Appendix A. The CelDial Case Study

Before reviewing this case study, you should be familiar with the material presented in Chapter 7, “The Process of Data Warehousing” on page 49 from the beginning to the end of 7.3, “Requirements Gathering” on page 51. The case study is designed to enable you to:

- Understand the information presented in a dimensional data model
- Create a dimensional data model based on a given set of business requirements
- Define and document the process of extracting and transforming data from a given set of sources and populating the target data warehouse

We begin with a definition of a fictional company, CelDial, and the presentation of a business problem to be solved. We then define our data warehouse project and the business needs on which it is based. An ER model of the source data is provided as a starting point. We close the case study with a proposed solution consisting of a dimensional model and the supporting metadata.

Please review the case study up to but not including the proposed solution. Then return to 7.4, “Modeling the Data Warehouse” on page 53 where we document the development of the solution. We include the solution in this appendix for completeness only.

A.1 CelDial - The Company

CelDial Corporation started as a manufacturer of cellular telephones. It quickly expanded to include a broad range of telecommunication products. As the demand for, and size of, its suite of products grew, CelDial closed down distribution channels and opened its own sales outlets.

In the past year CelDial opened new plants, sales offices, and stores in response to increasing customer demand. With its focus firmly on expansion, the corporation put little effort into measuring the effectiveness of the expansion. CelDiaλ′ s growth has started to level off, and management is refocusing on the performance of the organization. However, although cost and revenue figures are available for the company as a whole, little data is available at the manufacturing plant or sales outlet level regarding cost, revenue, and the relationship between them.

To rectify this situation, management has requested a series of reports from the Information Technology (IT) department. IT responded with a proposal to implement a data warehouse. After consideration of the potential costs and benefits, management agreed.

A.2 Project Definition

Senior management and IT put together a project definition consisting of the following objective and scope:

Project Objective

To create a data warehouse to facilitate the analysis of cost and revenue data for products manufactured and sold by CelDial.

Project Scope

The project shall be limited to direct costs and revenues associated with products. Currently, CelDiaλ′ s manufacturing costs cannot be allocated at the product level. Therefore, only component costs can be included. At a future time, rules for allocation of manufacturing and overhead costs may be created, so the data warehouse should be flexible enough to accommodate future changes.

IT created a team consisting of one data analyst, one process analyst, one manufacturing plant manager, and one sales region manager for the project.

A.3 Defining the Business Need

First, the project team defined what they needed to investigate in order to understand the business need. To that end, the team identified the following areas of interest:

- Life cycle of a product
- Anatomy of a sale
- Structure of the organization
- Defining cost and revenue
- What do the users want?

A.3.1 Life Cycle of a Product

The project team first studied the life cycle of a product. Each manufacturing plant has a research group that tests new product ideas. Only after the manufacturing process has been completely defined and approval for the new product has been obtained is the product information added to the companψ′ s records. Once the product information is complete, all manufacturing plants can produce it.

A product has a base set of common components. Additional components are added to the base set to create specific models of the product. Currently, CelDial has 300 models of products. This number is fairly constant as the rate of new models being created approximately equals the rate of old models being discontinued. Approximately 10 models per week experience a cost or price change. For each model of each product, a decision is made about whether or not it is eligible for discounting. When a model is deemed eligible for discounting, the salesperson may discount the price if the customer buys a large quantity of the model or a combination of models. In a retail store (see A.3.2, “Anatomy of a Sale” on page 165) the store manager must approve such a discount.

The plant keeps an inventory of product models. When the quantity on hand for a model falls below a predetermined level, a work order is created to cause more of the model to be manufactured. Once a model is manufactured, it is stored at the manufacturing plant until it is requested by a sales outlet.

The sales outlet is responsible for selling the model. When a decision is made to stop making a model, data about the model is kept on file for six months after the last unit of the model has been sold or discarded. Data about a product is removed at the same time as data about the last model for the product is removed.

A.3.2 Anatomy of a Sale

There are two types of sales outlets: corporate sales office and retail store. A corporate sales office sells only to corporate customers. Corporate customers are charged the suggested wholesale price for a model unless a discount is negotiated. One of CelDiaλ′ s 30 sales representatives is assigned to each corporate customer. CelDial currently serves 3000 corporate customers. A customer can place orders through a representative or by phoning an order desk at a corporate sales office. Orders placed through a corporate sales office are shipped directly from the plant to the customer. A customer can have many shipping locations. It is possible for a customer to place orders from multiple sales offices if the customeρ′ s policy is to let each location do its own ordering. The corporate sales office places the order with the plant closest to the customer shipping location. If a customer places an order for multiple locations, the corporate sales office splits it into an individual order for each location. A corporate sales office, on average, creates 500 orders per day, five days per week. Each order consists of an average of 10 product models.

