



**ARTS Data Model Committee  
Retail Data Model Scope**

**March 31, 2003  
Release 4.0**

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## Introduction and Overview

### ***Document Purpose***

The scope document introduces the reader to the ARTS Retail Data Model by providing information on:

- Documentation provided
- Development history and contributing companies
- Uses and users of the Model
- Testing applications for conformance to the Model
- The Model maintenance process and how you can request changes/enhancements
- The retail segments and business functions supported by the Model

After reading the Scope Document you should be able to navigate the extensive documentation effectively to determine:

- How your company can use the Data Model to develop retail systems that are comprehensive by including all business requirements, more rapidly and at less cost and
- Why it is important that you purchase applications built on the Model.

## ***Introduction***

The ARTS Data Model has been developed over the past 10 years by retailers and vendors working together to create a relational data model to guide the automation of systems to support the business functions and activities of retail. The Model is intended to support all retail business segments involved in the sale of goods and supporting services. Until release 4.0, the Model focused on applications within a store. Release 4.0 provides the organizational and group structures to link stores to central or corporate offices and to create management grouping of stores for multiple purposes.

The Model is presented in two views, Logical and Near Physical. As a vendor neutral, operating system independent standards association, ARTS can not implement the Model in a specific data base management system (DBMS). The Logical Data Model is a representation of the data structure that is unconstrained by technical, organizational or platform requirements. The Near Physical

Data Model contains physical data names and makes some provisions for the generally accepted efficiency practices required to implement a logical data model.

## The ARTS Data Model

### ***Data Model Documentation***

The Data Model is documented very extensively and presented in the following volumes:

- **Scope:** Introduction and Overview of the Model and associated administrative processes.
- **Release 4.0 Changes:** Presents the changes that have been made in Version 4.0 of the data model.
- **Logical View:** Presents the model
  - **Volume I (Introduction):** A narrative document introducing the logical view of the data model.
  - **Volume II (Entity & Attribute Definitions):** A listing of all the entities & attributes defined in the model.
  - **Volume III (Entity – Relationship Diagrams):** A set of Entity-Relationship diagrams
  - **Volume IV (CRUD Matrix):** Associates data model entities with business processes.
- **Worked Examples:** Presents some real-world business problems along with the data that would be stored in the data model.
  - **Volume I (Sales Tax):** Illustrates the implementation of complex sets of sales tax rules.
  - **Volume II (Retail Store Group):** Illustrates the use of StoreGroup structures to implement reporting hierarchies,
- **Near Physical View:** Presents the physical implementation of the model
  - **Volume I (Introduction):** A narrative introducing the near-physical view of the data model.
  - **Volume II (Table & Column Definitions):** A listing of all the tables & columns defined in the model.
  - **Volume III (Relationship Definitions):** A listing of all the relationships defined in the model.
  - **Volume IV (Abbreviations):** A list of all abbreviations used to assemble the physical table & column names.
- **Road Map:** Presents the data model committee's plans for future development of the data model.

All documentation is available on CD or can be downloaded by ARTS members only from <http://www.nrf-arts.org>

**Data Model History**

<b>ARTS Data Model Version Number</b>	<b>Extensions include</b>
ARTS Data Model Release 1.0 November 1997	The first release of the Model to support in-store core retail business functions with a strong focus on POS and to demonstrate the value of a standard model.
ARTS Data Model Release 1.2 December 1998	Release 1.2 was the second release of the ARTS Retail Data Model. Customer was added to support the growing emphasis on automated systems to support customer relationship management.
ARTS Data Model Release 2.0 June 1999	Release 2.0 expanded the Model outside of single store retail operations to enhance customer relationship business functions that are typically performed at the Home Office level and provide multiple financial and reporting levels within the store.
ARTS Data Model Release 2.1 October 2000	Release 2.1 was the first release of the model to include subject areas that are targeted at a specific retail business segment. This version included the addition of the Forecourt subject area, which includes support for the storage, blending, measurement, dispensing and selling of petroleum products.  In addition, this Release provided a major overhaul of the sales tax and the price derivation rule subject areas of the model.
ARTS Data Model Release 3.0 March 2002	Release 3.0 was the first to provide the Model in Popkin Systems Architect format in addition to CA Erwin. Stock types (apparel, fuel, pack, etc.) were introduced along with correction and enhancements requested by members.
ARTS Data Model Release 4.0 March 2003	Release 4.0 provides the long awaited major enhancement of support for the entire retail enterprise. Stores can now be clustered in to groups for administration, taxation, advertising, shipping schedules and other purposes as determined by the implementer.  Release 4.0 includes 9 major enhancements; see the Change Documentation of complete information.

***Companies that have contributed to the Data Model***

ARTS wishes to thank those companies who have actively participated in the development of the Model by serving as volunteers on the Committee and or providing file designs and data diagrams. It is impossible to list all those who have contributed over the years, so the following list is presented to indicate the wide variety of retail segments that are covered within the Model.

