP between 1020 and 1024 -- Sample token ID's representing a -- block of contiguous reporting periods group by DW3_STRD_SMRY_CT_SLSTRN.ID_CT ,DW3_STRD_SMRY_CT_SLSTRN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ; </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Customer Average Transaction Value Per Business Unit for a Reporting Period (sample measure 1)
	-- End Average Sales Query by Customer, Business Unit for one or more -- -- reporting periods (Sample Measure 1) -- -----
Remarks	
<p>The value used here is calculated using the ACTUAL RETAIL prices which reflect all discounts.</p> <p>The value here reflects net sales (sales at actual retail minus returns).</p> <p>Retailer designates which reporting period to use.</p> <p>Retailer can elect to include more than a single reporting period</p> <p>Worksheet Reference: 1 BUCustAvgTrans\$</p>	

Link back to Business narrative: [#SampleMeasure1](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 6: Customer Reporting Period Average Transaction Value Chain Wide

Sample Performance Measure Specification	
Measure Name:	Customer Average Transaction Value (chain wide) for a Reporting Period (sample measure 2)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	Not used here
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	<p>FOR ONE PERIOD: Sum net sales and net margin by customer for a reporting period, divide by transaction count for the reporting period.</p> <p>FOR MULTIPLE PERIODS: Sum net sales and net margin by customer for a set of reporting periods, divide by transaction count for the reporting periods.</p>
SQL Code	<pre> ----- -- Query - Average net sales and net margin by customer chain wide -- -- over one reporting period. (Sample Measure 2) -- ----- select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS) as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS)/COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN)/COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ; ----- -- Query - Average net sales and net margin by customer chain-wide -- -- over multiple reporting periods. (multi period version for sample measure 2-- ----- select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS) as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS)/COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN)/COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and ID_PRD_RP between 1020 and 1024 -- Sample token ID's representing a -- block of contiguous reporting periods group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ; ----- -- End Average Sales Query by Customer, chain wide one or more -- -- reporting periods (Sample Measure 2) -- ----- </pre>
Remarks	
<p>The value used here is calculated using the ACTUAL RETAIL prices which reflect all discounts.</p> <p>The value here reflects net sales (sales at actual retail minus returns).</p> <p>Includes customer sales at ALL business units, so this is a chain-wide figure.</p> <p>Retailer may elect to include more than a single reporting period</p>	

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Customer Average Transaction Value (chain wide) for a Reporting Period (sample measure 2)
Worksheet Reference: 1b CustAvgTrans\$	

Link back to business narrative: [#SampleMeasure2](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 7: Customer Average Monthly Spend Per Business Unit Within Reporting Period

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Sale per Business Unit per Month within a Reporting Period (sample measure 3)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	Not used here
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum net sales and net margin by customer and business unit for one (or more) reporting periods and divide by the number of months in the reporting period (or periods)
SQL Code	<pre> -- Query - MONTHLY Average net sales and net margin by customer and business -- -- unit for a reporting period (Sample Measure 3) -- ----- select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_STRD_SMRY_CT_SLSRTN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ----- -- Execute function to extract calendar period as YEAR and PERIOD -- -- which is NRF's 4-5-4 calendar representation of a month -- ----- ,dbo.FN_RP_CP_EXTR (DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD') ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS) as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS) / COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) / COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_STRD_SMRY_CT_SLSRTN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,dbo.FN_RP_CP_EXTR (DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD') -- need way to do a group by month in reporting period ; -- End QUERY MONTHLY Average Net Sales and net margin by customer and -- -- business unit for a reporting period (sample measure 3) -- ----- </pre>
Remarks	
<p>The value used here is calculated using the ACTUAL RETAIL prices which reflect all discounts.</p> <p>The value here reflects net sales (sales at actual retail minus returns).</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods. This performance measure highlights the relationship between a reporting period and a calendar period for a designated calendar.</p> <p>Worksheet Reference 2 BUCustAM\$</p>	

Link back to business narrative: [#SampleMeasure3](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 8: Customer Average Monthly Spend Chain Wide

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Spend (chain wide) (sample measure 4)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	Not used here
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum net sales and net margin by customer for one (or more) reporting periods and divide by the number of months in the reporting period (or periods)
SQL Code	<pre> -- Query - MONTHLY Average net sales and net margin by customer CHAIN-WIDE -- -- unit for a reporting period (Sample Measure 4) -- ----- select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ----- -- Execute function to extract calendar period as YEAR and PERIOD -- -- which is NRF's 4-5-4 calendar representation of a month -- ----- ,dbo.FN_RP_CP_EXTR (DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD') ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS) as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS) / COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) / COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,dbo.FN_RP_CP_EXTR (DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD') -- need way to do a group by month in reporting period ; -- End QUERY MONTHLY Average Net Sales and net margin by customer and -- -- business unit for a reporting period (sample measure 4) -- ----- </pre>
Remarks	
<p>The value used here is calculated using the ACTUAL RETAIL prices which reflect all discounts.</p> <p>The value here reflects net sales (sales at actual retail minus returns).</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods. This performance measure highlights the relationship between a reporting period and a calendar period for a designated calendar.</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods. This performance measure highlights the relationship between a reporting period and a calendar period for a designated calendar.</p> <p>Worksheet Reference: 2b CustAMSS</p>	

Link back to business narrative: [#SampleMeasure4](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 9: Customer Monthly Average Transaction Count by Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Monthly Average <i>Transaction Count</i> by Business Unit (sample measure 5)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	Not used
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Count transactions by customer by store for a reporting period and divide that count by the number of months (NRF 4-5-4 periods) in the reporting period
SQL Code	<pre> -- Customer monthly average transaction count by Business Unit -- Count transactions by customer by store for a reporting period and divide -- that count by the number of months (NRF 4-5-4 periods) in the reporting -- period. (sample measure 5) ----- with CT_QU_TR_QU_RP as (select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_STRD_SMRY_CT_SLSRTN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN_PR_RP ----- -- Here we're extracting month calendar level information so we can count -- -- it to calculate the customer-store average transaction per month for -- -- the reporting period. ----- ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD')) as QU_MO_PR_RP from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_STRD_SMRY_CT_SLSRTN.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP) select CT_QU_TR_QU_RP.ID_CT ,CT_QU_TR_QU_RP.ID_BSN_UN ,CT_QU_TR_QU_RP.ID_PRD_RP ,CT_QU_TR_QU_RP.QU_TRN_PR_RP / CT_QU_TR_QU_RP.QU_MO_PR_RP as QU_CT_MO_AVG_TR from CT_QU_TR_QU_RP ----- -- End Customer Monthly Average Transaction Count by Business Unit -- (sample measure 5) ----- </pre>
Remarks	
<p>The value returned here is a TRANSACTION COUNT not a monetary amount</p> <p>The value is arrived at using a COUNT aggregation function not a sum</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods.</p> <p>Assumes that report covers one or more whole, contiguous reporting periods – not partial reporting periods</p> <p>Worksheet Reference: 3 BUCustAMTCount</p>	

Link back to business narrative: [#SampleMeasure5](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 10: Customer Monthly Average Transaction Count Chain Wide

Sample Performance Measure Specification	
Measure Name:	Customer Monthly Average Transaction Count – CHAIN WIDE (sample measure 6)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	Not used
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Count retail transactions by customer for a reporting period (or periods) and divide that count by the number of months in the reporting period (or periods)
SQL Code	<pre> -- Customer monthly average transaction count chain-wide -- Count transactions by customer chain wide for a reporting period and divide -- that count by the number of months (NRF 4-5-4 periods) in the reporting -- period. (sample measure 6) ----- with CT_QU_TR_QU_RP as (select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN_PR_RP ----- -- Here we're extracting month calendar level information so we can count -- -- it to calculate the customer-store average transaction per month for -- -- the reporting period. ----- ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD')) as QU_MO_PR_RP from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP) select CT_QU_TR_QU_RP.ID_CT ,CT_QU_TR_QU_RP.ID_PRD_RP ,CT_QU_TR_QU_RP.QU_TRN_PR_RP / CT_QU_TR_QU_RP.QU_MO_PR_RP as QU_CT_MO_AVG_TR from CT_QU_TR_QU_RP ; ----- -- End Customer Monthly Average Transaction Count by Business Unit -- (sample measure 6) ----- </pre>
Remarks	
<p>The value is arrived at using a COUNT aggregation function not a sum</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods.</p> <p>Assumes that report covers one or more whole, contiguous reporting periods – no partial reporting periods</p> <p>Worksheet Reference: 3b CustAMTCount</p>	

Link back to business narrative: [#SampleMeasure6](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 11: Customer Avg Monthly Spend by Business Unit by Tender Type

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Spend by Month, by Business Unit, by Tender Type, by Tender Media Brand for one or more Reporting Periods based on payment (tender)
Technical Implementation	
Stored Data Summary Tables	Not used
Fact Tables	DW3_FACT_TENDER_BEHAVIOR
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum tender by tender type and tender media brand by customer by store for one reporting period and divide by the months in that reporting period
SQL Code	<pre> -- Customer Average Monthly spend by TENDER type, tender media brand, -- by business unit for a reporting period (sample measure 7) -- ----- with CT_TNDR_ACTVTY as (select DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_FACT_TENDER_BEHAVIOR.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN ,sum(MO_TRN_AMT) AS MO_TNDR_APPLD ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, 'I', 'PERIOD')) as QU_MO_PR_RP from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_FACT_TENDER_BEHAVIOR.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN) select CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_BSN_UN ,CT_TNDR_ACTVTY.ID_PRD_RP ,CT_TNDR_ACTVTY.TY_TND ,CT_TNDR_ACTVTY.CRDB_TY_CRD ,CT_TNDR_ACTVTY.CRDB_ID_TND_MD_BRN ,CT_TNDR_ACTVTY.MO_TNDR_APPLD / QU_MO_PR_RP as MO_CT_BSN_UN_MO_AVG_TNDR_SPND from CT_TNDR_ACTVTY ; -- END Customer Average Monthly Spend for a reporting period by Business Unit, -- by Tender Type, by Tender Media Brand ----- </pre>
Remarks	
<p>Monetary value is based on TenderFactTable</p> <p>Value returned is a monetary amount</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods.</p> <p>Assumes that report covers one or more whole, contiguous reporting periods – no partial reporting periods</p> <p>Worksheet Reference: 4 BUCustAMTndS</p>	

Link back to business narrative: [#SampleMeasure7](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 12: Customer Avg Monthly Spend By Tender Type By Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Average Monthly Spend by Month, by Tender Type, by Tender Media Brand, Chain Wide for one or more Reporting Periods based on payment (tender) (sample measure 8)
Technical Implementation	
Stored Data Summary Tables	not used
Fact Tables	DW3_FACT_TENDER_BEHAVIOR
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Count transactions by customer, business unit, tender type, tender media for a reporting period and divide by number of months in that reporting period.
SQL Code	<pre> ----- -- Customer Average Monthly spend by TENDER type, tender media brand, -- -- chain-wide for a reporting period (sample measure 8) -- ----- with CT_TNDR_ACTVTY as (select DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN ,sum(MO_TRN_AMT) AS MO_TNDR_APPLD ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD')) as QU_MO_PR_RP from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN) select CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_PRD_RP ,CT_TNDR_ACTVTY.TY_TND ,CT_TNDR_ACTVTY.CRDB_TY_CRD ,CT_TNDR_ACTVTY.CRDB_ID_TND_MD_BRN ,CT_TNDR_ACTVTY.MO_TNDR_APPLD / QU_MO_PR_RP as MO_CT_MO_AVG_TNDR_SPND from CT_TNDR_ACTVTY ; ----- -- END Customer Average Monthly Spend for a reporting period by Business Unit,-- -- by Tender Type, by Tender Media Brand -- ----- </pre>
Remarks	
<p>Monetary value is based on TenderFactTable</p> <p>Value returned is a monetary amount</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods.</p> <p>Assumes that report covers one or more whole, contiguous reporting periods – no partial reporting periods</p> <p>Worksheet Reference: 4b CustAMTndS\$</p>	

