

IBM Retail Data Warehouse General Information Manual



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Executive Summary

The Retail Data Warehouse

The IBM Information FrameWork (IFW) and IBM Retail Data Warehouse (RDW) accelerate development and mitigate risks associated with enterprise data management, data warehousing and Business Intelligence application development. RDW is a data management toolkit with detailed industry content covering the full spectrum of the retail sector. The data warehouse enables retailers to exploit the potential of detailed information previously locked in legacy systems or summarized in distributed data marts, making them inaccessible to the business user. RDW encourages retailers to adopt a business-focused approach to transforming into an on-demand business when building Business Intelligence and data management solutions, and incorporates IBM's implementation experiences gained at hundreds of such engagements. RDW is currently in use by several retailers, large and small, around the world.

The Retail Market

The enormous challenges facing retailers in today's economic climate is so complex that only those enterprises who have business agility gained by confident and focused decision support can effectively compete. Today's retailer needs analytical visibility in many critical areas of their enterprise such as:

- Customer Segmentation and Management
- Product and Service Management
- Merchandising
- Store Operations
- Multi-Channel Replenishment
- Regulatory Compliance

Overall, the retail industry is turning to a more customer-centric strategy that focuses on how to transform their businesses and differentiate them so as to attract customers and instill loyalty to their brand. It is a known fact that it costs five times as much to acquire new customers than to retain existing customers. To do so, they need to better leverage the data they collect about their customers. Transforming their supply chains in order to put the right products in the right place at the right time is critical so that consumers get those products when and where they want. Retailers must empower their home office and store employee teams by giving them the tools they need to do their jobs more effectively. They must optimize their existing infrastructures to deploy innovation quickly, cost effectively and securely. To meet these challenges, retailers need to fully analyze the data generated by their businesses and external data made available by government, industry experts, the media and surveys. Unfortunately, all this data is diverse, complex and is not available in a form that clearly indicates trends, patterns or other forms of analysis that support the decisions required to drive the business confidently. In short, it lacks business intelligence. Implementing the RDW can alleviate these problems.

Uses of the RDW

- **Common Customer View**
Integrating customer identifiers, organizational structures and account hierarchies across lines of business and functions.
- **Product Life-cycle Management**
Integrating product management and performance measurement across lines of business and functions in merchandising planning and category management.
- **Campaign Performance Management**
Improving program planning and tracking of sales and marketing activities and performance metrics across channels and touch points.
- **Analytical Customer Relationship Management**
Integrating Customer Segmentation, Data Mining, Online Analytical Processing (OLAP) and Campaign Management in closed-loop CRM.

- **Data Warehouse and Data Mart Consolidation**

Reengineering legacy data warehouse and BI infrastructure, consolidating data repositories and analytical reporting requirements.

- **Other Data Management Solutions**

Establishing data architectures for Enterprise Application Integration (EAI), Service Oriented Architectures (SOA) and other near real-time data analysis such as operational data stores for fraud management.

- **Channel Effectiveness**

Defining the metrics associated with the means by which a product is merchandised to a customer in the most successful and cost effective manner.

Data Integration and BI Self Service

RDW is designed with data integration and change management at its core. Retailers who implement data models biased towards their existing source systems and BI requirements typically fail to integrate the data and make query development much more difficult for IT as well as business end users. RDW enables retailers to create BI self-service models that clearly separate the responsibility for data integration from the responsibility for business analytics. RDW enables IT departments to take the lead in maintaining the integration of volatile source data with RDWM. This enables the Lines of business to focus on defining analytical requirements, priorities and designs.

Reengineering

RDW also offers an iterative, project-by-project approach for reengineering an existing data warehouse or other core applications based on cost/benefit analysis that assures a phased procession of low-risk, high-return projects well aligned with business priorities.

Business Advantages of the RDW

A data warehouse designed with RDW will enable retailers to not only respond positively to the pressures they face but actually translate these pressures into business advantage. There are several areas of business advantage that can be leveraged by the construction of an RDW-based data warehouse:

- **Customer Segmentation**

Who shops in my store and how do I bring more of my best customers into my store?

- **Store Segmentation**

What store profile sells what merchandise, impacting LOMO assortment?

- **Market Basket Analysis**

What do they buy? How can I increase my transaction size?

- **Promotion Targeting**

Targeting promotions to customers based on behavior. Who responds to offers and how can I increase closure rate?

- **Replenishment**

What is my optimum inventory productivity? How can I reduce my out of stocks and prevent costly inventory overages?

- **Store Formatting**

What sells with what? How can I up-sell my customer?

- **Supplier Performance**

What is the true contribution of my suppliers? Who can I depend on? Who is delivering real margin?



Data Warehousing with RDW

Building a Data Warehouse

If the benefits of business transformation through improved data management are to be achieved, a comprehensive specification of the organization's data and analytical requirements is required. In fact, the data and solutions models should be independent of the volatile core data architecture and current analytical reporting requirements. Designing and implementing such data and solution models can be a complex process and many organizations may not have the appropriate skills available in house. The best-practice solution is to leverage the data and solution model templates from third parties reducing project risk, cost and time-to-implementation.

RDW enables retailers to build data warehouse solutions to suit their specific needs. RDW includes all the key components required for a data warehousing solution. RDW comprises a flexible and scalable data warehouse infrastructure, enabling retailers to build both comprehensive enterprise data warehouses as well as departmental data marts through rapid and phased development. RDW unleashes data management solutions with high business value by enabling retailers to initially focus on business areas offering the greatest returns and technical feasibility. This approach assures that parallel or subsequent projects will be aligned with a single, proven data architecture. While the Industry Models help clients define and describe a unified view of their analytical data that persists in a data warehouse, in order for the analytical solution to work, IBM Information Server enables organizations to understand their existing data sources, to cleanse, correct and standardize information and to load the information into the data warehouse.

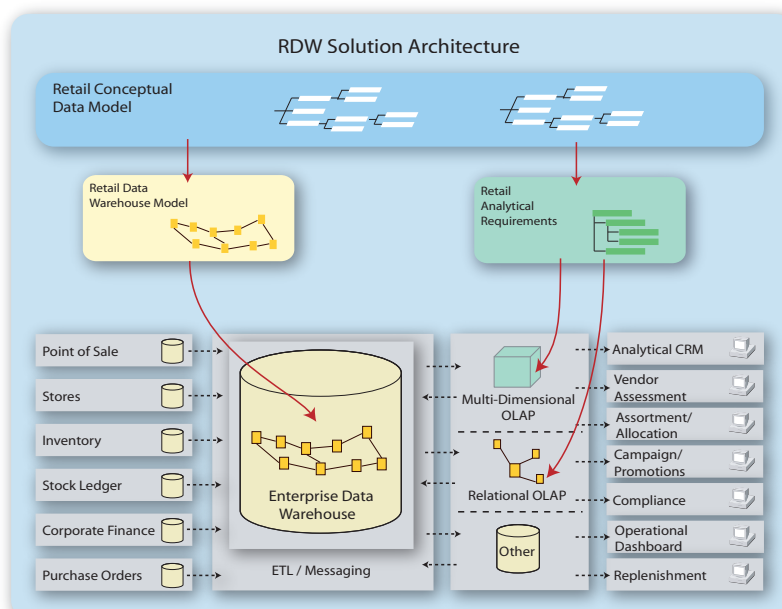
RDW Solution Architecture

Data warehousing and Business Intelligence solutions are based on the basic assumptions that:

- line of business and functional users have a set of analytical reporting requirements
- a set of data is available to draw the information from

These two assumptions represent two divergent approaches to define project scope. The first is a top-down business-oriented approach, while the second is a bottom-up data driven approach. Best practice is to employ a combined approach and a gap analysis to determine:

- the final project scope
- instances where there is no data to satisfy specific business requirement
- instances where there are no identified business use cases for certain data sets in the source systems



RDW Components

RDW is composed of three components that assist with analytical BI: The Retail Data Warehouse Model (RDWM), the Retail Services Data Model and the RDW Analytical Requirements.

Retail Data Warehouse Model

RDWM provides a highly normalized and generic, enterprise entity relationship diagram (ERD) for a variety of retail data management solutions. Comprising over 830 entities and 4,100 attributes it forms the blueprint for implementing a data warehouse. RDWM supports rapid, phased implementation of data management solutions with a well-defined, proven data model. The content and customization of RDWM are described in detail in the Retail Data Warehouse Model section.

Retail Analytical Requirements

The Analytical Requirements consist of over 85 best-practice business scorecards grouped by reporting area. Analytical Requirements provide immediate benefits to a Business Intelligence initiative in two ways:

- They provide a proven means for gathering business requirements through customizing a range of predefined OLAP models.
- Once customized, the modified Analytical Requirements then provide design templates for the physical generation of MOLAP cubes and ROLAP reports.