<b>Retailers</b>	<b>Vendors, application solution providers</b>
American Stores Belks Department Stores Boscov's Department Stores Circuit City Coles Myer CSK Auto Home Depot Long John Silver's Marks and Spencer McDonalds Nordstrom Pier 1 Saks Shell Oil Target The Gap The Limited Toys-R-Us Woolworth Plc	360 Commerce Advantage Retail Solutions AfterBot CMA eMAC Digital Fujitsu Transaction Systems GK Software HB International IBM Information Solutions Group Logware PSI Retek STS Symbol Telxon Versatil

***Uses and Users of the Model***

Since its initial release in 1997 the Model has been used in a variety of ways by retailers and vendors. Some view it as intellectual property to guide and/or critique developments, while others have implemented the near physical model as production data bases. Specific uses include:

- Develop software applications
- Evaluate a software package
- Document data related business rules
- Create an object model
- Establish internal design and data naming standards

Many companies have informed ARTS that they are using in the Model for one of the above. They included, not exclusively,,: McDonalds, Shell Oil, Hollywood Video, Boscov's, KB Toys, Nordstrom, Smart and Final, Home Depot, Target, Marks and Spencer, Coles Myer, The Gap, 360 Commerce, Matra, GK Software, HB International, Advantage Retail.

The Data Model is the foundation for the ARTS XML Data Dictionary that supports IXRetail, which is developing standard XML schemas and messages to integrate applications with in the retail enterprise. You can view the Dictionary on <http://www.nrf-arts.org>

***Testing for Conformance***

In 2002 ARTS announced a conformance test that compares the Data Model to applications to determine to what degree the Model has been used in developing the applications. Conformance testing can be conducted against the total Model or to any of the individual business function areas. The testing is a combined automated and manual audit process conducted by ARTS using our experts.

Conformance testing is intended to protect the investment of retailers that purchase applications that are marketed as conforming to the ARTS Data Model ensuring they receive the flexibility and ease of integration promised. Further, conformance testing provides the vendors that have invested the time and money working with ARTS to become conformant, the extra consideration they deserve.



***Data Model Maintenance***

The Data Model is maintained by the Data Model Committee, volunteers from ARTS member companies with the support of the ARTS Sr Technical Architect. The Committee holds two day meetings each quarter and collaborates on the ARTS Webboard which is available to ARTS members only via <http://www.nrf-arts.org>. The webboard provides a forum for all interested members to ask questions or make suggestion to enhance the Model. The webboard dialogue is monitored by the ARTS staff to ensure help is providing to requesting users, and that all suggestions are considered by the Committee.

If you would like to join the Committee please contact [arts@nrf.com](mailto:arts@nrf.com).

The ARTS XML initiative, IXRetail, also provides input to the Committee for enhancing the Model. In developing standard XML schemas and messages IXRetail identified new elements and relationship. While all new elements are added to the Dictionary, the Committee reviews and determines which are applicable to the Model. Thus while the original Dictionary contained only information from the Model, the every expanding Dictionary that is available to the public contains elements that are not in the Model. The Dictionary does not identify the data relationships.

## **Retail Locations, Functions and Areas supported by the Model**

To ensure the Data Model contains all the data to automate retail activities, it was developed using a methodology that surveys the retail enterprise using three aspects:

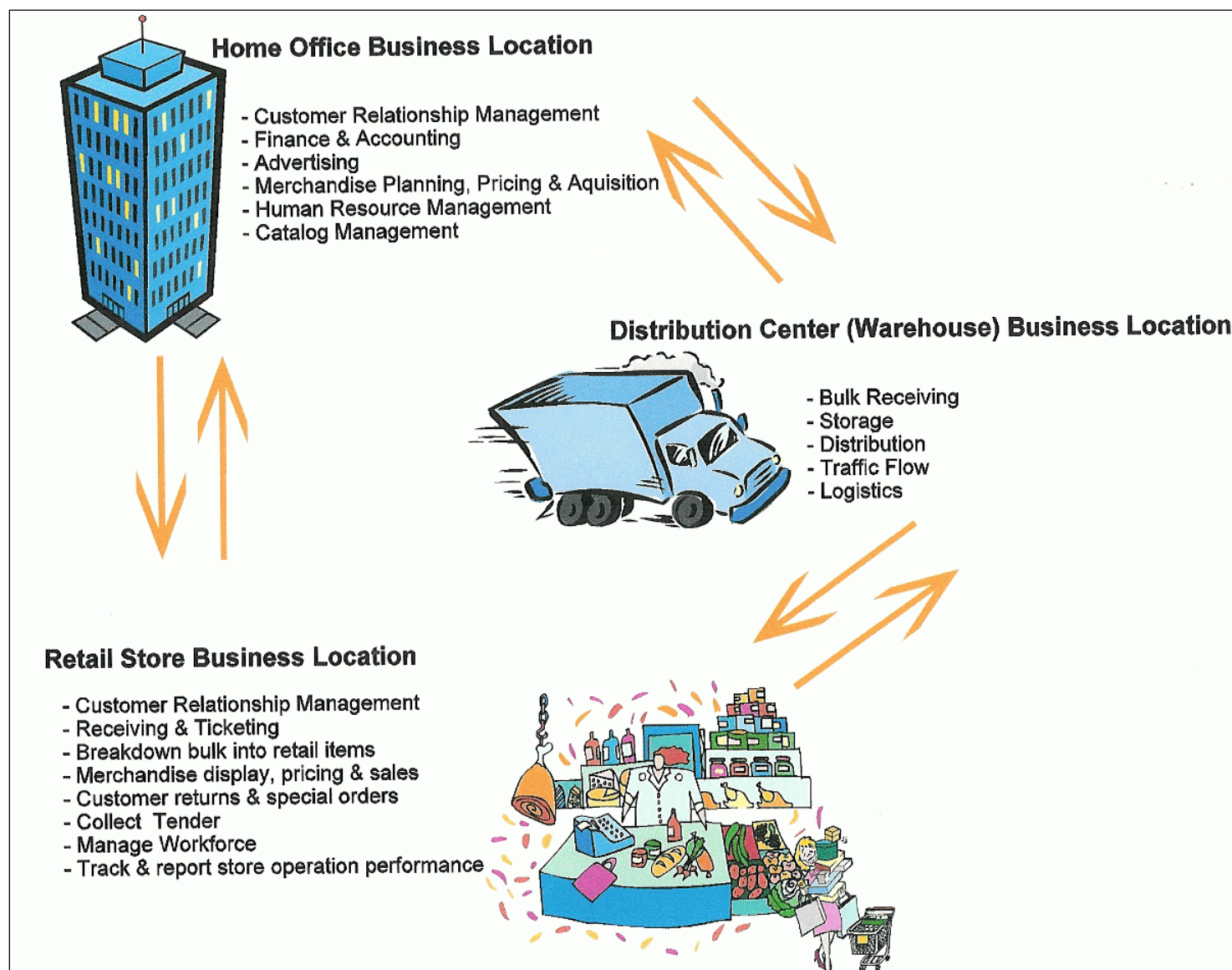
- Retail Business Locations – Review the model functionality against the needs of the various classes of location within the enterprise, at which business is conducted.
- Retail Business Functions – Review the model functionality against the business functions that are performed at each of the business locations.
- Retail Subject Area – Decomposed business functions into smaller work unit.