Link back to business narrative: [#SampleMeasure8](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 13: Customer Reporting Period Average Monthly Transaction Count by Tender Type By Business Unit

Sample Performance Measure Specification	
Measure Name:	Customer Monthly Average Transaction Count By Tender Type, Tender Media Brand, Chain-wide, for one or more reporting periods (sample measure (sample measure 9))
Technical Implementation	
Stored Data Summary Tables	Not used
Fact Tables	DW3_FACT_TENDER_BEHAVIOR_CT
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Count the transactions by customer, tender type, tender media brand for a reporting period (or periods) and divide that count by the number of months in the reporting period (or periods)
SQL Code	<pre> -- Customer Reporting Period Monthly Average Transaction Count by tender type -- -- chain-wide (sample measure 9) -- ----- with CT_TNDR_ACTVTY as (select DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN ,count(DW3_FACT_TENDER_BEHAVIOR.ID_TRN) as QU_TNDR_TRN ,sum(MO_TRN_AMT) AS MO_TNDR_APPLD ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD')) as QU_MO_PR_RP from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN) select CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_PRD_RP ,CT_TNDR_ACTVTY.TY_TND ,CT_TNDR_ACTVTY.CRDB_TY_CRD ,CT_TNDR_ACTVTY.CRDB_ID_TND_MD_BRN ,CT_TNDR_ACTVTY.QU_TNDR_TRN / QU_MO_PR_RP from CT_TNDR_ACTVTY ; ----- -- END Customer Reporting Period Monthly Average Transaction Count by tender -- -- type chain-wide (sample measure 9) -- ----- </pre>
Remarks	
<p>The value is arrived at using a COUNT aggregation function not a sum</p> <p>The worksheet specifically designates this as a TRANSACTION COUNT not a tender line item count</p> <p>The Reporting Period designated here is assumed to include ONE OR MORE CALENDAR MONTH periods.</p> <p>Assumes that report covers one or more whole, contiguous reporting periods – no partial reporting periods</p> <p>Worksheet Reference: 5 BUCustAMTTndCount</p>	

Link back to business narrative: [#SampleMeasure9](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 14: Customer Average Monthly Transaction Count by Tender Type by Business Unit

Business Definition & Description	
Measure Name:	Customer Average Monthly Transactions Count By Tender Type, Tender Media Brand and Business Unit (sample measure 10)
Technical Implementation	
Stored Data Summary Tables	Not used
Fact Tables	DW3_FACT_TENDER_BEHAVIOR_CT
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Count the transactions by customer, tender type, tender media brand for a reporting period (or periods) and divide that count by the number of months in the reporting period (or periods)
SQL Code	<pre> -- Customer Reporting Period Monthly Average TRANSACTION COUNT by tender type -- -- and Business Unit (sample measure 10) -- ----- with CT_TNDR_ACTVTY as (select DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_FACT_TENDER_BEHAVIOR.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN ,count(DW3_FACT_TENDER_BEHAVIOR.ID_TRN) as QU_TNDR_TRN ,sum(MO_TRN_AMT) AS MO_TNDR_APPLD ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD')) as QU_MO_PR_RP from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_FACT_TENDER_BEHAVIOR.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN) select CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_BSN_UN ,CT_TNDR_ACTVTY.ID_PRD_RP ,CT_TNDR_ACTVTY.TY_TND ,CT_TNDR_ACTVTY.CRDB_TY_CRD ,CT_TNDR_ACTVTY.CRDB_ID_TND_MD_BRN ,CT_TNDR_ACTVTY.QU_TNDR_TRN / QU_MO_PR_RP from CT_TNDR_ACTVTY ; ----- -- END Customer Reporting Period Monthly Average Transaction Count by tender -- -- type and Business Unit (sample measure 10) -- ----- </pre>
Remarks	
Worksheet Reference: 5b_CustAMTTndCount	

Link back to business narrative: [#SampleMeasure10](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 15: Average Tender Line Item Count Per Customer Per Transaction per Business Unit

Sample Performance Measure Specification	
Measure Name:	Average Tender Line Item Count Per Customer, Per Transaction, per business unit for a reporting period (sample measure 11)
Technical Implementation	
Stored Data Summary Tables	Not used
Fact Tables	DW3_FACT_TENDER_BEHAVIOR
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Use a subquery to count tender line items PER TRANSACTION, use an outer query sum the transaction line item counts for a reporting period and divide by the number of transactions in that reporting period
SQL Code	<pre> -- Average Tender LINE ITEM COUNT per TRANSACTION by customer and business -- -- unit for one reporting period (sample report 11) -- ----- with CT_TNDR_ACTVTY as (select DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_FACT_TENDER_BEHAVIOR.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.ID_TRN ,count(DW3_FACT_TENDER_BEHAVIOR.IC_LN_ITM) as QU_LN_ITM -- count tender line items per transaction from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period group by DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_FACT_TENDER_BEHAVIOR.ID_BSN_UN ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.ID_TRN) select CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_BSN_UN ,CT_TNDR_ACTVTY.ID_PRD_RP ,count(CT_TNDR_ACTVTY.ID_TRN) as QU_TNDR_TRN -- Count tender transactions ,sum(QU_LN_ITM) as QU_TNDR_LN_ITM -- Sum transaction line item counts ,sum(QU_LN_ITM)/count(CT_TNDR_ACTVTY.ID_TRN) as AVG_QU_TNDR_LN_ITM -- Do the average from CT_TNDR_ACTVTY group by CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_BSN_UN ,CT_TNDR_ACTVTY.ID_PRD_RP ; ----- -- END Average Tender LINE ITEM COUNT per TRANSACTION by customer and -- -- business unit for one reporting period (sample measure 11) -- ----- </pre>
Remarks	
Worksheet Reference 5c BUCustAMTTndCount	
This measure is looking at tender line item counts NOT TENDER TYPES. So in this sample measure we are not distinguishing tender types.	
Link back to business narrative: #SampleMeasure11	

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 16: Percent Tender Type Spend By Customer Chain Wide

Sample Performance Measure Specification	
Measure Name:	Percent tender type, tender media brand spend by customer on a chain wide basis for a reporting period (sample measure 12)
Technical Implementation	
Stored Data Summary Tables	Not used
Fact Tables	DW3_FACT_TENDER_BEHAVIOR DW3_FACT_SMP_CR_DB_CRD_SPND
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum the credit debit card purchases by tender type, card type, tender media brand for each customer for a reporting period (chain-wide) and divide by the customer reporting period total supplied by an outside service and stored in the sample credit/debit card total customer spend table.
SQL Code	<pre> ----- -- Customer percent debit/credit card (tender type and credit card type) and -- -- tender media brand payment spent at the retailer for a reporting period -- -- (sample measure 12) ----- with CT_TNDR_ACTVTY as (select DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN ,sum(MO_TRN_AMT) AS MO_TNDR_APPLD ,COUNT(dbo.FN_RP_CP_EXTR(DW3_DIM_CA_PRD_RP.CLD_PRD_HRC_LVL_NM_PTH, DW3_DIM_CA_PRD_RP.CLD_PRD_NM_PTH, ' ', 'PERIOD')) as QU_MO_PR_RP from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose -- which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include -- desired reporting -- period where ----- -- In this sample we are limiting our analysis to non-proprietary -- -- debit/credit cards. ----- DW3_FACT_TENDER_BEHAVIOR.TY_TND in ('CREDIT','DEBIT') group by DW3_FACT_TENDER_BEHAVIOR.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,DW3_FACT_TENDER_BEHAVIOR.TY_TND ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN) select CT_TNDR_ACTVTY.ID_CT ,CT_TNDR_ACTVTY.ID_PRD_RP ,CT_TNDR_ACTVTY.TY_TND ,CT_TNDR_ACTVTY.CRDB_TY_CRD ,CT_TNDR_ACTVTY.CRDB_ID_TND_MD_BRN ,CT_TNDR_ACTVTY.MO_TNDR_APPLD ,DW3_FACT_SMP_CR_DB_CRD_SPND.MO_CR_DB_TOT ,(CT_TNDR_ACTVTY.MO_TNDR_APPLD / DW3_FACT_SMP_CR_DB_CRD_SPND.MO_CR_DB_TOT) * 100 AS PE_CT_RP_SPND from CT_TNDR_ACTVTY join DW3_FACT_SMP_CR_DB_CRD_SPND on CT_TNDR_ACTVTY.ID_CT = DW3_FACT_SMP_CR_DB_CRD_SPND.ID_CT and CT_TNDR_ACTVTY.ID_PRD_RP = DW3_FACT_SMP_CR_DB_CRD_SPND.ID_PRD_RP and CT_TNDR_ACTVTY.CRDB_TY_CRD = DW3_FACT_SMP_CR_DB_CRD_SPND.TY_CRD and CT_TNDR_ACTVTY.CRDB_ID_TND_MD_BRN = DW3_FACT_SMP_CR_DB_CRD_SPND.ID_TND_MD_BRN ; ----- -- END Customer percent debit/credit card (tender type and credit card type) -- -- and tender media brand payment spent at the retailer for a reporting -- -- period (sample measure 12) ----- </pre>
Remarks	
Worksheet Reference 5d CustAMTTndCount	
This measure is looking at tender line item counts NOT TENDER TYPES. So in this sample measure we are not distinguishing tender types.	
Link back to business narrative: #SampleMeasure12	

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 17: Comparable Quarterly Sales By Business Unit