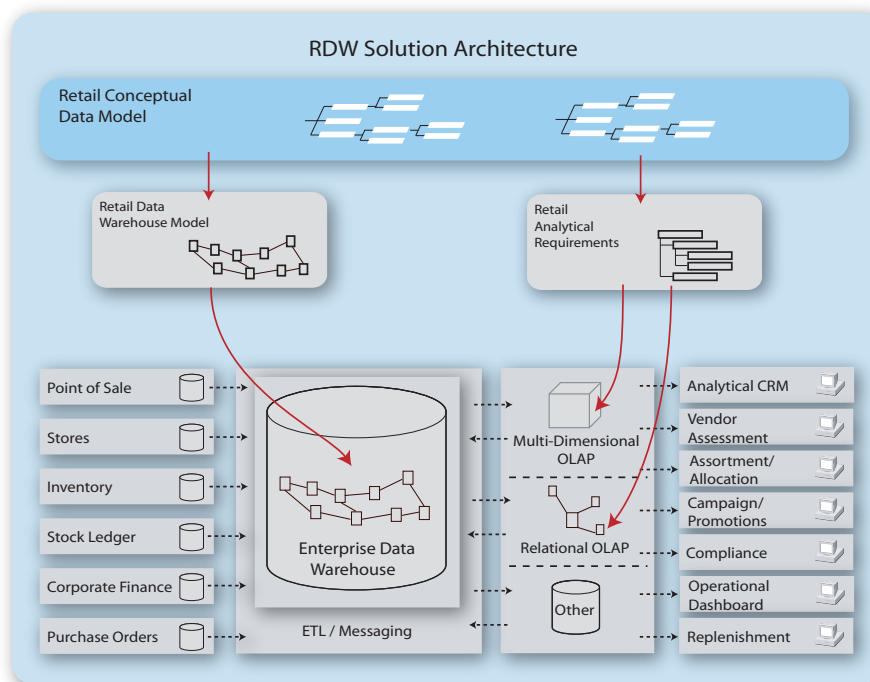
Analytical Requirements enable business users to manage more efficiently the scope and design of a data warehousing development or reengineering project. The content and usage of Analytical Requirements are described in detail in the Retail Analytical Requirements section.

RDW Customization

- Use the Analytical Requirements to interview the lines of business and gather business requirements. This provides a top-down project scope based on overlapping business requirements. Many requirements refer to the same set of measures and dimensions.
- Perform a gap analysis between the data scope and business scope to determine overall feasibility and the reduced project scope. Then, instead of data modeling, we customize RDWM System of Record and summary tables based on the reduced project scope. This is the initial guide for ETL design.
- Use the customized Analytical Requirements to design MOLAP cubes and dependent ROLAP reports.
- ETL programmers will continue to refine RDWM System of Record model during ETL design and testing by adding additional subtypes and attributes. The highly normalized nature of RDWM allows for this type of parallel ETL development without breaking other ETL processes and BI applications under development.



Retail Conceptual Model



What is the Retail Conceptual Model?

The Retail Conceptual Model is a classification model designed specifically for the retail industry, containing thousands of carefully constructed business definitions reflecting many person-years of analysis. It provides an enterprise-wide view of generic information concepts in retail. The Conceptual Model has been developed to provide a retailer with a “jump start” in its model development process and assists in maximizing the value of information. The Conceptual Model is a generic model, defining data that is common between retailers. The information reflected in the model is independent of organizational structure and has been validated by multiple retailers.

The Conceptual Model is a business model that:

- Provides a vehicle for merging requirements of existing models
- Is designed for stability, flexibility and reusability
- Is designed to incorporate classification, inheritance, object state behavior and other concepts of object-oriented design.

Using this model, the information management team can be proactive in supporting a retailer’s response to the dramatic changes that are driving the retail industry. The Conceptual Model represents at least 80% of the information captured by the core applications that support a retailer’s core business. The Conceptual Model is not simply a bland listing of data types and definitions. The structure of the model is designed to address some of the key issues facing retailers in the current environment of strong competition and accelerating technological change. The Conceptual Model is structured in a hierarchical, top-to-bottom structure with multiple layers of business content models containing industry standard business definitions. Each layer of the structure contains a model that provides a more detailed view based on the previous layer.

Issues Addressed by the Retail Conceptual Model

Improved customer care

The Conceptual Model reflects the complex interrelationships between customers and between customers and the retailer. It distinguishes between the natures of the customers themselves and the relationship the customer has with the retailer. The Conceptual Model is therefore a pivotal component in the retailer's response to changing market dynamics. It enables the business to refine its approach to the management of customer relationships while providing information systems staff with a blueprint for integrated customer care systems.

Rapid development of new products

The Conceptual Model recognizes that products should be rapidly assembled from fundamental components and readily packaged together. It understands the distinction between marketable products and the resources that make up those products. Further, it recognizes the complex ways in which a product may be acquired by a customer and then operated in the field. By clarifying the distinction between a marketed product and the technical capability required to deliver that product, the Conceptual Model enables the retailer to plan and manage the increasingly complex relationships between services offered and the means of providing those services.

Complex relationships with competitors

The Conceptual Model recognizes that competitors are also customers and, on occasion, strategic partners. It allows for these changing roles and the policies, regulations and agreements that impact these roles.

Integration of business and store operations

The Conceptual Model does not differentiate data according to lines of business or organizational structures. The model reflects a fully integrated view of data that can be used by all segments of the business. The model focuses on providing the retailer with a means of understanding the different facets of each business challenge and how those facets can be combined into a solution. It cuts through the confusion of legacy systems and provides the path to co-ordination between store operations and business applications.

Retail Conceptual Model Benefits

The Conceptual Model has been developed with the assistance of retail professionals. The structure, especially that of the business model, has been designed to facilitate the understanding and navigation of the model by those who may have had minimal exposure to data modeling. At the same time, the structure and rigor of the Conceptual Model satisfies the needs of Business Analysts. Consequently, the Conceptual Model provides a communication bridge between the data warehousing project team and core technical staff as well as line of business and functional users.

In addition, the Conceptual Model:

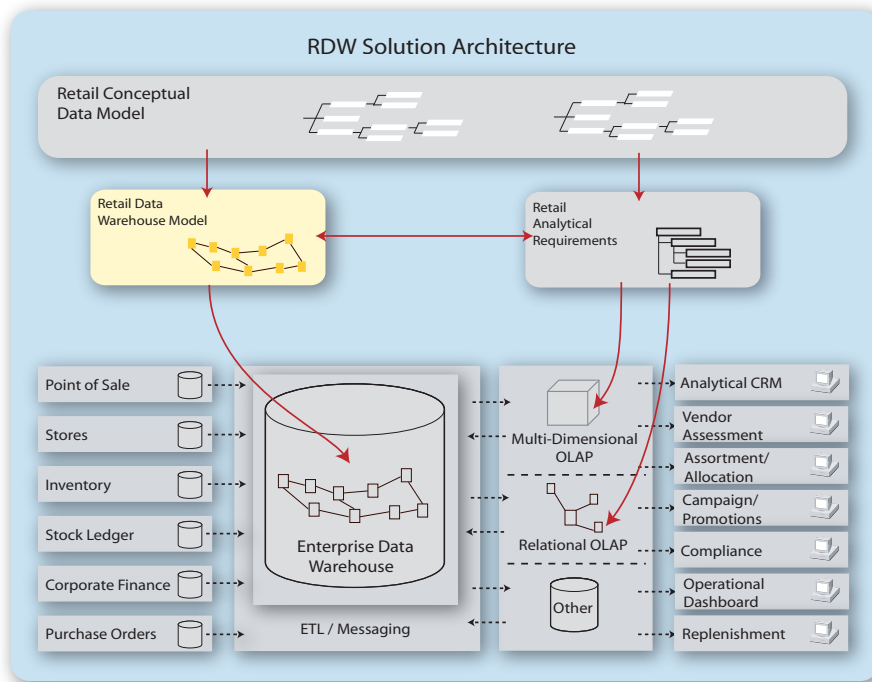
- fully compliments RDWM
- provides a structured starting point to integrate data and process
- provides a generic specification of data that helps to reduce redundancy and inconsistency across the enterprise
- provides common definitions for increasing reuse of data elements
- accelerates the application development life cycle, reducing development costs and project schedules
- provides a consistent data architecture for modeling new or changed requirements
- provides a single framework that incorporates detail data, business rules and analytical requirements
- focuses the development effort on validating, enhancing and extending data requirements rather than labor-intensive data modeling

Retail Conceptual Model - Nine Data Concepts

Arrangement	<p>The Arrangement Data Concept represents a potential or actual agreement, between two or more individuals, organizations or organizational units, that provides and affirms the rules and obligations associated with the exchange for value of goods, services and/or resources. For example:</p> <ul style="list-style-type: none"> • installment loan arrangement • credit card arrangement • purchase Arrangement between the Retail Organization and an equipment vendor for the purchase of Point Of Sale Terminals • employment arrangement
Business Direction Item	<p>The Business Direction Item Data Concept records an expression of an Involved Party's intent with regard to the manner and environments in which it wishes to carry out its business. For example:</p> <ul style="list-style-type: none"> • generic function and/or responsibility in a description for an employment position • Retail Organization's mission statement reflecting its intention to provide excellent service to its customers, to operate so as to be highly profitable and to be a good corporate citizen • competitor's objective and plan to open seven new Stores in the Retail Organization's service area • company Policy that requires employees to take two consecutive weeks of vacation each year • POS Terminal settlement procedure #01789 • short-term economic forecast which states the real Gross National Product will grow at an annualized rate of two percent in the third quarter • formal mission statement of an organization unit
Condition	<p>The Condition Data Concept describes the specific requirements that pertain to how the business is conducted and includes information such as prerequisite or qualification criteria and restrictions or limits associated with the requirements. Conditions can apply to various aspects of a Retail Organization's operations, such as the sale and servicing of products, the determination of eligibility to purchase a product, the authority to perform business transactions, the assignment of specific general ledger accounts appropriate for different business transactions, the required file retention periods for various types of information kept by a Retail Organization and the selection criteria for a market segment. For example:</p> <ul style="list-style-type: none"> • penalty fee of 10% of shipment value will be deducted if the shipment is more than five days late. • full time employee is entitled to three weeks of vacation annually after seven years of service • Retail Organization's employee #54321, John Smith, is assigned authority limit six, which empowers him to approve purchases of up to twenty five thousand dollars without prior internal review • Organization position #56789 carries an authority limit ten, which empowers its incumbent to hire employees
Classification	<p>The Classification Data Concept organizes and manages specific business information by defining structures that represent classification categories. Classification also organizes and manages groups of business concepts that apply to multiple Data Concepts. For example:</p> <ul style="list-style-type: none"> • XYZ Bank's corporate-wide general ledger structure (Accounting Structure) • Advertising expenses (Accounting Unit Category) • Display Unit depreciation (Accounting Unit Category) • Product line composed of DIY Tools (Group) • Individual (Involved Party Classification Type) • German (Language) • Foot (Unit Of Measure)