The Model covers most segments of retail including General Merchandise, Department Store, Specialty (both hardlines and softlines), Convenience & Petroleum, Fast food (Quick Service Restaurants), Home & Garden, Food & Grocery and Electronics. This statement is well supported by the list of above contributors.

### ***Retail Business Locations***

A retail enterprise is typically divided into three major business locations. These business locations are the Home Office, Distribution Center (Warehouse) and the Retail Store. Exhibit 1 illustrates the three major business locations and the principal business functions that are performed within each.

## Exhibit 1: Major Retail Enterprise Business Location



**The Home Office Business Location:**

Typically, many business decisions are made centrally and not at the store level. The ARTS Data Model supports business functions of retail store operation that occur at the Home Office Level.

- **Customer Relationship Management** – The management of customer preferences, purchase history and gift registry capability as well as function supporting customer-focused micro-marketing.
- **Finance & Accounting Management** – Full tracking and audit trail capability of finance movement within the retail enterprise.
- **Merchandise Management** – The management of the retail operation's pricing, planning and acquisition of merchandise.
- **Human Resource Management** - Administration of the factors affecting the human resources in the retail enterprise.
- **Home Office Catalog Management** – The provision of item description, suggested pricing, promotional pricing, and the maintenance of the taxation and selling rules for multiple pricing and taxation zones.

Support for Real Estate, complex Human Resource and other administration support functions outside of the day-to-day retail operation of the enterprise have been deferred to a later release of the model.

**The Distribution Center (Warehouse) Business Location:**

Receiving, processing, allocation and logistics management are handled through distribution facilities and warehouses in most retail enterprises. This high-level view of the retail enterprise is important because it defines the context of the ARTS Data Model.

- **Receiving** – Provision for receiving large amounts of stock, on the behalf of many retail stores, from the suppliers into the warehouse. Receiving may be bulk with post distribution, pre-distribution by store or cross docking.
  - **Storage** – Information regarding the on-hand availability and shelf life of the products in the warehouse, chiefly answering the questions – how much stock do we have?, where is the stock?, how long has the stock been there?, and how long will the stock last? Inventory locations are supported whether they are inside a Retail Store, and /or are shared by many retail stores.
  - **Distribution** – The tracking of economical shipment sizes and the stock handling capacity of the warehouse and the retail stores in order to create “just-in-time” ordering.
  - **Traffic Flow** – Tracking system providing information about the in- and out-bound flow of the stock. Full documentation of merchandise flow into & out of the warehouse is supported.
- Logistics** – The movement of goods from one point to another.

The determination of stock ownership and financial accounting between vendor, distribution center and stores and automatic rule-based ordering, packing & distribution systems will be supported in future releases.