Sample Performance Measure Specification	
Measure Name:	Comparable quarterly sales 2012 versus 2011 by Business Unit (sample measure 13)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_BSN_UN_QTRLY_NET (sample stored quarterly summary sales by business unit. This same pattern applies to period, weekly and even daily sales if necessary)
Fact Tables	Behind the summary table DW3_FACT_SALE_RTN_BEHAVIOR
Dimension Tables	DW3_DIM_CA_HIER
Transformation Logic	Two step process: Step 1 is a query to create a summary view and load the DW3_STRD_SMRY_BSN_UN_QTRLY_NET table Step 2 is the query that does the year to year comparative quarterly sales using a recursive join for current and prior year.
SQL Code	<pre> ----- -- STEP 1: Create View VW_DW3_BSN_UN_QRTLY_SLS -- ----- -- Business Unit Quarterly Sales View - Generalized Quarter Roll up of Net -- -- Sales and Net Margin by business unit. Same pattern can be used for any -- -- NRF 4-5-4 period. -- ----- -- drop view VW_DW3_BSN_UN_QRTLY_SLS; create view VW_DW3_BSN_UN_QRTLY_SLS AS with ALL_PRD_NET_SLS as (select DW3_STRD_SMRY_CT_SLSRTN.ID_BSN_UN ,DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN ,DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS ,DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN ,dbo.FN_REVSPILT(DW3_DIM_CA_HIER.CLD_PRD_LVL_NM_PTH,' ') as CLD_PRD_LVL_NM_PTH ,dbo.FN_REVSPILT(DW3_DIM_CA_HIER.CLD_PRD_NM_PTH,' ') as CLD_PRD_NM_PTH from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_HIER on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_HIER.DC_DY_BSN and DW3_DIM_CA_HIER.NM_CLD = 'NRF 4-5-4 Retail Calendar') select ALL_PRD_NET_SLS.ID_BSN_UN ,dbo.FN_RP_CP_EXTR (ALL_PRD_NET_SLS.CLD_PRD_LVL_NM_PTH ,ALL_PRD_NET_SLS.CLD_PRD_NM_PTH ,' ' ,'QUARTER') as NRF_454_YR_QTR ,sum(ALL_PRD_NET_SLS.MO_NT_SLS) MO_BSN_UN_QTR_NET_SLS ,sum(ALL_PRD_NET_SLS.MO_NET_MRGN) MO_BSN_UN_QTR_NET_MRGN from ALL_PRD_NET_SLS group by ALL_PRD_NET_SLS.ID_BSN_UN ,dbo.FN_RP_CP_EXTR (ALL_PRD_NET_SLS.CLD_PRD_LVL_NM_PTH ,ALL_PRD_NET_SLS.CLD_PRD_NM_PTH ,' ' ,'QUARTER') ; ----- -- End View VW_DW3_BSN_UN_QRTLY_SLS -- -- END Business Unit Quarterly Sales View - Generalized Quarter Roll up of Net-- -- Sales and Net Margin by business unit. Same pattern can be used for any -- -- NRF 4-5-4 period. -- ----- select * into DW3_STRD_SMRY_BSN_UN_QTRLY_NET from VW_DW3_BSN_UN_QRTLY_SLS; ----- -- Stored summary table to improve efficiency when doing self-joins for this -- -- year last year analysis -- ----- </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Comparable quarterly sales 2012 versus 2011 by Business Unit (sample measure 13)
	<pre> ----- -- STEP 2: Sample Year to Year Comp Net Sales for 2012 by Quarter -- -- This query uses the DW3_STRD_SMR_Y_BSN_UN_QTRLY_NET created in the previous -- -- SQL code section for VW_DW3_BSN_UN_QTRLY_SLS. -- ----- with QTR_TO_QTR as (select QTR_YR.ID_BSN_UN ,QTR_YR.NRF_454_YR_QTR ,SUBSTRING(QTR_YR.NRF_454_YR_QTR,5,4) AS YR ,SUBSTRING(QTR_YR.NRF_454_YR_QTR,44,1) AS QTR ,QTR_YR.MO_BSN_UN_QTR_NET_SLS ,QTR_YR.MO_BSN_UN_QTR_NET_MRGN from DW3_STRD_SMR_Y_BSN_UN_QTRLY_NET as QTR_YR) select CURRENT_YR.ID_BSN_UN ,CURRENT_YR.NRF_454_YR_QTR ,CURRENT_YR.MO_BSN_UN_QTR_NET_SLS ,CURRENT_YR.MO_BSN_UN_QTR_NET_MRGN ,PRIOR_YR.NRF_454_YR_QTR ,PRIOR_YR.MO_BSN_UN_QTR_NET_SLS ,PRIOR_YR.MO_BSN_UN_QTR_NET_MRGN from QTR_TO_QTR as CURRENT_YR JOIN QTR_TO_QTR AS PRIOR_YR on CURRENT_YR.ID_BSN_UN = PRIOR_YR.ID_BSN_UN and PRIOR_YR.YR = CURRENT_YR.YR -1 and CURRENT_YR.QTR = PRIOR_YR.QTR WHERE CURRENT_YR.YR = 2012 ----- -- END Sample Year to Year Comp Net Sales by Quarter -- ----- </pre>
Remarks	
<p>Retailers can choose to define custom quarters using reporting periods OR they can use calendar quarter periods (for their choice of calendar). Because comp sales is an additive based performance measure (based on SaleReturnFact ata) it can be rolled up using item, item category, and a number of other dimensions and the summarized data will make sense.</p>	

Link back to business narrative: [#SampleMeasure_026](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 18: Business Unit Inventory Unit and Cost Velocity

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Unit and Cost Velocity for ONE or more reporting periods (sample measure 14)
Technical Implementation	
Stored Data Summary Tables	We are creating a summary view VW_DW3_BSN_RP_INV_VLCTY_CST that will be used in other queries that summarize multiple reporting periods for a business unit.
Fact Tables	DW3_FACT_INVENTORY detail.
Dimension Tables	DW3_DIM_CT DW3_DIM_CA_PRD_RP
Transformation Logic	This query summarizes a view that summarizes inventory facts into business unit-reporting period summaries across multiple reporting periods.
SQL Code	<pre> -- Inventory Velocity Units and Cost Sample Query by Business Unit Reporting -- -- Period ----- -- This sample query summarizes inventory movement in to and out of a -- -- BusinessUnit to present an aggregate inventory velocity measure. This is -- -- the kind of metric that might show up on a store manager's dashboard. It -- -- provides an indicator of inventory movement. It tells the manager to look -- -- deeper if inventory movement is below or above an expected value. To look -- -- deeper additional, more detailed summary query drilling down to the -- -- individual item level. ----- drop view VW_DW3_BSN_RP_INV_VLCTY_CST; create view VW_DW3_BSN_RP_INV_VLCTY_CST as with INVTY_DTL as (select ----- -- ARTS most granular level of inventory tracking is by item, -- -- business unit, location inside a business unit, inventory -- -- state (i.e. damaged, reserved, available for sale) and revenue -- -- cost center. This fact data consists of beginning and ending -- -- unit count balances for a REPORTING PERIOD and cumulative -- -- counts for different inventory actions (receipts, sales, etc.).-- ----- DW3_FACT_INVENTORY.ID_ITM -- Item ID (SKU) ,DW3_FACT_INVENTORY.ID_BSN_UN -- Business Unit ,DW3_FACT_INVENTORY.ID_LCN -- Location inside Business Unit ,DW3_FACT_INVENTORY.ID_ST_INV -- Inventory State ,DW3_FACT_INVENTORY.ID_CTR_RVN_CST -- Revenue Cost Center ,DW3_FACT_INVENTORY.ID_PRD_RP -- Reporting Period ----- -- Reporting period summary data in our InventoryFact table -- ----- ,DW3_FACT_INVENTORY.QU_BGN -- Beginning unit count balance ,DW3_FACT_INVENTORY.QU_RCV -- Cumulative Quantity received ,DW3_FACT_INVENTORY.QU_TSF_IN -- Cumulative Transfer In ,DW3_FACT_INVENTORY.QU_TSF_OT -- Cumulative Transfer Out ,DW3_FACT_INVENTORY.QU_ADJT -- Cumulative Adjustment ,DW3_FACT_INVENTORY.QU_RTN -- Cumulative Customer Returns ,DW3_FACT_INVENTORY.QU_SLS -- Cumulative Sales ,DW3_FACT_INVENTORY.QU_RTV -- Cumulative Return to Vendor ,DW3_FACT_INVENTORY.QU_END -- Ending unit count balance ----- -- Reporting Period Inventory Cost of inventory moved -- ----- ,DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN as CP_BGN -- Beginning Inventory AT cost ,DW3_FACT_INVENTORY.TC_RCV_CM -- Total cost of receipts based on -- actual receiving item costs ----- -- The following inventory movement costs use the reporting -- -- period ending average unit cost ----- ,DW3_FACT_INVENTORY.QU_TSF_IN * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_TSF_IN -- Transfer in cost ,DW3_FACT_INVENTORY.QU_TSF_OT * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_TSF_OT -- Transfer out cost ,DW3_FACT_INVENTORY.QU_ADJT * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_ADJT -- Adjustment cost ,DW3_FACT_INVENTORY.QU_RTN * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_RTN -- Customer return cost ,DW3_FACT_INVENTORY.QU_SLS * </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Unit and Cost Velocity for ONE or more reporting periods (sample measure 14)
	<pre> DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_SLS -- Sales cost (COGS) ,DW3_FACT_INVENTORY.QU_RTV * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_RTV -- Return to vendor cost ,DW3_FACT_INVENTORY.QU_END * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_END -- Ending inventory AT cost ----- -- Calculate non-additive UNIT facts at most granular level -- ----- ,(DW3_FACT_INVENTORY.QU_BGN + DW3_FACT_INVENTORY.QU_END)/2 as QU_AVG_INVTY -- Average Inventory UNITS for Reporting -- Period which is a NON-ADDITIVE fact ,DW3_FACT_INVENTORY.QU_SLS/ ((DW3_FACT_INVENTORY.QU_BGN + DW3_FACT_INVENTORY.QU_END)/2) as QU_TRNOVR_INVTY -- Inventory Turnover UNITS -- which is a NON-ADDITIVE fact ----- -- Calculate non-additive COST facts at most granular level -- -- NOTE: The ODM sums the receipts, transfers, sales and other -- -- actions into a reporting period ending balance (QU_END) so -- -- we use that in this query to calculate ending inventory cost. -- ----- ,((DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN) + (DW3_FACT_INVENTORY.QU_END * DW3_FACT_INVENTORY.CP_UN_AV_WT_END))/2 as CP_AVG_INVTY -- Average Inventory COST for Reporting -- Period which is a NON-ADDITIVE fact. ,(DW3_FACT_INVENTORY.QU_SLS * DW3_FACT_INVENTORY.CP_UN_AV_WT_END) / ((DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN) + (DW3_FACT_INVENTORY.QU_END * DW3_FACT_INVENTORY.CP_UN_AV_WT_END))/2) as CP_TRNOVR_INVTY -- Inventory Turnover COST -- which is a NON-ADDITIVE fact from DW3_FACT_INVENTORY) ----- -- Summarization to business unit level using the INVTY_DTL subquery which -- -- provides the most granular level of detail available from the InventoryFact -- -- table. The inventory balances and summary counts are additive fact in this -- -- sample because they are summed along a NON-reporting period dimension -- -- (business unit) -- ----- select INVTY_DTL.ID_BSN_UN ,DW3_DIM_BUSINESS_UNIT.NM_BSN_UN ,DW3_DIM_BUSINESS_UNIT.TY_BSN_UN ,INVTY_DTL.ID_PRD_RP ----- -- Unit summary (additive) -- ----- ,SUM(INVTY_DTL.QU_BGN) as QU_BGN -- Beginning Quantity ,SUM(INVTY_DTL.QU_RCV) as QU_RCV -- Received Quantity ,SUM(INVTY_DTL.QU_TSF_IN) as QU_TSF_IN -- Transferred In Quantity ,SUM(INVTY_DTL.QU_TSF_OT) as QU_TSF_OT -- Transferred Out Quantity ,SUM(INVTY_DTL.QU_ADJT) as QU_ADJT -- Adjusted Quantity ,SUM(INVTY_DTL.QU_RTN) as QU_RTN -- Customer Return Quantity ,SUM(INVTY_DTL.QU_SLS) as QU_SLS -- Sold Quantity ,SUM(INVTY_DTL.QU_RTV) as QU_RTV -- Return to Vendor Quantity ,SUM(INVTY_DTL.QU_END) as QU_END -- Ending Quantity ----- -- Cost summary (additive) -- ----- ,SUM(INVTY_DTL.CP_BGN) as CP_BGN -- Beginning cost ,SUM(INVTY_DTL.TC_RCV_CM) as TC_RCV_CM -- Received cost ,SUM(INVTY_DTL.CP_TSF_IN) as CP_TSF_IN -- Transfer In Cost ,SUM(INVTY_DTL.CP_TSF_OT) as CP_TSF_OUT -- Transfer Out Cost ,SUM(INVTY_DTL.CP_ADJT) as CP_ADJT -- Adjustment Cost ,SUM(INVTY_DTL.CP_RTN) as CP_RTN -- Customer Return Cost Value ,SUM(INVTY_DTL.CP_SLS) as CP_SLS -- Cost of goods sold ,SUM(INVTY_DTL.CP_RTV) as CP_RTV -- Return to vendor cost ,SUM(INVTY_DTL.CP_END) as CP_END -- Ending inventory cost ----- -- Recalculate average inventory and inventory turnover for BUSINESS -- -- UNIT reporting period since the detailed calculations are NON-ADDITIVE -- -- facts. We use business unit level summary facts to do this -- -- calculation. -- </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Unit and Cost Velocity for ONE or more reporting periods (sample measure 14)
	<pre> ----- , (SUM(INVTY_DTL.QU_BGN) + SUM(INVTY_DTL.QU_END)) / 2 as QU_BSN_UN_AVG_INVTY , SUM(INVTY_DTL.QU_SLS) / ((SUM(INVTY_DTL.QU_BGN) + SUM(INVTY_DTL.QU_END)) / 2) as QU_BSN_UN_TRNOVR_INVTY ----- -- Recalculate average inventory COST and inventory turnover for -- -- BUSINESS UNIT reporting period since the detailed calculations are -- -- NON-ADDITIVE FACTS. -- ----- , (SUM(INVTY_DTL.CP_BGN) + SUM(INVTY_DTL.CP_END)) / 2 as CP_BSN_UN_AVG_INVTY , SUM(INVTY_DTL.CP_SLS) / ((SUM(INVTY_DTL.CP_BGN) + SUM(INVTY_DTL.CP_END)) / 2) as CP_BSN_UN_TRNOVR_INVTY from INVTY_DTL join DW3_DIM_BUSINESS_UNIT on INVTY_DTL.ID_BSN_UN = DW3_DIM_BUSINESS_UNIT.ID_BSN_UN group by INVTY_DTL.ID_BSN_UN , DW3_DIM_BUSINESS_UNIT.NM_BSN_UN , DW3_DIM_BUSINESS_UNIT.TY_BSN_UN , INVTY_DTL.ID_PRD_RP ; ----- -- END Inventory Velocity using COST Sample Query -- ----- </pre>
Remarks	