Event	<p>The Event Data Concept describes a happening about which the Retail Organization wishes to keep information as a part of carrying out its mission and conducting its business. For example:</p> <ul style="list-style-type: none"> • cost reduction project meeting conclusion on April 15 • property settlement associated with the purchase of a building by the Retail Organization • account origination task performed by a Store employee on Monday at 11:15 a.m. • Operation execution which deletes an account record • kickoff of the campaign to market Store Loyalty Cards to young adults
Involved Party	<p>The Involved Party Data Concept represents all participants that may have contact with the Retail Organization or that are of interest to the Retail Organization and about which the Retail Organization wishes to maintain information. This includes information about the Retail Organization itself. For example:</p> <ul style="list-style-type: none"> • Mary L. Doe • John Q. Public • ABC Corporation • XYZ Salesco Human Resources Department • Senior Cashier #326
Location	<p>The Location Data Concept describes a place where something can be found, a destination of information or a bounded area, such as a country or state, about which the Retail Organization wishes to keep information. For example:</p> <ul style="list-style-type: none"> • 123 East Main Street • Lot 5432, Section 6, Tract 78 • Section 6 • Tract 78 • Telephone number 01 301 987 6543 • Rack 25, bin 003 in Storeroom 4 • Australia • Staffordshire County • Greater New York City Metropolitan Area • Postcode area 22193 • C:\BOBS\WORK.RPT
Product	<p>The Product Data Concept describes the goods and services that can be offered, sold, provided or purchased by the Retail Organization, its competitors and other Involved Parties during the normal course of its business. For example:</p> <ul style="list-style-type: none"> • Diesel Powered, Four Door, Sedan • Tailoring • Tin Of Beans • Credit Card Account • Beauty Treatment Hamper
Resource Item	<p>The Resource Item Data Concept includes and describes any value item, either tangible or intangible, that is owned, managed or used by, or of specific interest to, the Retail Organization in the course of accomplishing its business. For example:</p> <ul style="list-style-type: none"> • A red truck, Vehicle Identification Number 9876543, included in the Retail Organization's transportation fleet • The Retail Organization's Product Information Kiosk installed on the 4th Floor of the Main Street Store • A corporate headquarters building which houses executive offices and leasable tenant space • A vehicle title, held in the Retail Organization's files, as evidence of collateral pledged to secure an automobile Lease To Own Arrangement • The text portion of data and information such as documents and electronic messages • A Data Model, recently developed by the Retail Organization. • The name of the Retail Organization which is a Trademark.

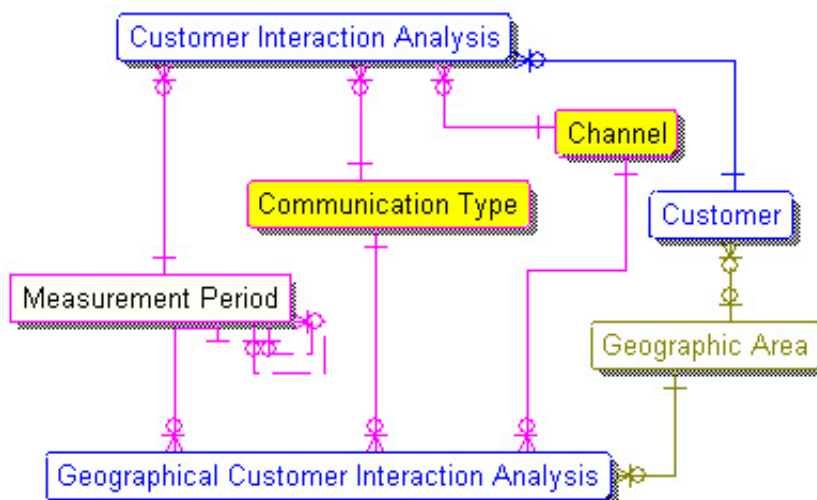
Retail Data Warehouse Models



What is the Retail Data Warehouse Model?

The Retail Data warehouse Model is a logical model consisting of more than 80% of the data structures typically needed by a retailer for a data warehouse. This model can be automatically generated into a physical data warehouse database once it has been customized to meet the exact requirements of the retailer. A logical model is a representation of a retailer's data or information requirements and is usually represented in an Entity Relationship Diagram (ERD) with business definitions. The data needs are represented without consideration for technology constraints associated with platforms, tools and software or how the application will be finally implemented. It is generic and flexible in design and facilitates consistent understanding of the meaning of a retailer's data.

An example of an ERD from RDWM:



RDWM features a flexible System of Record, the primary data storage area, as well as the summary tables typically needed by retailers to aggregate detail data for analytical purposes. RDWM has been designed to be “one-step” from physical data base generation. Normally, only a portion of RDWM is generated in the initial project phase. Over time, other areas can be incrementally generated as the Service Provider tackles more source systems and/or business areas.

This comprehensive data model is derived from IBM’s highly successful Retail Conceptual Model that, as described previously, can be used as the basis for supporting a detailed analysis of the business areas of most concern to retailers today.

Uses of RDWM

RDWM can be used as:

- The blueprint for a design of an enterprise data warehouse. In this case RDWM will assist in the creation of a flexible and extensible data warehouse platform-specific physical database.
- A neutral reference point for consolidating multiple legacy data warehouses across lines of business or in the case of mergers and acquisitions.
- A data structure template for near real-time data management solutions for the to support specific business applications such as CRM.

Benefits of RDWM

- Enables phased implementation based on prioritized business requirements.
- Easy customization and extension of the data warehouse.
- Combines third normal form and star schema data model designs.

Major Groupings in RDWM

RDWM has major groupings based on the intended usage of items within a data warehouse environment. These groupings are System of Record, Summary Area and Analysis Area.

System of Record

This is the component of the data warehouse that acts as the primary storage area for detail. Typically, this System of Record is populated by Extract, Transform and Load (ETL) processes from operational data in the Change Data Capture Staging Area. Typical components or entities of the System of Record are:

<p>Accounting Unit</p>	<p>An Accounting Unit is a repository used to monitor both monetary and non-monetary standings. An Accounting Unit may be used to support the operation of an Arrangement, or it may be used by the Retail Organization to facilitate myriad internal requirements to record and monitor quantitative change.</p> <p>Typically, for an Arrangement, an Organization Unit, a Campaign, etc. many quantities are tracked together. For example, Promotion costs, number of targets, volume of business gained, would be among the quantities tracked for a sales Campaign.</p>
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Activity Based Costing	<p>The purpose of Activity Based Costing is to enable the assignment of costs to the activities of the Retail Organization and to then allocate those costs out to the various agencies within the Retail Organization that can be considered to be responsible for generating them. In this way, a better image of profitability can be obtained.</p> <p>Costs (and Retail Organization income) can be assigned to Activities of a given Type occurring on a given Channel. In addition, any Involved Party can have a role of being an Allocation Center. Configuration tables are provided to define the percentage distribution of the costs (and incomes) of occurring Activities, according to the role the Involved Party has in relation to the Customer performing the Activity e.g. the Organization Unit that owns the Customer. A Transaction Allocated entity records the actual amounts allocated and an Allocation Center Summary summarizes the allocations by Measurement Period.</p>
Classification	<p>Classification represents a common collection point for simple sets of codes that are used to classify or codify some facet of the business. For example, there are a set of codes representing Involved Party Types - these are stored in the Classification structure; there are a set of classifications representing Individual Marital Status Types - these too are stored in the Classification structure. Classifications are composed of a Classification Scheme and a Classification Value. In the latter example 'Individual Marital Status Type' is the scheme while the values are codes representing 'Single', 'Married', 'Separated', 'Divorced', etc.</p>
Communication	<p>A Communication records an exchange of information with an Involved Party; for example, receive Customer's request for an interim statement, (USA) transmit a report on liquidity levels to the Federal Reserve.</p>
Condition	<p>Condition (CD) describes the specific requirements that pertain to how the business of a Retail Organization is conducted and includes information such as prerequisite or qualification criteria and restrictions or limits associated with these requirements. Conditions can apply to various aspects of a Retail Organization's operations, such as the sale and servicing of products, the determination of eligibility to purchase a product, the authority to perform business transactions, the assignment of specific general ledger accounts appropriate for different business transactions, the required file retention periods for various types of information and the selection criteria for a market segment.</p>
Event	<p>Event describes a happening about which the Retail Organization wishes to keep information as a part of carrying out its mission and conducting its business.</p>
Housekeeping and Characteristics	<p>Housekeeping entities represent information that is either static, or only changes slowly over time e.g. lists of countries, currencies, languages, etc. The data in Housekeeping entities is often obtained from official sources outside of the Retail Organization and the content of that data is usually outside the control of the Retail Organization.</p> <p>Characteristic entities are purely logical constructs used to control and identify sets of common attributes required to appear on multiple entities throughout the warehouse. For example, the Summary Currency Characteristic ensures that for each Summary entity, an identical set of attributes representing the Original and Measurement Currencies and the Exchange Rate between them appears on each Summary. By altering the Characteristic contents, all targeted entities can be immediately updated with a new and identical set of attributes.</p>
Insurance	<p>Holds the various entities involved in the support of Insurance.</p>
Involved Party	<p>Involved Parties are persons or organized groups of persons about whom the Retail Organization wants to keep information. Involved Party includes Individuals, Organizations, Grouped Individuals, Organization Units and Employment Positions.</p>
Limit	<p>Identifies restrictions on entities and restrictions on relationships between entities.</p>
Location	<p>Location stores the physical or logical locations used by the Retail Organization and by Customers. Examples of Addresses are: 2 Burlington Road, Dublin 4, Republic of Ireland; 555 Main Street, Boise, Idaho; www.ibm.com/solutions/financialservices/ifw.</p>
Multi-Channel Management	<p>Multi Channel Management involves the sales and distribution of goods and services by the Retail Organization to its customers through more than one sales channel. The traditional role of retailers servicing their customer through shops or stores is complemented by sales through other channels such as mail order, tele-sales and e-commerce.</p>