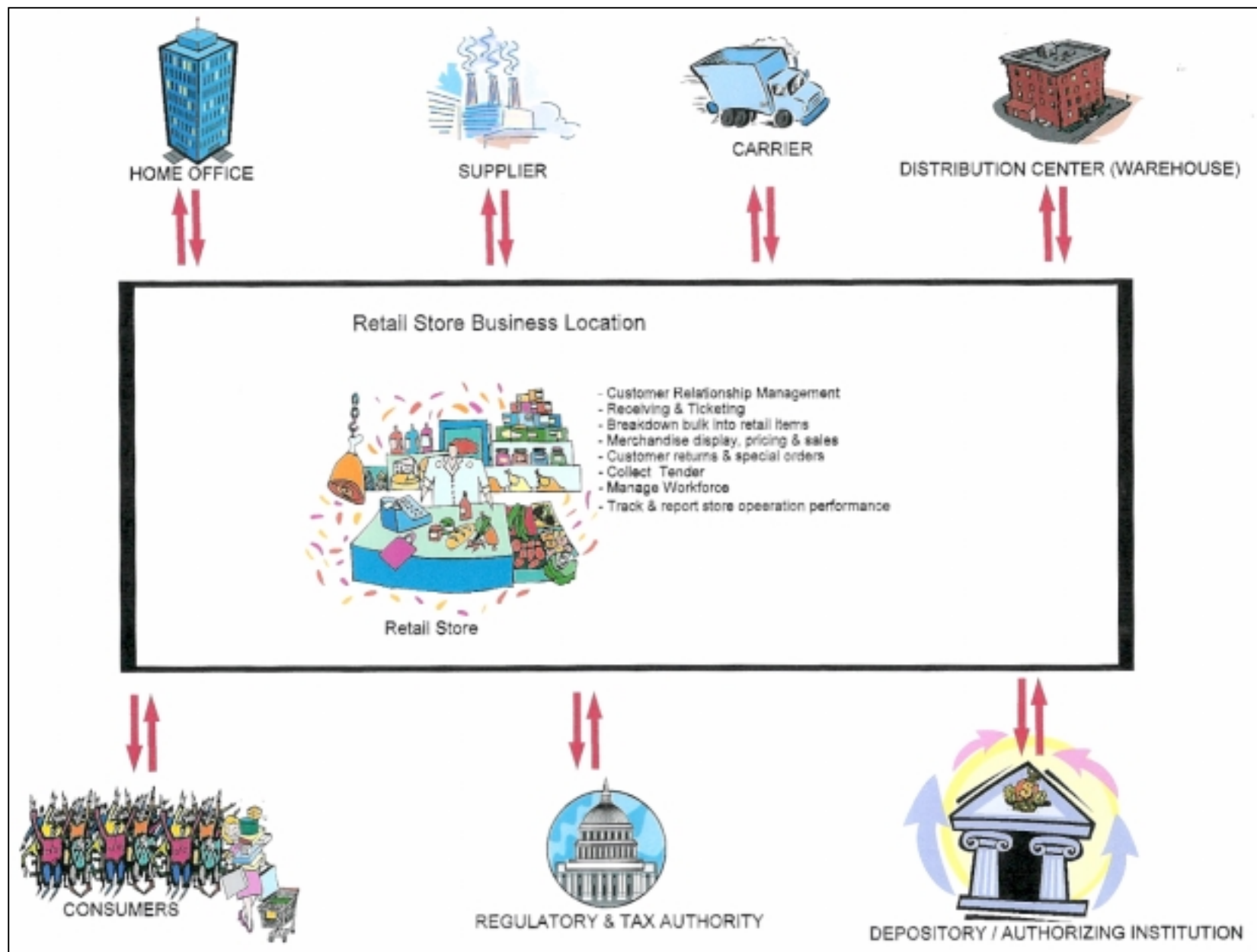
**The Retail Store Business Location:**

A retail store is a place or point of contact where merchandise and services are offered for sale to end consumers and where tender is collected in exchange. A retail store may be a physical store, website, kiosk, catalog or any point where merchandise is presented and sold to end consumers.

- **Customer Relationship Management** – The identification of the customer and their preferences, with the provision of gift registry loyalty awards schemes etc.
- **Receiving & Ticketing** – The receiving of goods from distribution centers and suppliers and the booking it into in-store inventory. The newly received stock can be ticketed if not done by the manufacture or distribution center.
- **Breakdown Bulk into Retail Items** – Separation of bulk items (e.g. cartons) into single units rendering them ready for sale
- **Merchandise display, pricing & sales** – The display of store merchandise on shelves, together with their allocated prices and the tracking of the sales to customers
- **Collect Tender** – The electronic authorization of checks, credit & debit cards, as well as the validation of gift certificates and loyalty award points in payment of goods being sold.
- **Manage Workforce** – The scheduling of staff as well as the monitoring of their performance
- **Track & Report Store Operation Performance** – The tracking and reporting of various financial and operational performances for each individual store.

Retailing is dependent on the flows of information within the enterprise, stores and home office and external organizations. Examples include price changes from the home office to stores, sales reporting from stores to the home office, EDI transaction to and from suppliers, and authorization for card tenders from the banks. These information flows are represented in Exhibit 2 by arrows and represented in the ARTS Data Model as messages.