Link back to business narrative: [#SampleMeasure_027](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 19: Business Unit Inventory Velocity Over MULTIPLE Reporting Periods

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Velocity Over MULTIPLE Reporting Periods (sample measure 15)
Technical Implementation	
Stored Data Summary Tables	VW_DW3_BSN_RP_INV_VLCTY_CST
Fact Tables	DW3_FACT_INVENTORY (indirect use since this fact table is summarized in VW_DW3_BSN_RP_INV_VLCTY_CST.
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum the additive unit and cost business unit-reporting period summaries in VW_DW3_BSN_RP_INV_VLCTY_CST and recalculate the average inventory count and cost and inventory unit and cost turnover values which are not additive facts.
SQL Code	<pre> -- Inventory Velocity for a Business Unit across more than one reporting period -- select VW_DW3_BSN_RP_INV_VLCTY_CST.ID_BSN_UN -- Sum data used in multiperiod avg and turnover calc. , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_BGN) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_END) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_SLS) -- Sum data used in multiperiod avg cost and turnover calc. , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_BGN) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_END) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_SLS) , COUNT(VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP) -- Sum other counts for multi reporting periods , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_TSF_IN) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_TSF_OT) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_ADJT) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_RTN) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_RTV) -- Sum other costs for multi reporting periods , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_TSF_IN) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_TSF_OT) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_ADJT) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_RTN) , SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_RTV) -- Multiperiod reporting period average inventory unit count , (SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_BGN) + SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_END)) / (COUNT(VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP) + 1) as QU_BSN_UN_RP_AVG_INVTY -- average inventory for the SET of -- reporting periods included in the -- where clause -- Multiperiod inventory unit turnover calculation , (SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_SLS) / (SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_BGN) + SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.QU_END))) / (COUNT(VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP) + 1) as QU_BSN_UN_RP_TRNOVR_INVTY -- Inventory turnover in units for -- the SET of reporting periods included -- in the where clause -- Multiperiod inventory average COST , (SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_BGN) + SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_END)) / (COUNT(VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP) + 1) as CP_BSN_UN_RP_AVG_INVTY -- Multiperiod inventory COST turnover calculation , (SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_SLS) / (SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_BGN) + SUM(VW_DW3_BSN_RP_INV_VLCTY_CST.CP_END))) / (COUNT(VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP) + 1) as CP_BSN_UN_RP_TRNOVR_INVTY -- Inventory turnover in COST for -- the SET of reporting periods included -- in the where clause from </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Business Unit Inventory Velocity Over MULTIPLE Reporting Periods (sample measure 15)
	<pre> VW_DW3_BSN_RP_INV_VLCTY_CST join DW3_DIM_CA_PRD_RP on VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP = DW3_DIM_CA_PRD_RP.ID_PRD_RP and DW3_DIM_CA_PRD_RP.ID_CLD = 1 --Using the NRF 4-5-4 calendar where VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP >= 201301 and VW_DW3_BSN_RP_INV_VLCTY_CST.ID_PRD_RP <= 201306 group by VW_DW3_BSN_RP_INV_VLCTY_CST.ID_BSN_UN ; ----- -- END Inventory Velocity for a Business Unit across more than one reporting -- -- period ----- </pre>
Remarks	
This query provides a good illustration of how to handle additive facts (across a business unit-reporting period) and non-additive facts.	

Link back to Business narrative: [#SampleMeasure_028](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 20: Item Out of Stock Period Count

Sample Performance Measure Specification	
Measure Name:	Reporting Period Out of Stock Percent of Items Carried By Business Unit (sample measure 16)
Technical Implementation	
Stored Data Summary Tables	Note – we use a subquery to presummarize inventory data to an ITEM, BUSINESS UNIT, REPORTING PERIOD level and to establish a summary-level out of stock indicator
Fact Tables	DW3_FACT_INVENTORY
Dimension Tables	DW3_DIM_INVENTORY_LOCATION CO_ST_INV (Inventory State table brought over directly from ODM)
Transformation Logic	Summarize inventory end of period count to business unit, item, reporting period level. Set an indicator value to 1 if the item end of period on hand balance is < 1. Set the value to 0 if the item is ≥ 1 in a subquery. Summarize the rowset returned by the inner query to business unit reporting period level and calculate the total distinct items carried and the percentage of those items that had a zero on hand balance at the end of the reporting period.
SQL Code	<pre> ----- -- Sample query to obtain a stock out percentage of out of stock conditions -- -- encountered by each store for a reporting period. The return rowset is a -- -- a list of business units (stores) and the percentage of carried items that -- -- that are out of stock for a reporting period. -- ----- with INVTY as (select DW3_FACT_INVENTORY.ID_ITM -- Item ID ,DW3_FACT_INVENTORY.ID_BSN_UN -- Business Unit ,DW3_FACT_INVENTORY.ID_PRD_RP -- Reporting Period ,sum(DW3_FACT_INVENTORY.QU_END) as QU_END -- Ending Onhand Count ----- -- Next count the out of stock occurrences for this item, -- -- business unit and reporting period based on our filter -- -- criteria defined in the where clause -- ----- ,case when sum(DW3_FACT_INVENTORY.QU_END) < 1 then 1 else 0 end as STK_OUT_IND from DW3_FACT_INVENTORY join DW3_DIM_INVENTORY_LOCATION on DW3_FACT_INVENTORY.ID_LCN = DW3_DIM_INVENTORY_LOCATION.ID_LCN join CO_ST_INV on DW3_FACT_INVENTORY.ID_ST_INV = CO_ST_INV.ID_ST_INV ----- -- In this sample we are limiting our selection of items to those -- -- with an inventory state of AVAILABLE FOR SALE so we're not looking -- -- at damaged or reserved balances. We are also only looking at -- -- item on the SALES FLOOR or in the STOCKROOM. The purpose is we -- -- only want to consider merchandise that's saleable. Retailers -- -- may alter this where clause to meet their specific needs. -- ----- where CO_ST_INV.NM_ST_INV = 'AVAILABLE FOR SALE' and DW3_DIM_INVENTORY_LOCATION.NM_LCN in ('SALES_FLOOR','STOCKROOM') group by DW3_FACT_INVENTORY.ID_ITM -- Item ID ,DW3_FACT_INVENTORY.ID_BSN_UN -- Business Unit ,DW3_FACT_INVENTORY.ID_PRD_RP) select INVTY.ID_BSN_UN ,INVTY.ID_PRD_RP ,COUNT(ID_ITM) as QU_ITM_SKU_CARRIED ,SUM(INVTY.STK_OUT_IND) as QU_ITM_STKOUT ,ROUND(SUM(INVTY.STK_OUT_IND)/COUNT(ID_ITM),2) as PCT_STKOUT_ITM from INVTY group by INVTY.ID_BSN_UN ,INVTY.ID_PRD_RP ----- -- End of Business Unit Stock out percentage for a reporting period query -- ----- </pre>
Remarks	
<p>Retailers need to be careful in applying this measure with respect to reporting period. The assumption is that reporting period as applied to this measure is a business day. Longer reporting periods are likely to hide out of stock conditions except for really slow moving products. Note that this also implies that retailers may maintain several different reporting periods AND inventory fact tables. Keep in mind that inventory facts are ALWAYS an expression of inventory in and out flows for a reporting period. <i>If the reporting period changes, the inventory fact table changes.</i></p>	

ARTS KPI's and Performance Measures Narrative Description

Link back to Business narrative: [#SampleMeasure_029](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 21: Item Out of Stock Count

Sample Performance Measure Specification	
Measure Name:	Item Out of Stock Period Count (sample measure 17)
Technical Implementation	
Stored Data Summary Tables	Implemented as subquery
Fact Tables	DW3_FACT_INVENTORY
Dimension Tables	DW3_DIM_INVENTORY_LOCATION DW3_DIM_CA_PRD_RP
Transformation Logic	Use a subquery to count detail level out of stock conditions and to filter rows selected based on sample start and end reporting periods. Use an outer query to summarize the inner query row set by business unit and item, summing the out of stock indicator value. That indicator value counts the number of reporting periods of an item was in an out of stock condition based on period end quantity on hand.
SQL Code	<pre> ----- -- Item Out of Stock Period Count by Item and Business Unit ----- with INVTY as (select DW3_FACT_INVENTORY.ID_ITM -- Item ID ,DW3_FACT_INVENTORY.ID_BSN_UN -- Business Unit ,DW3_FACT_INVENTORY.ID_PRD_RP -- Reporting Period ,sum(DW3_FACT_INVENTORY.QU_END) as QU_END -- Ending Onhand Count ----- -- Next count the out of stock occurrences for this item, -- business unit and reporting period based on our filter -- criteria defined in the where clause ----- ,case when sum(DW3_FACT_INVENTORY.QU_END) < 1 then 1 else 0 end as STK_OUT_IND from DW3_FACT_INVENTORY join DW3_DIM_INVENTORY_LOCATION on DW3_FACT_INVENTORY.ID_LCN = DW3_DIM_INVENTORY_LOCATION.ID_LCN join CO_ST_INV on DW3_FACT_INVENTORY.ID_ST_INV = CO_ST_INV.ID_ST_INV ----- -- Establish the range of reporting periods to cover for the -- stockout occurrence count ----- join DW3_DIM_CA_PRD_RP on DW3_FACT_INVENTORY.ID_PRD_RP = DW3_DIM_CA_PRD_RP.ID_PRD_RP and DW3_DIM_CA_PRD_RP.ID_CLD = 1 ----- -- In this sample we are limiting our selection of items to those -- with an inventory state of AVAILABLE FOR SALE so we're not looking -- at damaged or reserved balances. We are also only looking at -- item on the SALES FLOOR or in the STOCKROOM. The purpose is we -- only want to consider merchandise that's saleable. Retailers -- may alter this where clause to meet their specific needs. ----- where CO_ST_INV.NM_ST_INV = 'AVAILABLE FOR SALE' and DW3_DIM_INVENTORY_LOCATION.NM_LCN in ('SALES_FLOOR','STOCKROOM') and DW3_FACT_INVENTORY.ID_PRD_RP >= 201301 and DW3_FACT_INVENTORY.ID_PRD_RP <= 201306 group by DW3_FACT_INVENTORY.ID_ITM -- Item ID ,DW3_FACT_INVENTORY.ID_BSN_UN -- Business Unit ,DW3_FACT_INVENTORY.ID_PRD_RP) select INVTY.ID_BSN_UN -- Business Unit ,INVTY.ID_ITM -- Item ,SUM(STK_OUT_IND) as QU_RP_STKOUT -- Count of stock out reporting periods from INVTY group by INVTY.ID_BSN_UN ,INVTY.ID_ITM ; ----- -- END Item Out of Stock Period Count by Item and Business Unit ----- </pre>
Remarks	