Planograms - Physical Merchandising	Planograms define the physical layouts of Products on different types of Display Fixtures. Also known as Physical Merchandising.
Product	Product describes goods and services that can be offered, sold or purchased by the Retail Organization, its competitors and other Involved Parties during the normal course of business. Product also includes non-financial goods and services that are of interest to the Retail Organization.
Resource Item	Resource Item includes and describes any value item, either tangible or intangible, that is owned, managed, used by, or of specific interest to the Retail Organization in pursuit and accomplishment of its business.
Supply Chain	Supply Chain involves the acquisition of products by the Retail Organization for resale and the processes involved in getting those products to the various outlets and channels where they can be sold to customers. It includes the management of Purchase Orders, Receiving, Warehousing, Distribution and all stock management activities.
Loyalty Scheme Management	A Subject Area to hold the various entities involved in the support and monitoring of customer loyalty programs run by the Retail Organization.
Pharmacy Support	Pharmacy Management involves the acquisition and sale or dispensing of drugs and other products by the Retail Organization. It includes the management of Patients, Pharmacists, Prescribers, Payers and Products subject to varying levels of control.

Summary Area

This area contains summaries and aggregations commonly used in data warehouses developed for retailers. These summary entities may be populated by aggregating in the System of Record or they may be obtained pre-aggregated from operational systems such as G/L account balances. Creating and maintaining such summaries in the data warehouse facilitates a level of reuse that improves query performance, reduces overall system load and improves consistency in analysis. Summary entities are designed to store key metrics and status indicators on a periodic basis. Typical components/entities of the Summary Area include:

Accounting Unit	The Accounting Unit is the basic mechanism used for holding numerical data within the Retail Data Warehouse. The Accounting Unit Summary entity enables the capturing of the Accounting Unit information on a periodic basis, for example the quarterly credit and debit balances for a particular segment of the Customer base.
Arrangement	Holds the periodic summarizations related to Arrangement.
Campaign	The Campaign Summary entities are used to track the various internal and external marketing events and grouping that the Retail Organization undertakes in order to promote its Products and other aspects of its business. The Campaign Summary entities enable the Retail Organization to monitor the effectiveness of such Campaigns, as well as the cost of each.
Group	Holds the periodic summarizations related to Groups.
Involved Party	Some of the subtypes of Involved Party would typically require periodic summaries. Typically such summaries are required for Customer and Organization Unit. The purpose of such summaries is to record key indicators for the relevant item.
Product	Holds the periodic summarizations related to Product.

Analysis Area

This is the component of the data warehouse that prepares the data initially stored in the System of Record for subsequent distribution to MOLAP cubes. The entities in the Analysis Area consist of fact and dimension tables in Snowflake designs.

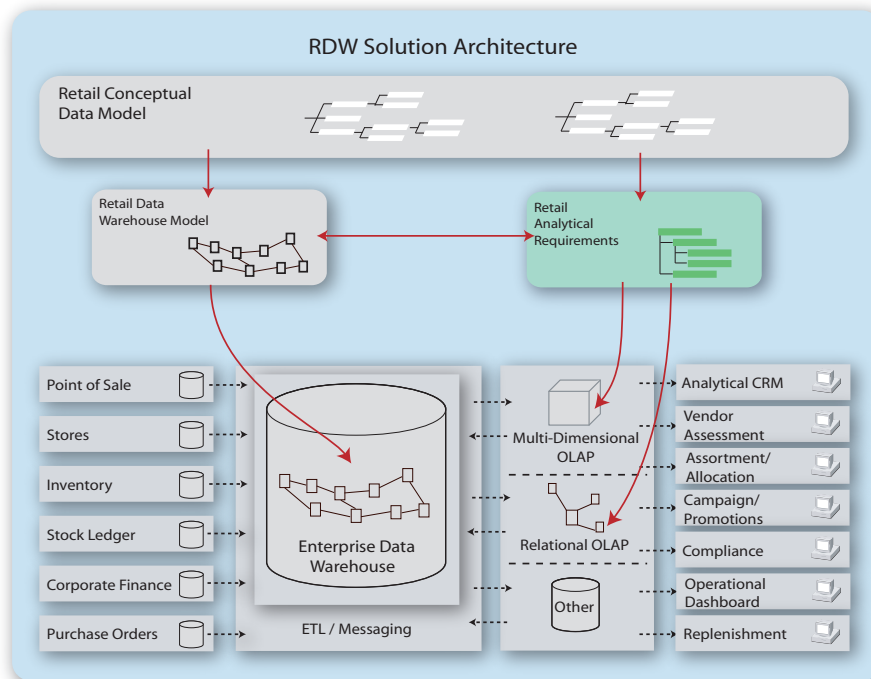
Typical components/entities of the Analysis Area are grouped under the following headings:

- Campaign
- Complaint
- Credit Profiling
- Cross Sell
- Customer Analysis
- Customer Attrition Analysis
- Customer Interaction
- Customer Lifetime Value
- Inventory Analysis
- Pricing Analysis
- Product Performance Analysis
- Product Profitability
- Promotion
- Salesperson Performance
- Store Format Performance

These are described in more detail in the Retail Analytical Requirements section.



Retail Analytical Requirements

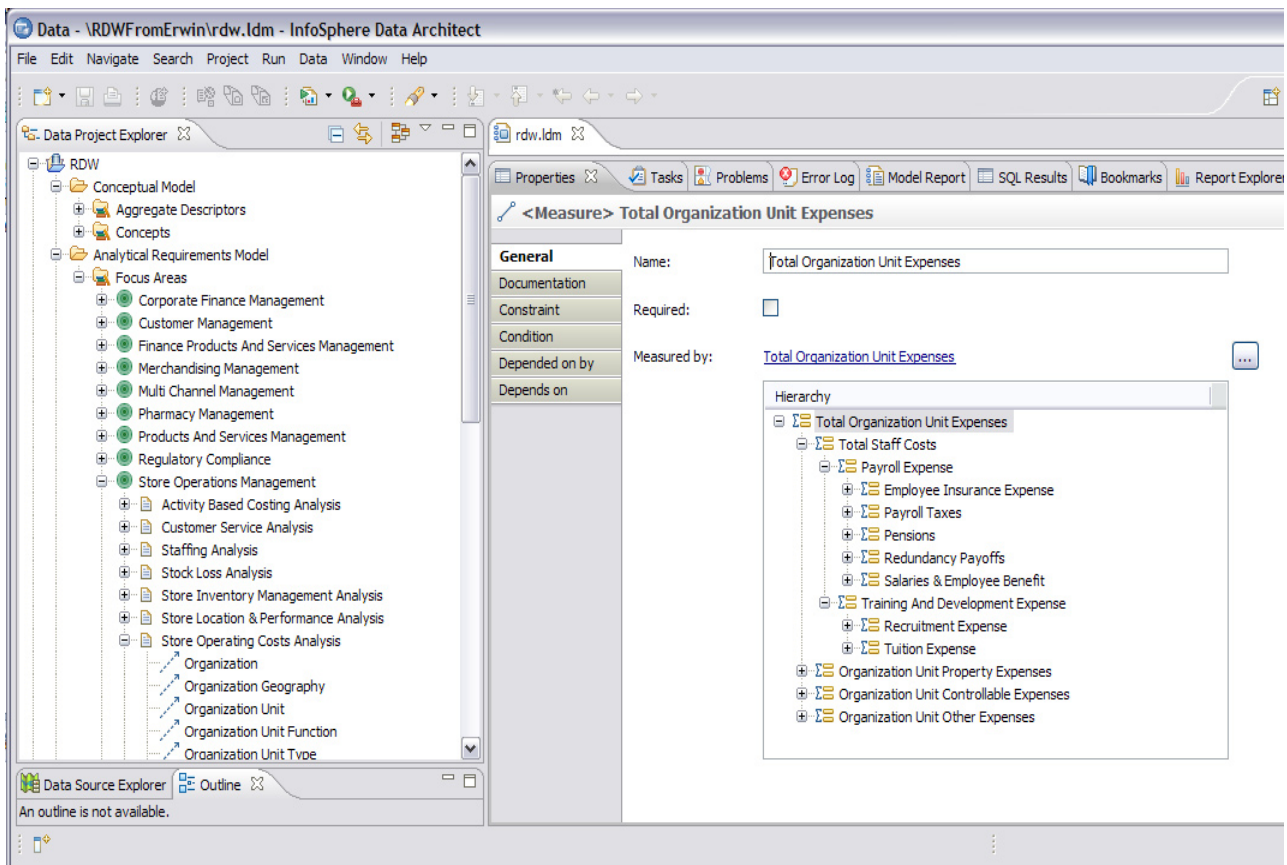


What are the Retail Analytical Requirements?