## Exhibit 2: Retail Store Business Area Context



***Retail Business Functions***

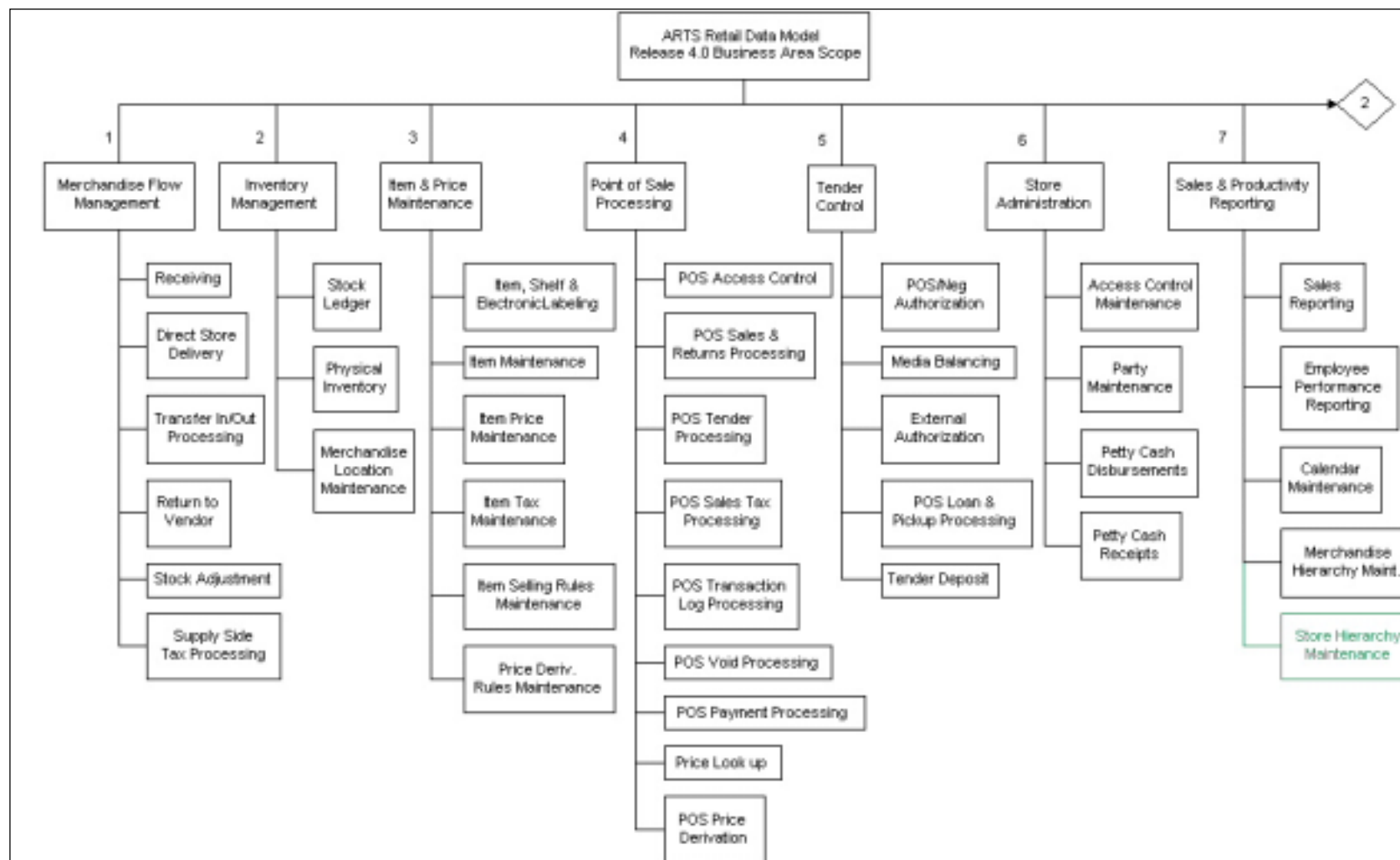
The ARTS Data Model currently supports eight of ten retail business functions:

- Merchandise flow management
- Inventory management
- Item and price maintenance
- Point of sale processing
- Tender control
- Store administration
- Customer relationship management
- Sales and productivity reporting

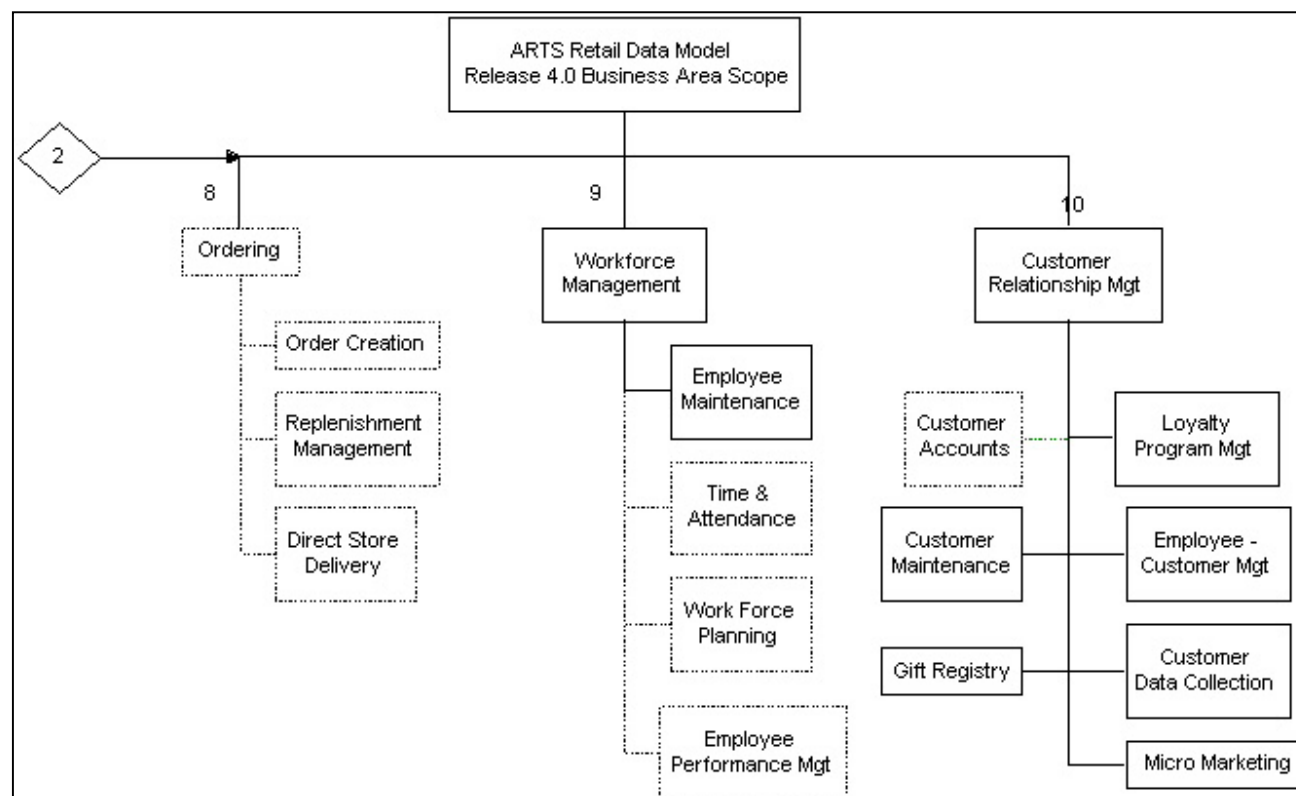
Ordering and Workforce Management are business functions that are not supported in Release 4.0 (as illustrated in Exhibit 3 & 4). These will be supported in future releases of the data model.