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Item Out of Stock Period Count (sample measure 17)
Retailers need to be careful in applying this measure with respect to reporting period. The assumption is that reporting period as applied to this measure is a business day. Longer reporting periods are likely to hide out of stock conditions except for really slow moving products. Note that this also implies that retailers may maintain several different reporting periods AND inventory fact tables. Keep in mind that inventory facts are ALWAYS an expression of inventory in and out flows for a reporting period. <i>If the reporting period changes, the inventory fact table has to change and be repopulated using the revised reporting period.</i>	

Link back to Business narrative: [#SampleMeasure_030](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 22: Inventory Freshness

Sample Performance Measure Specification	
Measure Name:	Inventory Freshness (sample measure 18)
Technical Implementation	
Stored Data Summary Tables	Implemented as subquery
Fact Tables	DW3_FACT_INVENTORY
Dimension Tables	CO_ST_INV DW3_DIM_INVENTORY_LOCATION
Transformation Logic	Subquery applies a filter to include items that are available for sale and located on the sales floor or in the stockroom. Also it limits the rowset to a single reporting period. It calculates a single day count value between the system date and first or last date of receipt for each row. Normally a retailer is interested in running this kind of query for the most current reporting period or possibly one back.
SQL Code	<pre> -- Sample inventory freshness query - This sample has arbitray logic to -- -- determine "freshness". This query can be upgraded to incorporate -- -- freshness condition day count ranges that vary by product category and -- -- other item attributes. -- ----- with INVTY as (select DW3_FACT_INVENTORY.ID_ITM ,DW3_FACT_INVENTORY.ID_BSN_UN ,DW3_FACT_INVENTORY.ID_PRD_RP ,DW3_FACT_INVENTORY.DC_INV_FS_RCPT ,DW3_FACT_INVENTORY.DC_INV_LS_RCPT ,case when DW3_FACT_INVENTORY.DC_INV_LS_RCPT is null then DATEDIFF(DD,DW3_FACT_INVENTORY.DC_INV_FS_RCPT,CURRENT_TIMESTAMP) else DATEDIFF(DD,DW3_FACT_INVENTORY.DC_INV_LS_RCPT,CURRENT_TIMESTAMP) end as DY_CNT_SINCE_LST_RCPT from DW3_FACT_INVENTORY join DW3_DIM_CA_PRD_RP on DW3_FACT_INVENTORY.ID_PRD_RP = DW3_DIM_CA_PRD_RP.ID_PRD_RP and DW3_DIM_CA_PRD_RP.ID_CLD = 1 join DW3_DIM_INVENTORY_LOCATION on DW3_FACT_INVENTORY.ID_LCN = DW3_DIM_INVENTORY_LOCATION.ID_LCN join CO_ST_INV on DW3_FACT_INVENTORY.ID_ST_INV = CO_ST_INV.ID_ST_INV where ----- -- In this sample we're limiting freshness to one reporting period -- -- and the inventory state to items that are available for sale -- -- and are on the sales floor or in the stock room. -- ----- DW3_FACT_INVENTORY.ID_PRD_RP = 201301 and CO_ST_INV.NM_ST_INV = 'AVAILABLE FOR SALE' and DW3_DIM_INVENTORY_LOCATION.NM_LCN in ('SALES_FLOOR','STOCKROOM') and DW3_FACT_INVENTORY.DC_INV_FS_RCPT is not null) select INVTY.ID_ITM ,INVTY.ID_BSN_UN ,INVTY.ID_PRD_RP ,INVTY.DY_CNT_SINCE_LST_RCPT ,case when INVTY.DY_CNT_SINCE_LST_RCPT between 0 and 3 then 'FRESH' when INVTY.DY_CNT_SINCE_LST_RCPT between 4 and 7 then 'OUT_OF_DATE' when INVTY.DY_CNT_SINCE_LST_RCPT > 7 then 'UNSALABLE' end as SAMPLE_FRESHNESS_VALUE from INVTY ----- -- END Sample inventory freshness query -- ----- </pre>
Remarks	
This performance measure is typically most relevant for the CURRENT reporting period. Keep in mind that each reporting period will have its own "Inventory Freshness" measure. Also keep in mind the reporting period comments made for the other Inventory Service Level Measures covered in this section of the DWM 3 Narrative document.	

Link back to Business narrative: [#SampleMeasure_031](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 23: Gross Margin Return on Investment

Sample Performance Measure Specification	
Measure Name:	Gross Margin Return on Investment for Item and Business Unit for a Contiguous Block of Reporting Periods (sample measure 19)
Technical Implementation	
Stored Data Summary Tables	
Fact Tables	DW3_FACT_INVENTORY
Dimension Tables	DW3_DIM_CA_PRD_RP DW3_DIM_INVENTORY_LOCATION CO_ST_INV
Transformation Logic	Use subquery to pre-calculate detail (i.e. item, business unit, reporting period level) net unit sales, net sales at retail, gross margin, reporting period beginning stock to sales ratio and gross margin percent. Then in main query, sum the N reporting periods designated in the where clause to derive an average reporting period inventory cost which is used in deriving the GMROI for the item, business unit for the N reporting periods.
SQL Code	<pre> -- GMROI Sample Query with INVTY_DTL as (-- Calculate intermediate values used for GMROI. The values derived -- in this subquery are by item, business unit and reporting period. -- Retailers have to be careful in choosing a reporting period -- for INVENTORY to ensure it is at the appropriate level of -- granularity so it can be summarized into higher level reporting -- periods (which are composed of the lower level reporting periods) -- -- Note that we are extending the INVTY_DTL subquery pattern -- established in earlier samples. This is so users can pick up a -- single consolidated INVTY_DTL subquery that supports a number of -- outer sample queries. The intent is to prepare the detail -- inventory facts for subsequent summarization and analysis along -- different dimensions. Keep in mind that this subquery is working -- at the business unit, item, reporting period level. select -- ARTS most granular level of inventory tracking is by item, -- business unit, location inside a business unit, inventory -- state (i.e. damaged, reserved, available for sale) and revenue -- cost center. This fact data consists of beginning and ending -- unit count balances for a REPORTING PERIOD and cumulative -- counts for different inventory actions (receipts, sales, etc.). DW3_FACT_INVENTORY.ID_ITM -- Item ID (SKU) ,DW3_FACT_INVENTORY.ID_BSN_UN -- Business Unit ,DW3_FACT_INVENTORY.ID_LCN -- Location inside Business Unit ,DW3_FACT_INVENTORY.ID_ST_INV -- Inventory State ,DW3_FACT_INVENTORY.ID_CTR_RVN_CST -- Revenue Cost Center ,DW3_FACT_INVENTORY.ID_PRD_RP -- Reporting Period -- Reporting period summary data in our InventoryFact table ,DW3_FACT_INVENTORY.QU_BGN -- Beginning unit count balance ,DW3_FACT_INVENTORY.QU_RCV -- Cumulative Quantity received ,DW3_FACT_INVENTORY.QU_TSF_IN -- Cumulative Transfer In ,DW3_FACT_INVENTORY.QU_TSF_OT -- Cumulative Transfer Out ,DW3_FACT_INVENTORY.QU_ADJT -- Cumulative Adjustment ,DW3_FACT_INVENTORY.QU_RTN -- Cumulative Customer Returns ,DW3_FACT_INVENTORY.QU_SLS -- Cumulative Sales ,DW3_FACT_INVENTORY.QU_RTV -- Cumulative Return to Vendor ,DW3_FACT_INVENTORY.QU_END -- Ending unit count balance -- Reporting Period Inventory Cost of inventory moved ,DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN as CP_BGN -- Beginning Inventory AT cost ,DW3_FACT_INVENTORY.TC_RCV_CM -- Total cost of receipts based on -- actual receiving item costs -- The following inventory movement costs use the reporting -- period ending average unit cost -- ,DW3_FACT_INVENTORY.QU_TSF_IN * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_TSF_IN -- Transfer in cost ,DW3_FACT_INVENTORY.QU_TSF_OT * DW3_FACT_INVENTORY.CP_UN_AV_WT_END </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Gross Margin Return on Investment for Item and Business Unit for a Contiguous Block of Reporting Periods (sample measure 19)
	<pre> as CP_TSF_OT -- Transfer out cost ,DW3_FACT_INVENTORY.QU_ADJT * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_ADJT -- Adjustment cost ,DW3_FACT_INVENTORY.QU_RTN * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_RTN -- Customer return cost ,DW3_FACT_INVENTORY.QU_SLS * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_SLS -- Sales cost (COGS) ,DW3_FACT_INVENTORY.QU_RTV * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_RTV -- Return to vendor cost ,DW3_FACT_INVENTORY.QU_END * DW3_FACT_INVENTORY.CP_UN_AV_WT_END as CP_END -- Ending inventory AT cost ----- -- GMROI Intermediate Detail Calculations ----- ,DW3_FACT_INVENTORY.QU_SLS - DW3_FACT_INVENTORY.QU_RTN as QU_NET_UN_SLS -- Net sale units ,DW3_FACT_INVENTORY.MO_UN_RTL -- Reporting period current unit -- retail price ----- -- Calculation using counts and current retail - superceded by -- using the cumulative gross sales and returns in the next -- column specification ----- --, (DW3_FACT_INVENTORY.QU_SLS - -- DW3_FACT_INVENTORY.QU_RTN) * -- DW3_FACT_INVENTORY.MO_UN_RTL -- as MO_NET_SLS -- Net sale amount at retail , (DW3_FACT_INVENTORY.TP_SLS_GS_CM - DW3_FACT_INVENTORY.TP_RTN) as MO_NET_SLS -- Monetary Net Sales Amount , (DW3_FACT_INVENTORY.TP_SLS_GS_CM - DW3_FACT_INVENTORY.TP_RTN) - ((DW3_FACT_INVENTORY.QU_SLS - DW3_FACT_INVENTORY.QU_RTN) * DW3_FACT_INVENTORY.CP_UN_AV_WT_END) as MO_GRS_MRGN -- Monetary gross margin amount , (DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN) / (DW3_FACT_INVENTORY.TP_SLS_GS_CM - DW3_FACT_INVENTORY.TP_RTN) as PD_BGN_SLS_STK_RATIO -- Period beginning sales to -- stock ratio. -- Gross Margin Percent , (DW3_FACT_INVENTORY.TP_SLS_GS_CM - DW3_FACT_INVENTORY.TP_RTN) - ((DW3_FACT_INVENTORY.QU_SLS - DW3_FACT_INVENTORY.QU_RTN) * DW3_FACT_INVENTORY.CP_UN_AV_WT_END) / (DW3_FACT_INVENTORY.TP_SLS_GS_CM - DW3_FACT_INVENTORY.TP_RTN) as PCT_GRS_MRGN -- Gross Margin Percent ----- -- END GMROI Detailed Calculations ----- ----- -- Calculate non-additive UNIT facts at most granular level ----- , (DW3_FACT_INVENTORY.QU_BGN + DW3_FACT_INVENTORY.QU_END) / 2 as QU_AVG_INVTY -- Average Inventory UNITS for Reporting -- Period which is a NON-ADDITIVE fact ,DW3_FACT_INVENTORY.QU_SLS / ((DW3_FACT_INVENTORY.QU_BGN + DW3_FACT_INVENTORY.QU_END) / 2) as QU_TRNOVR_INVTY -- Inventory Turnover UNITS -- which is a NON-ADDITIVE fact ----- -- Calculate non-additive COST facts at most granular level </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Gross Margin Return on Investment for Item and Business Unit for a Contiguous Block of Reporting Periods (sample measure 19)
	<pre> -- NOTE: The ODM sums the receipts, transfers, sales and other -- -- actions into a reporting period ending balance (QU_END) so -- -- we use that in this query to calculate ending inventory cost. -- ----- , ((DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN) + (DW3_FACT_INVENTORY.QU_END * DW3_FACT_INVENTORY.CP_UN_AV_WT_END)) / 2 as CP_AVG_INVTY -- Average Inventory COST for Reporting -- Period which is a NON-ADDITIVE fact. , (DW3_FACT_INVENTORY.QU_SLS * DW3_FACT_INVENTORY.CP_UN_AV_WT_END) / ((DW3_FACT_INVENTORY.QU_BGN * DW3_FACT_INVENTORY.CP_UN_AV_WT_BGN) + (DW3_FACT_INVENTORY.QU_END * DW3_FACT_INVENTORY.CP_UN_AV_WT_END)) / 2) as CP_TRNOVR_INVTY -- Inventory Turnover COST -- which is a NON-ADDITIVE fact from DW3_FACT_INVENTORY join DW3_DIM_CA_PRD_RP on DW3_FACT_INVENTORY.ID_PRD_RP = DW3_DIM_CA_PRD_RP.ID_PRD_RP and DW3_DIM_CA_PRD_RP.ID_CLD = 1 join DW3_DIM_INVENTORY_LOCATION on DW3_FACT_INVENTORY.ID_LCN = DW3_DIM_INVENTORY_LOCATION.ID_LCN join CO_ST_INV on DW3_FACT_INVENTORY.ID_ST_INV = CO_ST_INV.ID_ST_INV where ----- -- In this sample we're limiting GMROI to the inventory state for -- -- items that are available for sale and are on the sales floor or -- -- in the stock room. -- ----- CO_ST_INV.NM_ST_INV = 'AVAILABLE FOR SALE' and DW3_DIM_INVENTORY_LOCATION.NM_LCN in ('SALES_FLOOR','STOCKROOM') and DW3_FACT_INVENTORY.DC_INV_FS_RCPT is not null) ----- -- Main query to calculate the GMROI for each business unit and item returned -- -- from the subquery. Keep in mind we filtered the rows to only look at -- -- items available for sale and items on the sales floor and stock room. -- ----- select INVTY_DTL.ID_ITM -- Item ID , INVTY_DTL.ID_BSN_UN -- Business Unit , COUNT(ID_PRD_RP) -- Number of contiguous reporting periods , SUM(INVTY_DTL.CP_END) / (COUNT(ID_PRD_RP) + 1) as MO_RP_AVG_INVTY_CST -- Average Inventory Cost per Reporting Period , SUM(INVTY_DTL.MO_NET_SLS) / (SUM(INVTY_DTL.CP_END) / (COUNT(ID_PRD_RP) + 1)) as ITM_BSN_GMROI -- GMROI per item, business unit, for the -- contiguous set of reporting periods from INVTY_DTL where INVTY_DTL.ID_PRD_RP between 201301 and 201306 -- Sample reporting period ID's group by INVTY_DTL.ID_ITM , INVTY_DTL.ID_BSN_UN ; ----- -- END GMROI Sample Query -- ----- </pre>
Remarks	