The IBM Retail Data Warehouse incorporates a set of predesigned Business Intelligence solutions called Retail Analytical Requirements that enable business managers to quickly and easily specify analytical reporting requirements. Each RBST consists of a series of measures and dimensions. A measure is an item that business users wish to track, for example: Number of Customers or Profitability. A dimension is something by which users want to sub-divide or sub-categorize measures, such as Number of Customers by Customer Segment.

The Analytical Requirements provide the framework to rapidly define and deliver high-value Business Intelligence applications. Business users can easily work with Analytical Requirements to specify their own analytical reporting requirements. Prototype OLAP applications can then be generated automatically based on the customized Analytical Requirements. Because the Analytical Requirements are mapped to the Retail Data Warehouse Model, the scoping performed by business users will also be reflected in RDWM, enabling rapid scoping of the data warehouse based on business user requirements.

The following diagram shows an example of the Store Optimization Analysis BST:



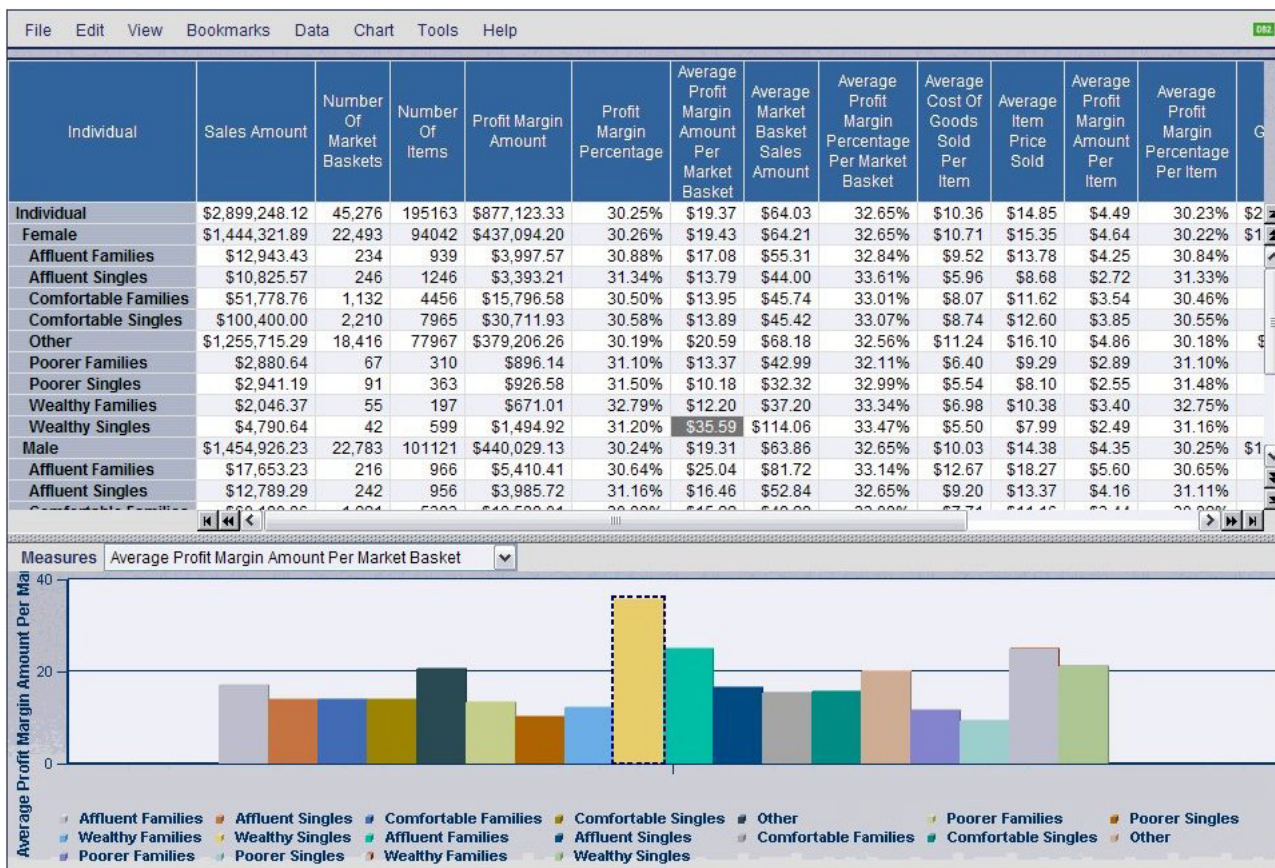
Using Analytical Requirements it is possible to easily generate prototype platform-specific physical MOLAP data mart designs. Once these cubes have been populated from the data warehouse it is possible to create a range of ROLAP reports. Here are some examples of the type of reports possible:



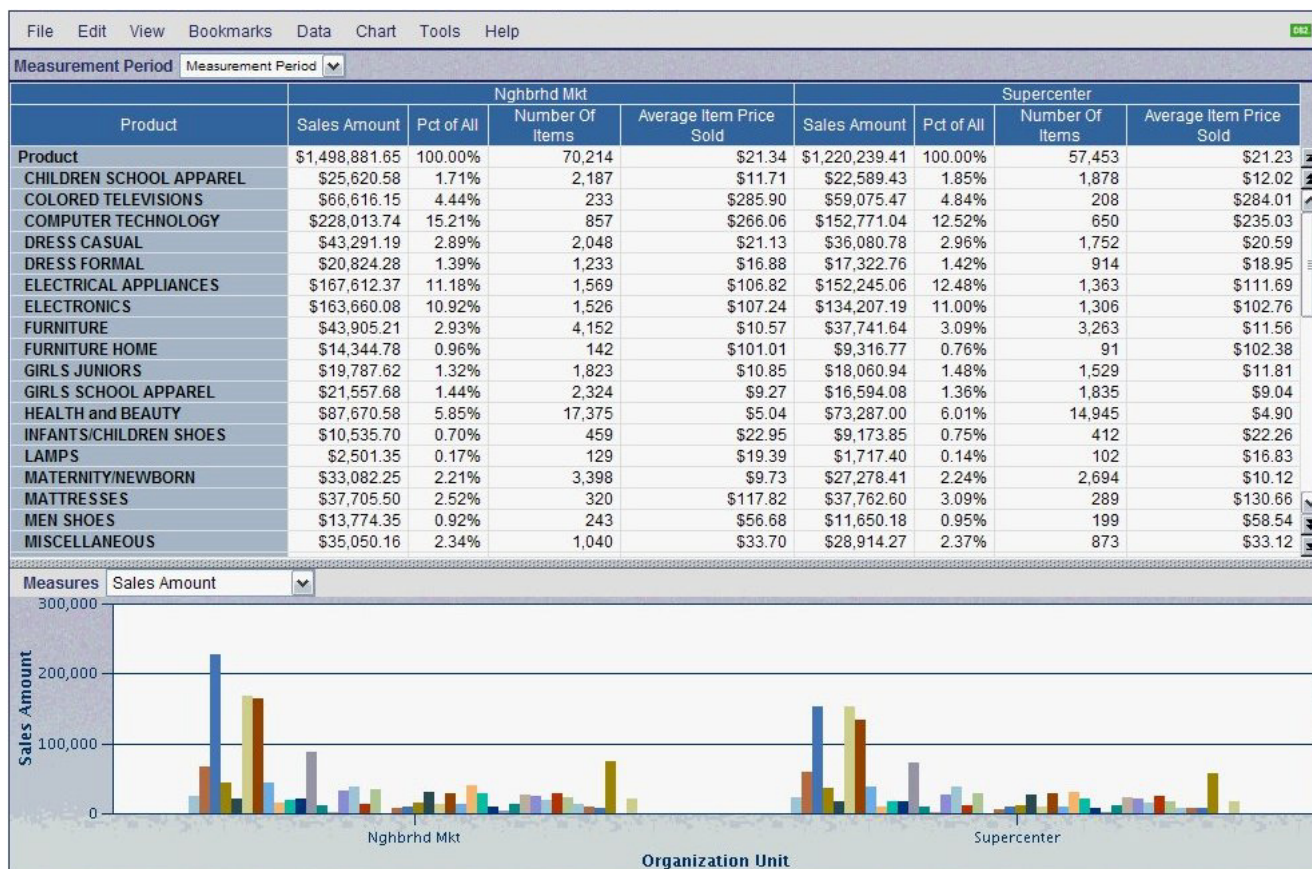
Company Performance Report Summary

File Edit View Bookmarks Data Chart Tools Help										
Product	Measurement Period	Total Sales				Marketbaskets				
		Number Of Items	Sales Amount	Profit Margin Amount	Average Item Price Sold	Average Number Of Items Per Market Basket	Average Item Price Sold Per Market Basket	High Item Price Sold	Low Item Price Sold	Average Profit Margin Amount Per Market Basket
Product	2004	70,006	\$1,060,009.03	\$320,999.74	\$15.14	4.2	\$15.15	\$2,618.46	\$0.16	\$19.27
	2003	64,213	\$911,930.92	\$276,414.17	\$14.20	4.3	\$14.22	\$2,313.38	\$0.16	\$18.54
	Difference	+5,793.00	+148,078.11	+44,585.57	+0.94	-0.10	+0.93	+305.08	+0.00	+0.73
CHILDREN SCHOOL APPAREL	2004	1,444	\$16,750.59	\$5,207.35	\$11.60	3.72	\$11.60	\$107.43	\$1.49	\$13.42
	2003	1,379	\$16,306.69	\$5,057.68	\$11.82	3.7	\$11.85	\$92.17	\$0.89	\$13.59
	Difference	+65.00	+443.90	+149.67	-0.22	+0.02	-0.24	+15.26	+0.60	-0.17
COLORED TELEVISIONS	2004	178	\$51,137.22	\$13,369.30	\$287.28	1	\$288.91	\$925.23	\$17.10	\$75.53
	2003	131	\$36,847.07	\$9,622.02	\$281.27	1.06	\$282.60	\$907.43	\$17.10	\$78.22
	Difference	+47.00	+14,290.15	+3,747.28	+6.01	-0.06	+6.31	+17.80	+0.00	-2.69
COMPUTER TECHNOLOGY	2004	529	\$141,420.16	\$44,135.22	\$267.33	3	\$267.84	\$2,618.46	\$1.36	\$250.76
	2003	458	\$102,758.56	\$31,762.39	\$224.36	3.03	\$224.59	\$2,313.38	\$2.31	\$210.34
	Difference	+71.00	+38,661.60	+12,372.83	+42.97	-0.03	+43.25	+305.08	-0.95	+40.42
DRESS CASUAL	2004	1,362	\$26,600.87	\$8,258.69	\$19.53	1.94	\$19.59	\$215.23	\$0.87	\$11.79
	2003	1,281	\$26,664.93	\$8,270.42	\$20.81	1.95	\$20.87	\$485.67	\$0.86	\$12.62
	Difference	+81.00	-64.06	-11.73	-1.28	-0.01	-1.28	-270.44	+0.01	-0.83
DRESS FORMAL	2004	753	\$14,378.57	\$5,030.39	\$19.09	1.92	\$19.15	\$159.98	\$0.50	\$12.86
	2003	598	\$10,249.72	\$3,582.66	\$17.14	1.81	\$17.21	\$180.99	\$1.72	\$10.88
	Difference	+155.00	+4,128.85	+1,447.73	+1.95	+0.11	+1.94	-21.01	-1.22	+1.98
ELECTRICAL APPLIANCES	2004	1,080	\$120,276.75	\$31,218.10	\$111.36	1.26	\$111.38	\$754.23	\$1.72	\$36.42
	2003	974	\$96,639.20	\$25,184.54	\$99.21	1.28	\$99.73	\$747.27	\$2.59	\$33.26
	Difference	+106.00	+23,637.55	+6,033.56	+12.15	-0.02	+11.65	+69.96	-0.87	+3.16
ELECTRONICS	2004	1,022	\$104,050.05	\$27,093.12	\$101.81	1.19	\$102.26	\$1,067.60	\$0.63	\$31.68
	2003	937	\$96,865.85	\$25,219.82	\$103.37	1.26	\$103.47	\$1,690.50	\$1.54	\$33.94
	Difference	+85.00	+7,184.20	+1,873.30	-1.56	-0.07	-1.21	-622.90	-0.91	-2.26
FURNITURE	2004	2,841	\$31,944.45	\$9,885.90	\$11.24	3.93	\$11.26	\$1,177.32	\$0.85	\$13.69
	2003	2,385	\$25,965.04	\$8,062.16	\$10.88	3.66	\$10.90	\$608.52	\$0.85	\$12.38
	Difference	+456.00	+5,979.41	+1,823.74	+0.36	+0.27	+0.36	+568.80	+0.00	+1.31
FURNITURE HOME	2004	104	\$10,739.10	\$3,295.37	\$103.26	2.97	\$103.31	\$697.94	\$52.19	\$94.15
	2003	49	\$5,058.83	\$1,585.58	\$103.24	1.88	\$103.49	\$538.61	\$9.95	\$60.98
	Difference	+55.00	+5,680.27	+1,709.79	+0.02	+1.09	-0.18	+159.33	+42.24	+33.17
CHILDREN'S SHOES	2004	1,124	\$13,487.57	\$4,200.21	\$11.99	2.41	\$12.03	\$983.30	\$0.89	\$9.03
	2003	1,124	\$13,487.57	\$4,200.21	\$11.99	2.41	\$12.03	\$983.30	\$0.89	\$9.03