***Retail Subject Areas***

The ARTS Retail Data Model supports the business functions illustrated in Exhibit 3 & 4. The exhibits show how the 10 Business functions are further segregated into 52 Retail Subject Areas. The dashed blocks (in Exhibit 4) identify functions that are to be supported in future releases of the ARTS Retail Data Model. The business functions in Exhibit 3 largely reside at the store-level but with Release 4.0 can now be migrated to the enterprise. The Customer Relationship Management (CRM) functions and the data model subject areas that support them have since inclusion been at the enterprise level. Retailers each handle the "ownership" of the customer relationship differently. In most retail businesses, customer demographics, financial data and marketing information are owned by the enterprise.

**Exhibit 3: ARTS Retail Data Model Functional Decomposition Model**



**Exhibit 4: Retail Data Model Functional Decomposition Model (continued)**

## Data Model Presentation

### Data Model E-R Diagrams

The data model has 78 diagrams which show the entities and relationships for a particular retail subject area, (each retail subject area has at least one diagram, with many having more) in a varying amount of detail. The 78 diagrams are numbered according to numbering scheme presented in Exhibit 5.

**Exhibit 5: Diagram Numbering Scheme**

Logical View Series	Description
<b>Logical 00000 - 00999</b>	High-level macro views - Includes major entities of the ARTS Data Model from a very high level.
<b>Logical 01000 - 01099</b>	Item Description Views - Showing the different types of Item supported in the ARTS Data Model
<b>Logical 01100 - 01199</b>	Item selling rules views - Showing constraints that can be placed upon when, where, how and to whom items may be sold.
<b>Logical 01300 - 01399</b>	Item pricing views - Showing support for general non-targeted current, historical & future prices for merchandise
<b>Logical 01400 - 01499</b>	Item price derivation views - Showing support for highly targeted, transaction & customer specific pricing rules for merchandise
<b>Logical 01500 - 01599</b>	Item supplier views - Showing support for which suppliers provide which merchandise, at what prices.
<b>Logical 02000 - 02099</b>	Stock ledger views - How much stock do I have? Where is it? What's its current valuation?
<b>Logical 02200 - 02299</b>	In & Outbound Inventory Control - Records of all stock movements in and out of the store via the storeroom
<b>Logical 02300 - 02399</b>	POSLog - Retail Transaction Views - Records of all transactions conducted with customers that involve the exchange of merchandise for money.
<b>Logical 02400 - 02499</b>	POSLog - Control Transaction Views - Records of all miscellaneous administrative transactions conducted at POS
<b>Logical 02600 - 02699</b>	POSLog - Tender Control Transaction Views - Records of all transactions involving the movement of Cash, Cheques, Credit Card Slips and all other forms of tender.
<b>Logical 02700 - 02799</b>	Taxation Views - The rules & reporting summaries involved in paying and collecting sales & consumption taxes on the in & outbound sides of the retail business
<b>Logical 03000 - 03999</b>	Tender Reporting Views - Reporting summaries of all tender movements
<b>Logical 04000 - 04999</b>	Financial Ledger Views - The point of export from the operations conducted within the ARTS Data Model to the General Ledger & Accounting systems.
<b>Logical 05000 - 05999</b>	Sales & Performance Reporting - Reporting summaries of all sales by Item, Merchandise Class, Store & Employee
<b>Logical 06000 - 06999</b>	Store Administration Views - Miscellaneous infrastructural entities required to keep retail store operations running.
<b>Logical 07000 - 07999</b>	Customer Relationship Management Views - Records of customer preferences, inter-customer relationships, customer purchase history
<b>Logical 10000 - 19999</b>	Retail Enterprise Organization Views - The roll-up of stores into districts, regions, countries & zones. Employee assignments & responsibilities across the enterprise
<b>Logical 20000 - 20099</b>	Forecourt Segment Views - Support for the storage, measurement, dispensing & sale of petroleum products such as Gas, Petrol, Diesel, Kerosene etc..

Exhibit 6 presents a matrix showing the 78 implemented retail subject areas and their association with the business functions identified in Exhibit 3 & 4. This very high-level matrix defines the business scope of Release 4.0 of the ARTS Data Model from a data and function point of view. Exhibit 6 identifies a "*controlling*" association between a subject area and a business area. The controlling nature of an association is based on the where entity type instances in a subject area are created and deleted by functions in a business area.