Link back to Business narrative: [#SampleMeasure_032](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 24: Average Business Unit Transaction Count Per Weekday for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Average transaction count per business unit per weekday for a reporting period. (Measure 4 Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Use CTE to derive weekday for a date and summarize sales by business unit for reporting period and divide by count of that weekday in a reporting period. See comments in SQL code
SQL Code	<pre> -- Sample Measure 4 - Number of transactions per time per business unit for -- a reporting period. -- -- In this sample we are using Weekday as the "per time" basis for -- calculating a transaction count. -- -- Common table expression to return a count of weekdays in a reporting -- period. This may be used as a way to calculate an average transaction -- count per weekday pre business unit over a reporting period. By weekday -- we mean SUNDAY through SATURDAY elements. -- with WK as (select RP.NM_PRD_RP ,RP.NM_CLD_ ,RP.DC_DY_BSN ,DATEPART(DW,RP.DC_DY_BSN) as wkdy -- Weekday for given business -- day date from dbo.DW3_DIM_CA_PRD_RP RP where RP.NM_PRD_RP = 'SAMPLE REPORTING PERIOD') SELECT SLS.ID_BSN_UN ,WK.NM_CLD ,WK.NM_PRD_RP ,WK.WKDY ,COUNT(SLS.ID_TRN) ,COUNT(WK.WKDY) -- Average Transaction Count per Weekday for a Reporting Period -- For example for a 6 month reporting period store 34 has a SUNDAY average -- transaction count of 123, a Monday average transaction count of 68. This -- is a useful way to look at staffing requirements. ,ROUND(COUNT(SLS.ID_TRN) / COUNT(WK.WKDY),0) AS QU_TR_PER_WKDY FROM -- VW DW3_CT_SLSRTN STRD_SMRY SLS DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP on SLS.DC_DY_BSN = RP.DC_DY_BSN and RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose which calendar and RP.NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include desired reporting period JOIN WK ON WK.NM_PRD_RP = RP.NM_PRD_RP AND WK.NM_CLD = RP.NM_CLD GROUP BY SLS.ID_BSN_UN ,WK.NM_CLD ,WK.NM_PRD_RP ,WK.WKDY ; -- End Sample Measure 4 Query </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure 013](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 25: Average Net Sales Per Transaction by Customer and Channel for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Average net sale per transaction by customer, by channel for a reporting period on a chain-wide basis. (Measure 5 Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum sales for reporting period by customer and channel, divide by period transaction count.
SQL Code	<pre> -- Sample Measure 5 - Average net sales and net margin by customer, by -- channel chain wide for a reporting period -- -- Query - Average net sales and net margin by customer, by channel chain -- chain wide over one reporting period. (Sample Measure 2) -- select DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_STRD_SMRY_CT_SLSRTN.ID_CHNL ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS)as MO_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN) as MO_NET_MRGN ,COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) as QU_TRN ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NT_SLS)/COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_SLS ,SUM(DW3_STRD_SMRY_CT_SLSRTN.MO_NET_MRGN)/COUNT(DW3_STRD_SMRY_CT_SLSRTN.ID_TRN) AS MO_AVG_NT_MRGN from DW3_STRD_SMRY_CT_SLSRTN join DW3_DIM_CA_PRD_RP on DW3_STRD_SMRY_CT_SLSRTN.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' group by DW3_STRD_SMRY_CT_SLSRTN.ID_CT ,DW3_DIM_CA_PRD_RP.ID_PRD_RP ; -- End Sample Measure 5 </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_014](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 26: Chain-wide Percent Net Sales by Channel for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Percent as ratio of net sales by channel over total net sales for a reporting period. (Measure 6 Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum net sales and net margin by channel and divide by total net sale and net margin chain wide for a reporting period
SQL Code	<pre> -- Sample Measure 6 - Net Sales Percent by Channel Chain wide for a reporting -- -- period -- ----- WITH CHNL_SLS AS (SELECT SLS.ID_CHNL ,RP.ID_PRD_RP ,SUM(SLS.MO_NT_SLS) AS NET_SALES ,SUM(SLS.MO_NET_MRGN) AS NET_MARGIN FROM dbo.DW3_STRD_SMRY_CT_SLSRTN SLS JOIN dbo.DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY SLS.ID_CHNL ,RP.ID_PRD_RP) , CHAIN_SLS AS (SELECT RP.ID_PRD_RP ,SUM(SLS.MO_NT_SLS) AS NET_SALES ,SUM(SLS.MO_NET_MRGN) AS NET_MARGIN FROM dbo.DW3_STRD_SMRY_CT_SLSRTN SLS JOIN dbo.DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY RP.ID_PRD_RP) SELECT CHNL_SLS.ID_CHNL ,CHNL_SLS.NET_SALES ,CHNL_SLS.NET_MARGIN ,CHAIN_SLS.NET_SALES ,CHAIN_SLS.NET_MARGIN ,(CHNL_SLS.NET_SALES / CHAIN_SLS.NET_SALES) * 100 AS PCT_CHNL_NET_SALES ,(CHNL_SLS.NET_MARGIN / CHAIN_SLS.NET_MARGIN) * 100 AS PCT_CHNL_NET_MARGIN FROM CHNL_SLS JOIN CHAIN_SLS ON CHNL_SLS.ID_PRD_RP = CHAIN_SLS.ID_PRD_RP ----- -- End Sample Measure 6 -- ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_015](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 27: Chain-wide Percent Tender Type By Channel For Reporting Period