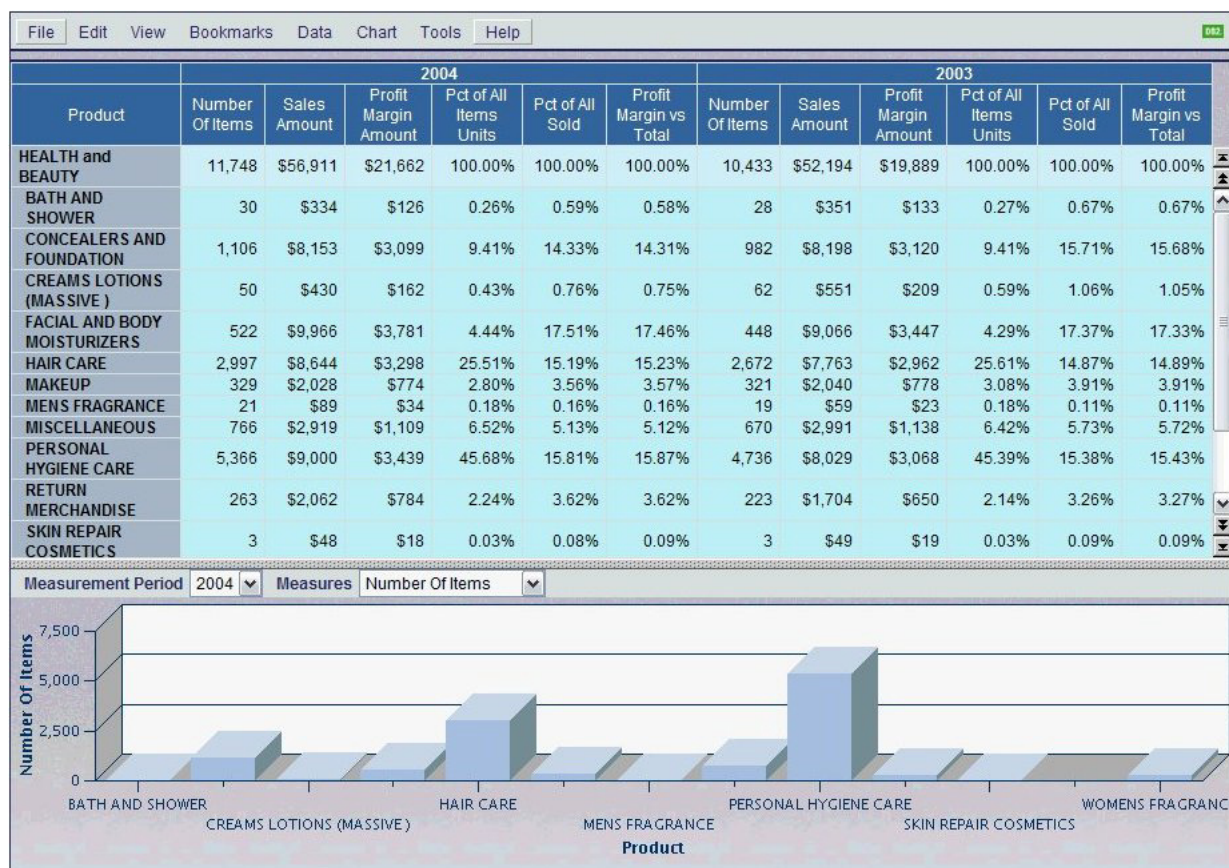
Demographic Profile to Market Basket



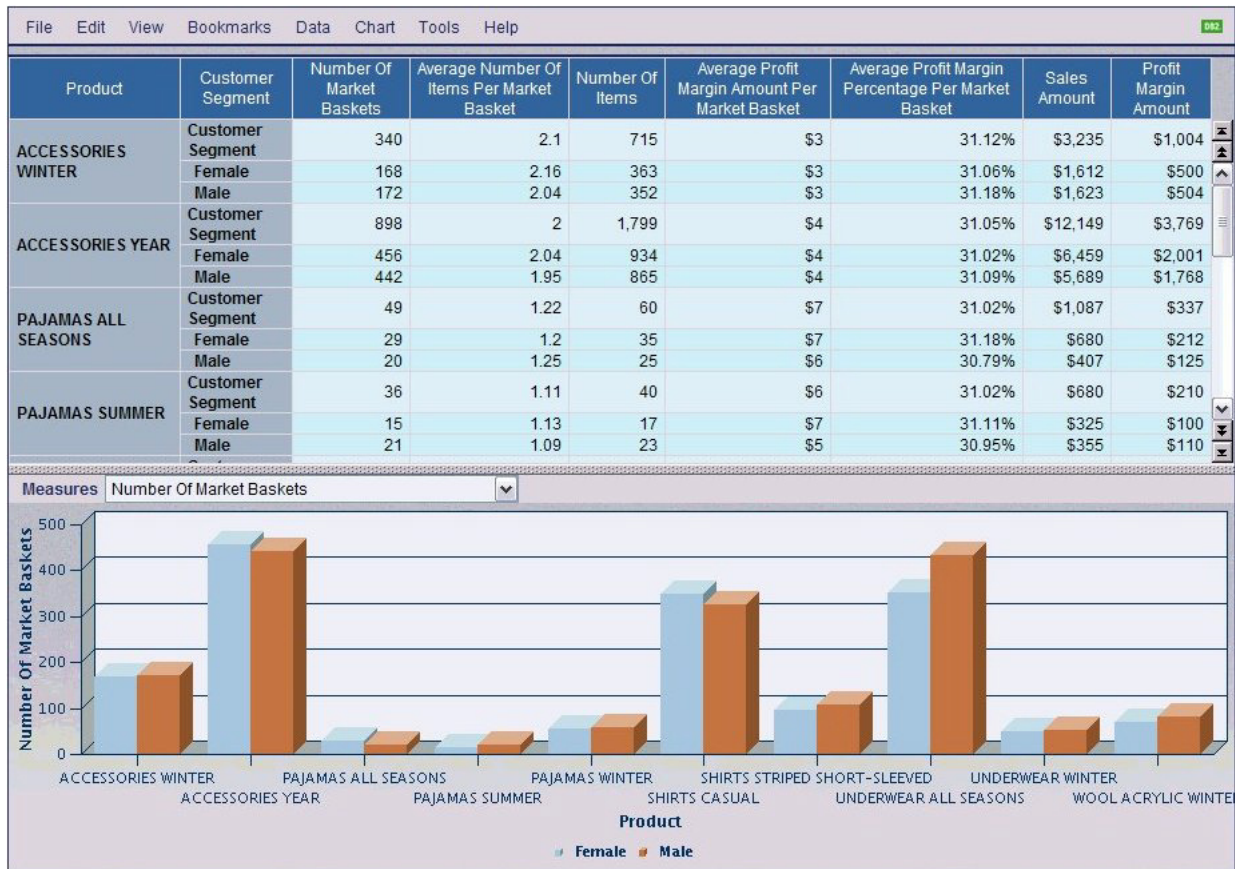
Product Sales by Store Type



Product Department Report



Product Department by Customer Segment



Uses of the Retail Analytical Requirements

Data mart and Data Warehouse Scoping and Design

The information analysis and management reporting aspects of a particular topic are scoped within the dimensions and measures that make up the Analytical Requirements. The scoped BSTs can then be used to automatically generate an appropriate physical data mart structure. The scope can also be projected onto RDWM to identify those areas of the central warehouse that must be implemented so that the data marts can be provided with the necessary information from the central warehouse.

Benefits of the Retail Analytical Requirements

- Business users can rapidly and effectively control the definition and scoping of a data mart solution.
- Provides a consistent structure and reporting for each data mart produced.
- Reduce the time and effort required in the analysis phase of a data warehouse implementation.
- Reduce the risk by using proven pre-defined templates.

Business Coverage

Corporate Finance Management

This set of Retail BSTs addresses the Retail Organizations corporate-wide financial accounting activities, taking into account income, expenses, assets, liabilities, etc. It allows analysis of the Retail Organizations financial standing and performance, historically, currently and in the future

Credit Risk Analysis - To analyze the Retail Organization's credit risk in terms of earnings volatility due to variations in credit losses. Any credit exposure is analyzed in the context of gross sales to identify scale.

Financial Management Accounting - Financial Management Accounting analysis is used to measure and report the financial results of the Retail Organization and to provide other analytical information such as statistical and financial data for internal use of the management of the Retail Organization. For example, production of Balance Sheets, Income Statements (Profit and Loss Accounts), allocation of costs between organization units.

Income Analysis - To analyze a Retail Organization's revenues and expenses, showing the net profit or loss in a specified accounting period and depicting a Retail Organization's financial performance due to operations as well as other activities rendering gains or losses.

Customer Management

Customer Management focuses on the interactions of the customer with the retailer in the manner, casual contact, information searches, transactions, complaints/problems and response to marketing messages.

Campaign & Promotion Analysis - To analyze the Retail Organization's campaigns and campaign promotions over set time periods to obtain marketing effort insights as to customer behavior changes such as customer visits, interactions, revenue generation and sales.

Customer Complaints Analysis - To understand the pattern of complaints and the effectiveness of the resolution process.

Cross Purchase Behavior Analysis - To analyze the characteristics of multi-product and cross-departmental purchases by customers to increase awareness of customer cross-purchasing behavior to suggest complementary product and service purchases.

Cross Sell Analysis - To analyze the characteristics of multi-product purchases by customers. Identifying profitable trends usage of a base product suggests complementary product and service purchases. This also allows review of a Retail Organization cross-selling plans.

Customer Attrition Analysis - To understand the reason and impact of customers ceasing to use the Retail Organization's products and services.

Customer Credit Risk Profile - To determine profiles of Customer Credit Risk in terms of the amount of credit in arrears, average balances, credit score and customer balance sheet and thereby help to reduce the risk of customer credit by forecasting the profile of the customer most likely to incur credit risk and give preventative advice.

Customer Delinquency Analysis - Customer Delinquency Analysis analyzes Customers who have at least one Arrangement that has been deemed delinquent, in terms of the length of time for which the delinquencies have occurred and the delinquent amounts outstanding.

Customer Interaction Analysis - Analysis of how the Retail Organization interacts with its customers and the effectiveness of communications and channels in terms of winning new business.

Customer Lifetime Value Analysis - To evaluate the total projected earnings of a customer to the Retail Organization over the probable lifetime of that customer.

Customer Loyalty - To understand the determination a customer has for continuing to use the services of the Retail Organization, while recognizing the customer has alternative choices.

Customer Movement Dynamics Analysis - To analyze the Retail Organizations' customer relationships to better understand and serve the customer base along with an understanding of customer acquisition potentials.

Customer Profile Analysis - To analyze customers based on non-identified and identified customer attributes such as age, geo-demographics and income. Mostly based on customer information directly from customer dimension but also on metrics such as number of customer visits and household values.

Customer Profitability - To evaluate the contribution to profit of the customers of the Retail Organization.

Involved Party Exposure - To determine the likelihood that an Involved Party, such as a customer, counter party or supplier, will not support a loan or make a payment according to the agreed conditions; and the degree to which the Retail Organization is at risk in this situation.

Lead Analysis - To identify prospects for new product and service sales and analyze the effectiveness of this activity.

Market Analysis - To identify the demographics of a market and the Retail Organization's customer base within the market; and compare the results with that of the target population and of peer Retail Organizations' customer bases.

Market Basket Analysis - To analyze the characteristics of customer market basket purchases by identifying product mix, revenue, quantity, trends and so forth.

Product Purchasing RFQ Analysis - To analyze a Retail Organizations' customer purchase patterns using recency, frequency and quantity metrics. The key metrics for defining customer loyalty (or propensity to repeatedly shop a retailer) is Recency (how recent a purchase was made), Frequency (how often the customer returned and made a purchase) and Quantity (overall revenue and/or number of items purchased).

Purchase Profile Analysis - To analyze a Retail Organization's customer purchases based on customer segmentation and sale metrics pertaining to market baskets and individual products.

Target Product Analysis - To analyze the characteristics of customer purchases based on a specific target product to further understand purchasing behavior and scenarios surrounding the product purchase.

Finance Products and Services Management

Many large retail organizations offer their customers financial products and services, such as credit cards, loans and store charge accounts. This focus area addresses the analysis of these specialized products and how they are performing for the retail organization.

Location Profitability - To identify the contribution to profit of geographic areas served by the Retail Organization.

Non Performing Loan Analysis - To identify the characteristics of loans that are not being repaid or supported according to their agreed conditions.

Performance Measurement - To identify the effectiveness and pattern of Organization Units business performance against benchmarks set by peers, such as comparable organizations and organization units.

Location Exposure - To determine the likelihood that within a given Geographic Area (such as a City, State, Region or Country) that loans and payments will not be supported according to the agreed conditions; and the degree to which the Retail Organization is at risk in this situation.

Transaction Activity Analysis - To enable the transactions that are handled by the Retail Organization to be analyzed with a view to monitoring currency transactions and international transportation of money in an effort to curb money laundering and other fraudulent activities.

Merchandising Management

Merchandising is the process of managing the product life cycle from evaluating product, deciding on what is to be carried and where, ordering from manufacturers, defining product presentation by channel of trade, establishing and monitoring pricing and promotions and ending product life in a profitable manner.

Assortment & Allocation Analysis - To analyze the Retail Organizations' product mix and its internal product distribution to the various organization levels over time.

Inventory Analysis - To analyze product quantities over time in terms of the readiness with which products can be made available for distribution or sale at various organizational levels within the Retail Organization such as department, store, distribution center and overall organization.

Physical Merchandising & Space Management Analysis - The analysis of the Retail Organization's physical grouping and placement of products in the stores on the shelves, gondolas, racks, floors etc. given the many aspects and restrictions of the individual products and their environments.

Pricing Analysis - To analyze Retail Organization product pricing based on expected and planned profit margins, revenues, costs, quantities sold, channels and so forth.

Promotion Analysis - To analyze and compare the effectiveness of the Retail Organization's promotions in terms of participants, geographic locations and performance.

Multichannel Management

Multi Channel Management involves the sales and distribution of goods and services by the Retail Organization to its customers through more than one sales channel. The traditional role of retailers servicing their customer through shops or stores is complemented by sales through other channels such as mail order, tele-sales and e-commerce.