**Exhibit 6a: Retail Subject Area - Business Function Association Matrix**

	Business Function										
	1	2	3	4	5	6	7	8	9	10	11
ARTS Data Model Subject Area	Merchandise Flow Management	Inventory Management	Item & Price Maintenance	Point of Sale Processing	Tender Control	Store Administration	Store & Productivity Reporting	Ordering	Work Force Management	Customer Relationship Mgt	Forecourt Retail Segment
Logical 00000 - ARTS Macro View											
Logical 01000 - Item Description - Macro View			X								
Logical 01010 - Item Description - Subtype View			X								
Logical 01020 - Item Description - Enterprise View			X								
Logical 01030 - Item Description - Recipe View			X								
Logical 01040 - Item Description - Rental View			X							X	
Logical 01050 - Item Description - Labelling View			X								
Logical 01100 - Item Selling Rules - Macro View			X	X							
Logical 01110 - Item Selling Rules - Restrictions View			X	X							
Logical 01120 - Item Selling Rules - Manufacturer Coupon View				X							
Logical 01300 - Item & Price Maintenance View			X								
Logical 01400 - Item Price Derivation - Macro View			X	X							
Logical 01410 - Item Price Derivation - Rules View			X	X							
Logical 01420 - Item Price Derivation - Retail Transaction View				X							
Logical 01500 - Item & Supplier View	X							X			
Logical 02000 - Stock Ledger View	X	X						X			
Logical 02200 - In and Outbound View	X										
Logical 02300 - Retail Transaction - Macro View				X							
Logical 02310 - Retail Transaction - Item Sale View				X							
Logical 02320 - Retail Transaction - Taxation View				X							
Logical 02330 - Retail Transaction - Tender - Macro View				X	X						
Logical 02333 - Retail Transaction - Tender - Coupon View				X	X						
Logical 02336 - Retail Transaction - Tender - Debit / Credit View				X	X						
Logical 02339 - Retail Transaction - Tender - Account View				X	X						
Logical 02340 - Retail Transaction - Shipping View				X							
Logical 02350 - Retail Transaction - Restriction Validation View				X							
Logical 02360 - Retail Transaction - Food Service View				X							
Logical 02370 - Retail Transaction - Rental View				X							
Logical 02380 - Retail Transaction - Total View				X							

**Exhibit 6b: Retail Subject Area - Business Function Association Matrix (Ctd)**

	Business Function										
	1	2	3	4	5	6	7	8	9	10	11
ARTS Data Model Subject Area Continued	Merchandise Flow Management	Inventory Management	Item & Price Maintenance	Point of Sale Processing	Tender Control	Store Administration	Store & Productivity Reporting	Ordering	Work Force Management	Customer Relationship Mgt	Forecourt Retail Segment
Logical 02400 - Control Transaction View				X		X					
Logical 02600 - Tender Control Transaction - Macro View				X	X						
Logical 02610 - Tender Control Transaction - Movement View				X	X						
Logical 02620 - Tender Control Transaction - Settlement View				X	x						
Logical 02700 - Taxation - Macro View			X								
Logical 02710 - Taxation - Rules View			X								
Logical 02720 - Taxation - Retail Transaction View				X							
Logical 02730 - Taxation - Inventory Control Document View	X										
Logical 02740 - Taxation - Reporting View							X				
Logical 03000 - Tender History - Macro View					X		X				
Logical 03100 - Tender History - Settlements View					X		X				
Logical 03200 - Tender History - Reporting Period View					X		X				
Logical 03300 - Tender History - Session View					X		X				
Logical 03400 - Tender History - Till, Operator, Workstation & Session					X		X				
Logical 04000 - Financial Ledger - Macro View							X				
Logical 04100 - Financial Ledger - Retail Transaction View							X				
Logical 04200 - Financial Ledger - Tender Control Transaction View							X				
Logical 04300 - Financial Ledger - Inventory Control View		X									
Logical 05100 - Sales Reporting View							X				
Logical 05110 - Sales Reporting - Merchandise Hierarchy View							X				
Logical 05200 - Stock Reporting View		X					X				
Logical 05300 - Employee Reporting View							X		X		
Logical 05400 - Workstation Reporting View											
Logical 06100 - Calendar View						X					
Logical 06200 - Access Control View						X					
Logical 06300 - Party Address and Contact View						X					
Logical 06310 - Party Role View						X					
Logical 06320 - Party Address View						X					

**Exhibit 6c: Retail Subject Area - Business Function Association Matrix (Ctd)**

	Business Function										
	1	2	3	4	5	6	7	8	9	10	11
ARTS Data Model Subject Area	Merchandise Flow Management	Inventory Management	Item & Price Maintenance	Point of Sale Processing	Tender Control	Store Administration	Store & Productivity Reporting	Ordering	Work Force Management	Customer Relationship Mgt	Forecourt Retail Segment
Logical 06330 - Party Identification View						X					
Logical 06400 - Store Equipment View						X					
Logical 06600 - Time Groups View				X							
Logical 06700 - Language Support						X					
Logical 06800 - Event Scheduler View			X			X					
Logical 07100 - Customer Information View										X	
Logical 07200 - Customer Purchase Transaction History View										X	
Logical 07300 - Customer Preferences View										X	
Logical 07320 - Customer Preferences - Gift Registry View										X	
Logical 07400 - Promotion Activity View										X	
Logical 07500 - Customer Account View										X	
Logical 10100 - Enterprise - Store Group View						X					
Logical 10200 - Enterprise - Merchandise View	X		X								
Logical 10300 - Enterprise - POS Department View											
Logical 10400 - Enterprise - Employee View						X		X			
Logical 20000 - Forecourt Macro View											X
Logical 20010 - Forecourt Fueling Point View											X
Logical 20020 - Forecourt Pricing View			X								X
Logical 20030 - Forecourt Transaction View				X							X
Logical 20040 - Forecourt History View							X				X
Logical 20050 - Forecourt Tank Gauge View		X									X