Sample Performance Measure Specification	
Measure Name:	Percent of tender (sales) by channel for reporting period (Measure 7 Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_TNDR
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum tender applied to transaction by channel and tender type for reporting a period, divide by total tender applied for reporting period on a chain-wide basis.
SQL Code	<pre> -- Sample Measure 7 - Sales Percent by Tender Type by Channel, chain wide for -- -- a reporting period. Breaks each chain-wide total tender value for a -- -- tender type down into channels as a percentage of total RP sales -- ----- WITH CHNL_TNDR_TYP_SMRY AS (SELECT SUM(MO_TNDR_SMRY.MO_TRN_ALL_TNDR_APPLD) MO_CHNL_TNDR_TYP_SMRY ,MO_TNDR_SMRY.ID_CHNL ,MO_TNDR_SMRY.TY_TND ,RP.ID_PRD_RP FROM DW3_STRD_SMRY_CT_TNDR MO_TNDR_SMRY JOIN DW3_DIM_CA_PRD_RP RP on MO_TNDR_SMRY.DC_DY_BSN = RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY MO_TNDR_SMRY.ID_CHNL ,MO_TNDR_SMRY.TY_TND ,RP.ID_PRD_RP) , CHAIN_TNDR_SMRY AS (SELECT SUM(MO_TNDR_SMRY.MO_TRN_ALL_TNDR_APPLD) MO_TNDR_TYP_SMRY ,MO_TNDR_SMRY.TY_TND ,RP.ID_PRD_RP FROM DW3_STRD_SMRY_CT_TNDR MO_TNDR_SMRY JOIN DW3_DIM_CA_PRD_RP RP on MO_TNDR_SMRY.DC_DY_BSN = RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY MO_TNDR_SMRY.TY_TND ,RP.ID_PRD_RP) SELECT CHNL_TNDR_TYP_SMRY.ID_CHNL ,CHNL_TNDR_TYP_SMRY.TY_TND ,CHNL_TNDR_TYP_SMRY.ID_PRD_RP ,CHNL_TNDR_TYP_SMRY.MO_CHNL_TNDR_TYP_SMRY ,CHAIN_TNDR_SMRY.MO_TNDR_TYP_SMRY , (CHNL_TNDR_TYP_SMRY.MO_CHNL_TNDR_TYP_SMRY / CHAIN_TNDR_SMRY.MO_TNDR_TYP_SMRY)*100 FROM CHNL_TNDR_TYP_SMRY JOIN CHAIN_TNDR_SMRY ON CHNL_TNDR_TYP_SMRY.ID_PRD_RP = CHAIN_TNDR_SMRY.ID_PRD_RP AND CHNL_TNDR_TYP_SMRY.TY_TND = CHAIN_TNDR_SMRY.TY_TND ; -- End Sample Measure 7 ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure 016](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 28: Chain-wide Percent Transactions By Channel for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Percent of transaction (count) by channel for a reporting period (Measure 9 Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum transaction count by channel and divide by total transaction count for a reporting period.
SQL Code	<pre> -- Sample Measure 8 - Transaction count percent by channel Chain Wide -- for a reporting period. -- ----- WITH CHNL_SLS AS (SELECT SLS.ID_CHNL ,RP.ID_PRD_RP ,COUNT(SLS.ID_TRN) AS QU_TRN FROM dbo.DW3_STRD_SMRY_CT_SLSRTN SLS JOIN dbo.DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY SLS.ID_CHNL ,RP.ID_PRD_RP) ,CHAIN_SLS AS (SELECT RP.ID_PRD_RP ,COUNT(SLS.ID_TRN) AS QU_TRN FROM dbo.DW3_STRD_SMRY_CT_SLSRTN SLS JOIN dbo.DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY RP.ID_PRD_RP) SELECT CHNL_SLS.ID_CHNL ,CHNL_SLS.QU_TRN ,CHAIN_SLS.QU_TRN ,(CHNL_SLS.QU_TRN / CHAIN_SLS.QU_TRN) * 100 AS PCT_CHNL_TRNS FROM CHNL_SLS JOIN CHAIN_SLS ON CHNL_SLS.ID_PRD_RP = CHAIN_SLS.ID_PRD_RP ----- -- End Sample Measure 8 -- ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_017](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 29: Transaction Count Percent by Channel Chain-wide for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Reporting Period, Chain-wide Transaction Percent By Channel
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum transaction counts by channel divide by total transaction count for a reporting period
SQL Code	<pre> -- Sample Measure 8 - Transaction count percent by channel Chain Wide -- for a reporting period. -- ----- WITH CHNL_SLS AS (SELECT SLS.ID_CHNL ,RP.ID_PRD_RP ,COUNT(SLS.ID_TRN) AS QU_TRN FROM dbo.DW3_STRD_SMRY_CT_SLSRTN SLS JOIN dbo.DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY SLS.ID_CHNL ,RP.ID_PRD_RP) ,CHAIN_SLS AS (SELECT RP.ID_PRD_RP ,COUNT(SLS.ID_TRN) AS QU_TRN FROM dbo.DW3_STRD_SMRY_CT_SLSRTN SLS JOIN dbo.DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 Retail Calendar' and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY RP.ID_PRD_RP) SELECT CHNL_SLS.ID_CHNL ,CHNL_SLS.QU_TRN ,CHAIN_SLS.QU_TRN ,(CHNL_SLS.QU_TRN / CHAIN_SLS.QU_TRN) * 100 AS PCT_CHNL_TRNS FROM CHNL_SLS JOIN CHAIN_SLS ON CHNL_SLS.ID_PRD_RP = CHAIN_SLS.ID_PRD_RP -- End Sample Measure 8 -- ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure 018](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 30: Customer Acquisition Rate

Sample Performance Measure Specification	
Measure Name:	Customer Acquisition Rate (Measure 13 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CT DW3_DIM_CA_PRD_RP
Transformation Logic	Count newly registered customers for a reporting period and divide it by total retail transaction customer count (distinct customers) during the reporting period
SQL Code	<pre> -- Sample Measure 13 - Customer Acquisition Rate expressed as the percentage -- -- ratio of newly registered customers to total active customers for a -- -- reporting period on a CHAIN WIDE BASIS. -- ----- WITH RP_NEW_CT AS (----- -- Count customer registrations (new customers) completed for a -- -- reporting period based on registration date match to business day -- -- date for a reporting period -- ----- SELECT RP.NM_PRD_RP ,COUNT(CT.ID_CT) QU_NW_CT FROM DW3_DIM_CT CT JOIN DW3_DIM_CA_PRD_RP RP ON CT.DT_RGSTN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 ReTail Calendar' AND NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY RP.NM_PRD_RP) , CT_ACTV AS (SELECT DISTINCT RP.NM_PRD_RP ,COUNT(ID_CT) AS QU_ACTV_CT FROM DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 ReTail Calendar' AND NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY RP.NM_PRD_RP) SELECT NEW.NM_PRD_RP ,NEW.QU_NW_CT ,ACTV.QU_ACTV_CT ,ROUND(NEW.QU_NW_CT / ACTV.QU_ACTV_CT,2)*100 AS PCT_RP_NW_CT FROM RP_NEW_CT NEW JOIN CT_ACTV ACTV ON NEW.NM_PRD_RP = ACTV.NM_PRD_RP ----- -- End Sample Measure 13 -- ----- </pre>
Remarks	

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 31: Customer Longevity

Sample Performance Measure Specification	
Measure Name:	Customer Longevity (Measure 16 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CT
Transformation Logic	Calculate day count between system date (cutoff date for this sample) and earliest date of a customer's transaction.
SQL Code	<pre>-- Sample Measure 16 - Customer Longevity (IN DAYS) -- ----- SELECT CT_SLS.ID_CT ,MIN(CT_SLS.DC_DY_BSN) DC_FST_CT_SLS ,DATEDIFF(D,MIN(CT_SLS.DC_DY_BSN),GETDATE()) as QU_DY_CT_LONGEVITY ,CT.LN_PRS ,CT.FN_PRS ,CT.NM_PRS_ML FROM DW3_STRD_SMRY_CT_SLSRTN CT_SLS JOIN DW3_DIM_CT CT ON CT_SLS.ID_CT = CT.ID_CT GROUP BY CT_SLS.ID_CT ,CT.LN_PRS ,CT.FN_PRS ,CT.NM_PRS_ML ;</pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_019](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 32: Chain-wide Customer Profit By Reporting Period

Sample Performance Measure Specification	
Measure Name:	Customer Profit by Reporting Period on a Chain-wide basis (Measure 17 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum net margin for each customer and divide by transaction count on a chain-wide basis for a reporting period.
SQL Code	<pre> -- Sample Measure 17 - Customer Profit by Reporting Period chain wide -- SELECT RP.NM_PRD_RP ,SLS.ID_CT ,SUM(SLS.MO_NT_SLS) -- Net Sales ,SUM(SLS.MO_NET_MRGN) -- Gross Margin on Net Sales FROM DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP ON SLS.DC_DY_BSN = RP.DC_DY_BSN AND RP.NM_CLD = 'NRF 4-5-4 ReTail Calendar' AND NM_PRD_RP = 'SAMPLE REPORTING PERIOD' GROUP BY RP.NM_PRD_RP ,SLS.ID_CT -- End Sample Measure 17 </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_020](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 33: Chain-wide Usage of Proprietary Credit/Debit Tender as Percent

Sample Performance Measure Specification	
Measure Name:	Customer utilization of proprietary CR/DB card as a percent of their total use of all CR/DB card during a reporting period on a chain-wide basis (Measure 23 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	
Fact Tables	DW3_FACT_TENDER_BEHAVIOR
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Use CTE, first query counts proprietary tender transactions, second query counts ALL CR/DB tenders and the final query calculates the ratio of proprietary to non-proprietary tender transaction counts
SQL Code	<pre> -- Sample Measure 23 - Customer use of proprietary DB/CRD as a percent of -- their total use of all DB/CRD card on a CHAIN WIDE basis. Total use as -- used here means the percent of TRANSACTION COUNT. This is intended to -- determine proprietary DB/CRD penetration by customer for a reporting -- period on a chain wide basis. ----- With CT_PRPRTY_CRDB_TNDR_ACTVITY as (----- -- Count the number of customer transactions by specific credit -- debit credit card brand (one which is the retailer's proprietary -- brand card). ----- select DISTINCT DW3_FACT_TENDER_BEHAVIOR.ID_CT -- Customer ,DW3_DIM_CA_PRD_RP.ID_PRD_RP -- Reporting ,DW3_FACT_TENDER_BEHAVIOR.TY_TND -- Tender type ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD -- Credit Debit card ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN -- Brand ,COUNT(DW3_FACT_TENDER_BEHAVIOR.ID_TRN) AS QU_PRPRTY_TNDR -- Transaction from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include ----- where ----- -- In this sample we are limiting our analysis to non-proprietary -- debit/credit cards. ----- DW3_FACT_TENDER_BEHAVIOR.TY_TND in ('CREDIT','DEBIT') And DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD = 'HOUSE CARD' and DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN = 'SAMPLE PROP' group by DW3_FACT_TENDER_BEHAVIOR.ID_CT -- Customer ,DW3_DIM_CA_PRD_RP.ID_PRD_RP -- Reporting period ,DW3_FACT_TENDER_BEHAVIOR.TY_TND -- Tender type ,DW3_FACT_TENDER_BEHAVIOR.CRDB_TY_CRD -- Credit Debit card ,DW3_FACT_TENDER_BEHAVIOR.CRDB_ID_TND_MD_BRN -- Brand) , CT_ALL_CRDB_TNDR_ACTVITY as (----- -- Count the number of customer transactions for ALL debit credit -- card transactions. Note here we're looking at market penetration -- into DB CR card use so we only consider DB/CR tender types. This -- query could be modified to include ALL tender types if needed. ----- select DISTINCT DW3_FACT_TENDER_BEHAVIOR.ID_CT -- Customer ,DW3_DIM_CA_PRD_RP.ID_PRD_RP -- Reporting period ,DW3_FACT_TENDER_BEHAVIOR.TY_TND -- Tender type ,COUNT(DW3_FACT_TENDER_BEHAVIOR.ID_TRN) AS QU_ALL_CRDB_TNDR -- Transaction from DW3_FACT_TENDER_BEHAVIOR join DW3_DIM_CA_PRD_RP on DW3_FACT_TENDER_BEHAVIOR.DC_DY_BSN = DW3_DIM_CA_PRD_RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include ----- where ----- -- In this sample we are limiting our analysis to non-proprietary ----- </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Customer utilization of proprietary CR/DB card as a percent of their total use of all CR/DB card during a reporting period on a chain-wide basis (Measure 23 from Sample Performance Measure Specification Spreadsheet)
	<pre> -- debit/credit cards. ----- DW3_FACT_TENDER_BEHAVIOR.TY_TND in ('CREDIT','DEBIT') group by DW3_FACT_TENDER_BEHAVIOR.ID_CT -- Customer ,DW3_DIM_CA_PRD_RP.ID_PRD_RP -- Reporting period ,DW3_FACT_TENDER_BEHAVIOR.TY_TND -- Tender type) SELECT PRPTY_CRDB.ID_CT ,PRPTY_CRDB.ID_PRD_RP ,PRPTY_CRDB.TY_TND ,PRPTY_CRDB.CRDB_TY_CRD -- Credit Debit card ,PRPTY_CRDB.CRDB_ID_TND_MD_BRN -- Brand ,PRPTY_CRDB.QU_PRPTY_TNDR -- Prop. DB CR trans count ,ALL_CRDB.QU_ALL_CRDB_TNDR -- ALL DB CR trans count ,(PRPTY_CRDB.QU_PRPTY_TNDR / ALL_CRDB.QU_ALL_CRDB_TNDR)*100 -- Prop pct of ALL FROM CT PRPTY_CRDB TNDR ACTVTY PRPTY_CRDB JOIN CT ALL_CRDB TNDR ACTVTY ALL_CRDB ON PRPTY_CRDB.ID_CT = ALL_CRDB.ID_CT AND PRPTY_CRDB.ID_PRD_RP = ALL_CRDB.ID_PRD_RP AND PRPTY_CRDB.TY_TND = ALL_CRDB.TY_TND ; ----- -- End Measure 23 ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_021](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 34: Chain Wide Net Sales By Channel – Customer Segment for a Reporting Period