A retail store sells over the counter. Unless a discount is negotiated, the suggested retail price is charged. Although each product sale is recorded on an order, the company does not keep records of customer information for retail sales. A store can only order from one manufacturing plant. The store manager is responsible for deciding which products will be stocked and sold from his or her store. A retail store, on average, creates 1000 orders per day, seven days per week. Each order consists of an average of two product models.

A.3.3 Structure of the Organization

It was clear to the team that understanding products and sales was not enough; an understanding of the organization was also necessary. The regional sales manager provided an up-to-date copy of the organization structure (see Figure 91 on page 166).

A.3.4 Defining Cost and Revenue

The project team must clearly define cost and revenue in order for users to effectively analyze those factors.
For each product model, the cost of each component is multiplied by the number of components used to manufacture the model. The sum of results for all components that make up the model is the cost of that model.
For each product model, the negotiated unit selling price is multiplied by the quantity sold. The sum of results for all order lines that sell the model is the revenue for that model.
When trying to relate the cost of a model to its revenue, the team discovered that once a model was manufactured and added to the quantity on hand in inventory, the cost of that unit of the model could not be definitively identified. Even though the cost of a component is kept, it is only used to calculate a current value of the inventory. Actual cost is recorded only in the companψ′ s financial system, with no reference to the quantity manufactured.
The result of this determination was twofold. First, the team requested that the operational systems be changed to start recording the actual cost of a manufactured model. However, both management and the project team recognized that this was a significant change, and that waiting for it would severely impact the progress of the project. Therefore, and based on the fact that component costs changed infrequently and by small amounts, the team defined this rule: The revenue from the sale of a model is always recorded with the current unit cost of the model, regardless of the cost of the model at the time it was manufactured.

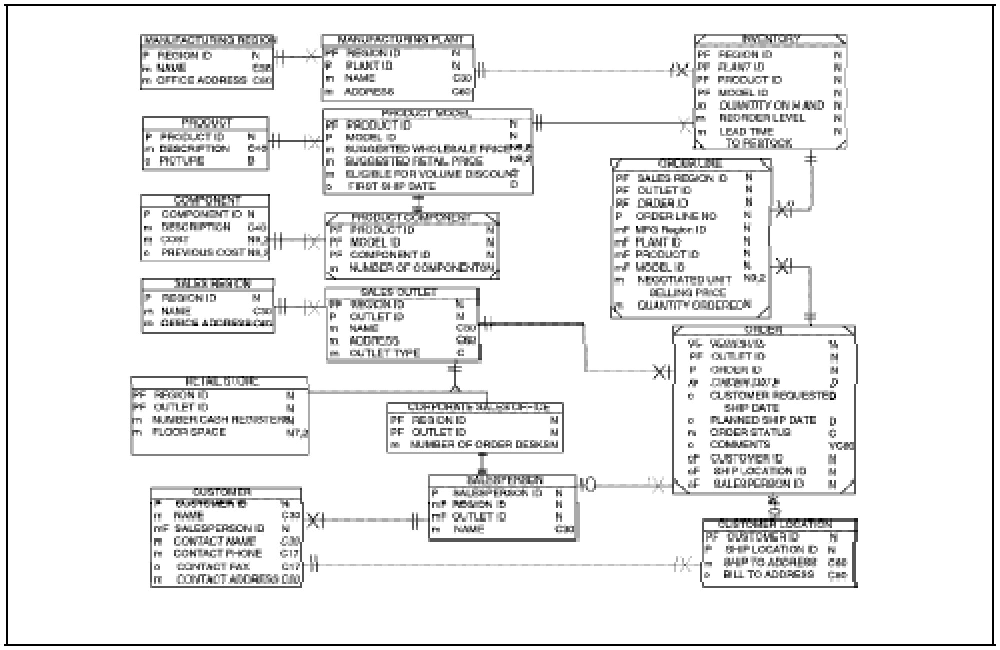

Figure 92. Subset of CelDial Corporate ER Model