**ARTS Release 4.0 Data Model CRUD Matrix**

ARTS Release 4.0 Data Model CRUD Matrix defines the data actions performed by each function in Exhibit 3 on each entity in the data model. The CRUD term refers to four permissible data actions: Create, Read, Update, and Delete. The functions are organized into business areas. The entities are listed in alphabetic sequence. The CRUD matrix is an integral part of this scope document and formalizes the association between the functional business scope and data model.

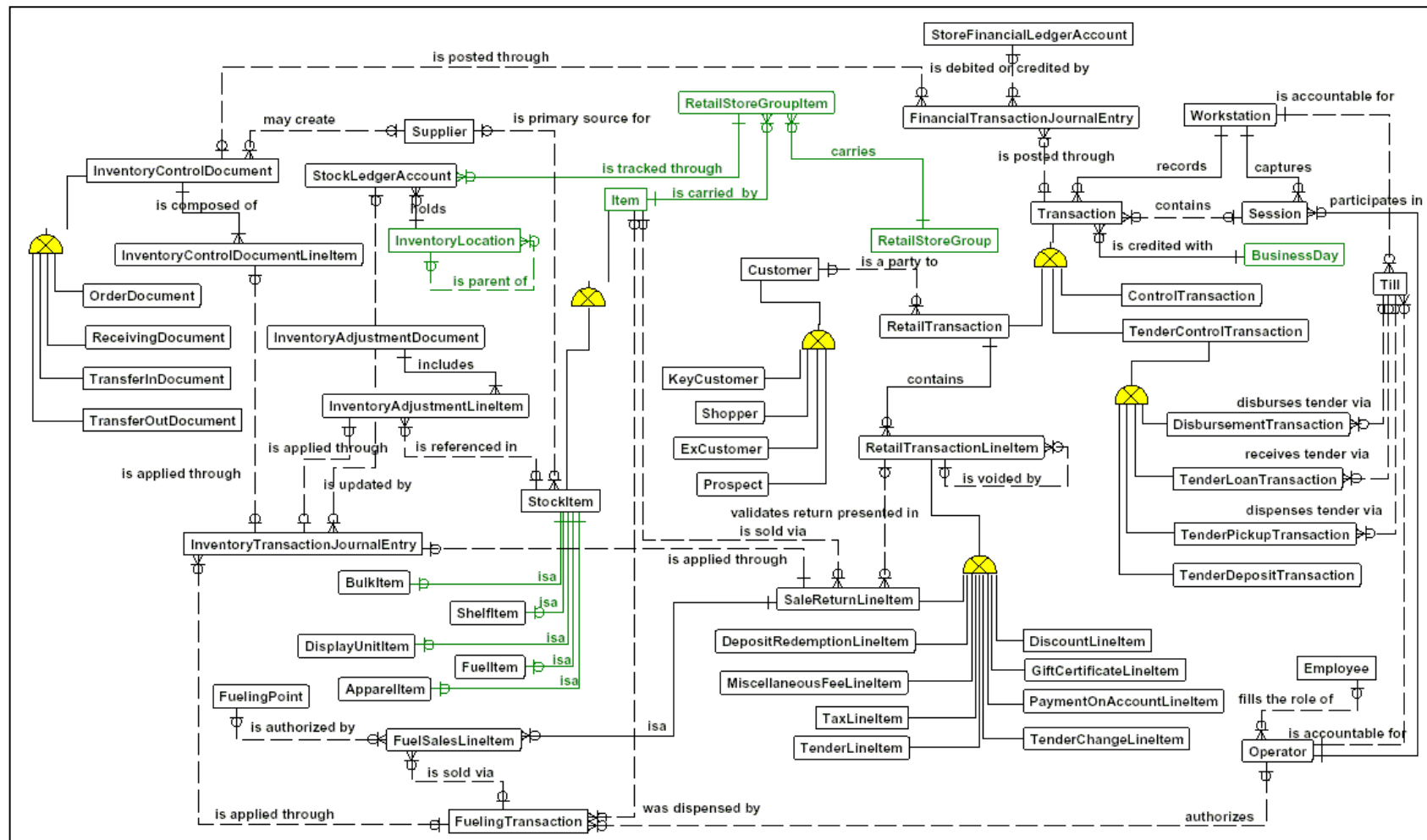
**Sample Entity – Relationship Diagrams**

Exhibit 7 presents the macro view of the model, showing the coverage of the model at an extremely high level.

- Entities & Relationships that are unchanged since Release 3.0 of the model are shown in **black**.
- Entities & Relationships that have been changed since Release 3.0 of the model are shown in **green**.

Exhibit 8 presents the macro view of the model and includes the primary key columns

- Columns that are both Primary Key & Foreign Key are shown in **red**.
- Columns that are Foreign Key are shown in **blue**.
- Columns that are Primary Key are shown in **black**.

**Exhibit 7: Logical 00000 - ARTS Macro View**

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