Sample Performance Measure Specification	
Measure Name:	Net sales percent by Channel, by customer segment for a reporting period on a chain-wide basis (Measure 24 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Use CTE, first query sums sales by channel and customer for a reporting period, second query sums sales for a reporting period, third sums customer sales by sample set of segment attributes and divides that value by total sales from 2 nd query yielding the ratio of custom-segment channel sales to total sales.
SQL Code	<pre> -- Measure 24 - Net sales by channel, by customer segment for a reporting period -- -- period divided by total net sales for a reporting period - this is a -- -- chain-wide measure. There are a lot of different ways to segment -- -- customers in ARTS. In this example three dimensions are identified to -- -- segment customers - gender, marital status, life stage. Retailers can -- -- adapt this query to use more or fewer segmentation attributes in the -- -- DW3_DIM_CT. -- ----- WITH SLS_BY_CT_CHNL AS (----- -- Sum sales for each customer by channel for reporting period -- ----- SELECT SLS.ID_CT ,SLS.ID_CHNL ,RP.NM_PRD_RP ,SUM(SLS.MO_NT_SLS) MO_RP_NT_SLS_CT_CHNL ,SUM(SLS.MO_NET_MRGN) MO_RP_NET_MRGN_CT_CHNL FROM DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP on SLS.DC_DY_BSN = RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- which calendar -- Filter to include -- desired reporting GROUP BY SLS.ID_CT ,SLS.ID_CHNL ,RP.NM_PRD_RP) , RP_TOT_SLS AS (SELECT RP.NM_PRD_RP ,SUM(SLS.MO_NT_SLS) AS MO_RP_TOT_NT_SLS ,SUM(SLS.MO_NET_MRGN) AS MO_RP_TOT_NET_MRGN FROM DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP on SLS.DC_DY_BSN = RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- which calendar -- Filter to include -- desired reporting GROUP BY RP.NM_PRD_RP) SELECT SLS_CT_CHNL.ID_CHNL ,SLS_CT_CHNL.NM_PRD_RP ,CT.TY_GND_PRS -- Gender ,CT.CD_MRTL_STS -- Marital status ,CT.CD_LF_STG -- Life stage ----- -- Net Sales \$ for customer segment and channel, total net sales and -- -- ratio of two to arrive at pct customer segment and channel net sales -- -- of total net sales for a reporting period. -- ----- ,SUM(MO_RP_NT_SLS_CT_CHNL) AS MO_RP_SLS_CHNL_CTSGMT ,RP_TOT_SLS.MO_RP_TOT_NT_SLS ,(SUM(MO_RP_NT_SLS_CT_CHNL) / RP_TOT_SLS.MO_RP_TOT_NT_SLS) * 100 ----- -- Gross margin on net sales for customer segment and channel, total -- -- gross margin on net sales and ratio of the two to arrive at pct -- -- customer segment and channel gross margin on net sales of total -- -- gross margin for a reporting period -- ----- ,SUM(MO_RP_NET_MRGN_CT_CHNL) AS MO_RP_NET_MRGN_CHNL_CTSGMT </pre>

ARTS KPI's and Performance Measures Narrative Description

Sample Performance Measure Specification	
Measure Name:	Net sales percent by Channel, by customer segment for a reporting period on a chain-wide basis (Measure 24 from Sample Performance Measure Specification Spreadsheet)
	<pre> ,RP_TOT_SLS.MO_RP_TOT_NET_MRGN ,(SUM(MO_RP_NET_MRGN_CT_CHNL)/RP_TOT_SLS.MO_RP_TOT_NET_MRGN) * 100 FROM SLS BY CT_CHNL SLS CT_CHNL JOIN RP_TOT_SLS RP_TOT_SLS ON SLS_CT_CHNL.NM_PRD_RP = RP_TOT_SLS.NM_PRD_RP JOIN DW3_DIM_CT CT ON SLS_CT_CHNL.ID_CT = CT.ID_CT GROUP BY SLS_CT_CHNL.ID_CHNL -- Channel ID ,SLS_CT_CHNL.NM_PRD_RP -- Reporting period name ,CT.TY_GND_PRS -- Gender ,CT.CD_MRTL_STS -- Marital status ,CT.CD_LF_STG -- Life stage ,RP_TOT_SLS.MO_RP_TOT_NT_SLS ,RP_TOT_SLS.MO_RP_TOT_NET_MRGN ; ----- -- End Sample Measure 24 ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure 022](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 35: Chain Wide Average Gross Margin Per Retail Transaction

Sample Performance Measure Specification	
Measure Name:	Average profit (gross margin on net sales) per retail transaction for a reporting period on a chain-wide basis (Measure 26 from August Measure)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum gross margin for reporting period divide by transaction count
SQL Code	<pre> -- Sample Measure 26 - Average Transaction Profit per Retail transaction for -- -- a reporting period, chain-wide -- ----- SELECT RP.NM_PRD_RP ,SUM(SLS.MO_NET_MRGN) AS TOT_NET_MRGN ,COUNT(SLS.ID_TRN) AS TRN_COUNT ,ROUND(SUM(SLS.MO_NET_MRGN)/COUNT(SLS.ID_TRN),2) AS MO_RP_AVG_NET_MRGN FROM DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP on SLS.DC_DY_BSN = RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose -- which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include -- desired reporting GROUP BY RP.NM_PRD_RP ; ----- -- End Sample Measure 26 -- ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure 023](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 36: Chain-wide Average UNIT Retail Price and Gross Margin for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Average UNIT retail price (actual price paid by customers for an item) and profit chain-wide for a reporting period. (Measure 27 and 28 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	DW3_STRD_SMRY_CT_SLSRTN
Fact Tables	
Dimension Tables	DW3_DIM_CA_PRD_RP
Transformation Logic	Sum net sales and divide by transaction item count for a reporting period.
SQL Code	<pre> -- Sample Measure 27 and 28 - Average UNIT retail price (actual price paid by -- -- customers for an item chain wide for a reporting period and Average UNIT -- -- gross margin on net sales for a reporting period -- ----- SELECT RP.NM_PRD_RP ,SUM(SLS.MO_NT_SLS) AS MO_TOT_NT_SLS -- Sum of net sales for RP ,SUM(SLS.MO_NET_MRGN) AS MO_TOT_NET_MRGN -- Sum of net margin for RP ,SUM(SLS.QU_ITM_SLD) QU_TOT_ITM_SLD -- Sum of item counts for transactions -- in rpt period ----- -- Calculate average UNIT net sales and gross margin ----- ,ROUND(SUM(SLS.MO_NT_SLS)/SUM(SLS.QU_ITM_SLD),2) AS MO_AVG_UNIT_NT_SLS ,ROUND(SUM(SLS.MO_NET_MRGN)/SUM(SLS.QU_ITM_SLD),2) AS MO_AVG_UNIT_NET_MRGN -- -- ,COUNT(SLS.ID_TRN) -- Count of retail transaction -- ,ROUND(SUM(SLS.MO_NET_MRGN)/COUNT(SLS.ID_TRN),2) AS MO_RP_AVG_NET_MRGN FROM DW3_STRD_SMRY_CT_SLSRTN SLS JOIN DW3_DIM_CA_PRD_RP RP on SLS.DC_DY_BSN = RP.DC_DY_BSN and NM_CLD = 'NRF 4-5-4 Retail Calendar' -- Filter to choose -- which calendar and NM_PRD_RP = 'SAMPLE REPORTING PERIOD' -- Filter to include -- desired reporting GROUP BY RP.NM_PRD_RP ; ----- -- End Sample measure 27 & 28 ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure 024](#)

ARTS KPI's and Performance Measures Narrative Description

Technical Sample Specification 37: Chain-wide Monthly Average Sales by Tender Type & Brand for Reporting Period

Sample Performance Measure Specification	
Measure Name:	Monthly average net sales by tender type and tender media brand for a reporting period on chain-wide basis (Measure 29 from Sample Performance Measure Specification Spreadsheet)
Technical Implementation	
Stored Data Summary Tables	
Fact Tables	DW3_FACT_TENDER_BEHAVIOR
Dimension Tables	DW3_DIM_CA_PRD_RP VW_RP_MNTH_COUNT (precalculated month count for each reporting period)
Transformation Logic	Sum tender amount by tender type and tender type brand for a reporting period and divide by the months in a reporting period.
SQL Code	<pre> -- Sample Measure 29 - Monthly average net sale by tender type and tender -- -- media brand for a reporting period on a chain-wide basis -- ----- SELECT RP.NM_CLD ,RP.NM_PRD_RP ,TNRD.TY_TND ,TNRD.CRDB_TY_CRD ,TNRD.CRDB_ID_TND_MD_BRN ,SUM(TNRD.MO_TRN_AMT) AS MO_TNRD_AMT ,RP_MNTH.MNTH_COUNT AS MNTH_COUNT ,ROUND(SUM(TNRD.MO_TRN_AMT)/RP_MNTH.MNTH_COUNT,2) AS MO_MNTHLY_AVG_TNRD FROM DW3_FACT_TENDER_BEHAVIOR TNRD JOIN DW3_DIM_CA_PRD_RP RP ON TNRD.DC_DY_BSN = RP.DC_DY_BSN JOIN VW_RP_MNTH_COUNT RP_MNTH ON RP.NM_CLD = RP_MNTH.NM_CLD AND RP.NM_PRD_RP = RP_MNTH.NM_PRD_RP GROUP BY RP.NM_CLD ,RP.NM_PRD_RP ,TNRD.TY_TND ,TNRD.CRDB_TY_CRD ,TNRD.CRDB_ID_TND_MD_BRN ,RP_MNTH.MNTH_COUNT ; -- End Sample Measure 29 -- ----- </pre>
Remarks	

Link back to Business Narrative: [#SampleMeasure_025](#)

3 Conclusion

This set of sample KPI's and performance measures shows how to use the ARTS DWM-3 to derive useful decision support information. Future releases of the data warehouse model will include additional sample KPI's and performance measures.

3.1 Comments, Corrections and Feedback

Please post any comments or correction you have to the ARTS Web Site under Questions/Comments.