Channel Performance Analysis - To analyze the relative performance of the Retail Organization's various sales channels and their ability to service the organization's customers.

Channel Geographic Analysis - To analyze the performance of the Retail Organization's various non-store sales channels and how they service the organization's customers.

Catalog Performance Analysis - To analyze the level of sales, profit and new business generated by Sales Catalogs produced and distributed by the Retail Organization.

Call Center Performance Analysis - To analyze the performance in terms of productivity, efficiency and profitability of call centers operated by or on behalf of the Retail Organization.

Operator Script Performance Analysis - To analyze the performance in terms of productivity, efficiency and profitability of call center operators and the scripts they use when dealing with the Retail Organization's customers.

ECommerce Site Performance Analysis - To analyze the relationship between the technical performance of a web-site and its commercial success in generating sales.

Promotion / Web Activity Analysis - To analyze the relationship between promotions run by the Retail Organization and levels of activity on the organization's web sites.

Access Type Conversion Analysis - To analyze the relationship between visits originating from different sources and their rate of conversion to sales.

Customer Service Order Level Analysis - To analyze the ability of the Retail Organization's sales order processing facilities to satisfy requests made by customers.

Customer Delivery Efficiency Analysis - To analyze the ability of the sales order delivery facilities to satisfy the requirements of the Retail Organization and to meet the expectations of its customers.

Sales Order Source Analysis - To analyze the contribution of various channels to the generation of sales to customers of the Retail Organization. It can also be used to analyze the different sources of orders within a channel. For example, the mail order channel may take orders via regular catalogs or via direct mail campaigns.

Pharmacy Management

Pharmacy Management involves the acquisition and sale or dispensing of drugs and other products by the Retail Organization. It includes the management of Patients, Pharmacists, Prescribers, Payers and Products subject to varying levels of control.

Patient Records Analysis - To analyze the drugs and other products which the Retail Organization has dispensed or otherwise sold to identified Patients.

Target Drug Analysis - To analyze inventories and all known movements of selected drugs or batches of drugs or other products which the Retail Organization has handled.

Drug Interaction Analysis - To analyze drugs or other products which the Retail Organization has dispensed or otherwise sold to Patients where such combinations of products create a risk of a negative interaction.

Prescription Settlement Analysis - To analyze the payment performance of Involved Parties who pay the Retail Organization for drugs and other Products dispensed under prescription to Patients.

Prescription Margin Analysis - To analyze the profitability of sales generated through the filling of prescriptions by the Retail Organization.

Alternative Drug Analysis - To analyze the incidence of different drugs or other products being dispensed to those originally prescribed.

Unusual Dosage Analysis - To analyze the incidence of drugs being prescribed for or dispensed to patients in volumes outside the normal or safe values associated with such drugs.

Emergency Drug Supply Analysis - To analyze the incidence of drugs being placed on urgent orders to satisfy patient requirements and the performance of the Retail Organization and its suppliers in fulfilling these orders.

Products and Services Management

Product and Service Management is the definition and analysis of a retailers business.

Product Quality Control Analysis - To analyze the incidence, value and cause of sub-quality products.

Product Forecasting & Performance Analysis - To analyze product or service performance against planned estimates for forecasting and performance reporting purposes.

Product Sales and Profitability Analysis - To evaluate the products contribution to the Retail Organization's profit margins.

Service Sales and Profitability Analysis - To analyze the performance of the Retail Organizations' services such as gift registry, product installations, catering and so forth.

Business Performance Analysis - To analyze an organizations' business performance based on Key Performance Indicators from previous to current time periods.

Transaction Analysis - To enable the transactions that are handled by the Retail Organization to be analyzed with a view to evaluating the volumes and cost (to the Retail Organization) of such transactions. Such measures can be broken down by dimensions such as Transaction Type, sales channel and geography to facilitate comparison.

Vendor Performance Analysis - To analyze specific supplier product performance such as revenue sold, number of products on hand, current versus projected margin by location, department and channel.

Regulatory Compliance

Analysis of the Retail Organization's Arrangements and Activities according to legal statutes, the directives of government and regulatory institutions.

Sarbanes Oxley Act Balance Sheet Analysis - To analyze the Retail Organization's 10Q and 10K Balance Sheets which report the Retail Organization's total assets, total liabilities and total shareholders equity at a specific time.

Sarbanes Oxley Act Income Statement Analysis - To analyze a Retail Organization's Income Statement which is a financial report that by summarizing revenues and expenses and showing the net profit or loss in a specified accounting period it depicts a Retail Organization's financial performance due to operations as well as other activities rendering gains or losses.

Sarbanes Oxley Act Cash Flow Analysis - To analyze a Retail organization's Cash Flow which is the amount of cash a Retail Organization generates and uses during a period, calculated by adding non-cash charges (such as depreciation) to the net income after taxes.

Sarbanes Oxley Act Statement Shareholder Equity Analysis - To analyze a Retail Organization's Statement Of Shareholders' Equity which includes net profit / loss for period, issuance and repurchase of stock, other gains and losses recognized directly in shareholders equity and the impact of changes in accounting policy and fundamental errors when these are presented as a prior period adjustment.

Sarbanes Oxley Act Financial Summary Analysis - To support the Retail Organization in the generation and analysis of the Security And Exchange Commissions (SEC) 10Q and 10K reports which support the Retail Organization with regard to compliance with Sections 302 and 404 of the Sarbanes Oxley Act.

Store Operations Management

Store Operations Management analyzes the principal sales and costs for the Retail Organization arising from staffing, in-store production management, loss, location and characteristics of the store.

Activity Based Costing - To determine how the costs and income received by the Retail Organization are being cross charged between the different Profit Centers and thereby help to determine an accurate income and cost allocation algorithm.

Staffing Analysis - To analyze the Retail Organization's staff via performance metrics such as hours worked, sales per employee hour, number of baskets processed, commissions and types of transactions.

Suspicious Activity Analysis - To identify suspicious transactions within the retail organization or between the retail organization and its customers in an attempt to target fraud or theft.

Customer Service Analysis - To analyze the level of service offered to the customer through number of complaints generated, efficiency of basket processing and Mystery Shopper Score.

Stock Loss Analysis - To identify areas of potential loss of revenues and inventories by analyzing suspicious activities, cash variances, stock discrepancies and so forth.

Store Operating Costs Analysis - To analyze the costs controlled at store level, such as labour, carrier bags and uniforms.

Store Promotion & Pricing Analysis - To analyze the effectiveness of retail pricing and promotional activity in terms of competitor activity, financial impact and customer behavior.

Store Inventory Management Analysis - To analyze store inventory and on-shelf availability.

Store Optimization Analysis - To analyze a Retail Organization's product placement within the store based on space allocation, location, fixturing and previous sales.

Store Location & Performance Analysis - To analyze a Retail Organization's store performance based on geographic location, demographics, store format and proximity to competitors.

Supply Chain Management

Supply Chain involves the acquisition of products by the Retail Organization for resale and the processes involved in getting those products to the various outlets and channels where they can be sold to customers. It includes the management of Purchase Orders, Receiving, Warehousing, Distribution and all stock management activities.

Distribution Center Service Level Analysis - To analyze the Retail Organizations' Distribution Centers and their ability to service the organization by delivering the correct amount of requested products on schedule and in good condition.

Distribution Center Throughput Analysis - To analyze the Retail Organizations' Distribution Centers and their ability to process goods through the fast moving channels such as Cross Dock and Flow Through.

Distribution Center Storage & Processing Analysis - To analyze the Retail Organization's Distribution Centers and the costs associated with the processing and storage of the organization's products.

Load Efficiency Analysis - To analyze the Retail Organization's use of transportation assets in the distribution of goods. This is typically the movement of goods between Distribution Centers and Stores.

Backhaul Utilization Analysis - To analyze the Retail Organization's use of delivery vehicles to collect goods from Suppliers, Stores or other Locations after completing their primary delivery task.

RFID Stock Trading Analysis - To analyze the movement of RFID tagged products throughout the Retail Organization's supply chain identifying areas where efficiency can be improved or where there is an actual or potential risk of stock loss.

Investment Buying Analysis - To analyze the Retail Organization's product purchasing activities identifying areas where there is an opportunity to earn additional profits through increased discounts relating to volume purchase agreements.

Stock Cover Analysis - To analyze the Retail Organization's inventory in relation to current sales and predicted demand in order to identify potential shortages and over-stocks.

Returns Analysis - To analyze the incidence, value and cause of returns of stock by the Retail Organization to its suppliers as well as the return of goods by the Retail Organization's Customers.

Stock Adjustment Analysis - To analyze the incidence, value and cause of adjustments to the stock of goods held by the Retail Organization over and above the regular anticipated stock movements such as Receipts, Sales and Returns. Adjustments can effect both quantity and monetary value stock balances.

Supplier Service Level Analysis - To analyze the performance of the Retail Organization's Suppliers and their ability to service the organization by delivering the correct amount of requested products on schedule and in good condition.

Distribution Center Productivity Analysis - To analyze the performance of the Retail Organization's Distribution Centers and to monitor the amount of stock they are capable of processing.

Stock Location & Status Analysis - To analyze the quantity and monetary values of stock held by the Retail Organization's in its various locations and in third party locations and its condition and availability for sale.

Stock Availability Analysis - To analyze the amount of stock held by the Retail Organization in its various locations and the amount of stock on order in relation to expected sales demand and scheduled replenishment deliveries.

Product Batch Traceability Analysis - To analyze inventories and all known movements of selected products or batches of products or component products which the Retail Organization has handled.



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