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## Framework For Cost Modeling A Supply Chain

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FRAMEWORK FOR COST MODELING A SUPPLY CHAIN

by

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A dissertation submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy  
in the Department of Industrial Engineering and Management Systems  
in the College of Engineering and Computer Science  
at the University of Central Florida  
Orlando, Florida

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Luis C. Rabelo

## **ABSTRACT**

Researchers are interested in value chain analysis to identify the different opportunities for cost savings. The literature have been narrow in scope and addressed specific problems; however none has addressed the need for a general framework that can be used as a standard template in the supply chain cost management and optimization, though Dekker and Goor (2000) said that the goal was to develop a model that would allow direct comparison of specific activities between firms, such as warehousing activities costs. There was no indication in the literature of a cost model that can identify all costs and cost drivers through the supply chain. Some firms built models to analyze the effect of changes in activities but only with limited activities such as logistics.

The purpose of this research is to create a general framework that can express the cost data for the partners of the supply chain in similar terms. The framework will layout the common activities identified within the firm and the relationship of these activities between the partners of the supply chain, and the framework will identify the effect of changes in activities on other partners within the supply chain. Cost information will help in making decisions about pricing, outsourcing, capital expenditures, and operational efficiency.

The framework will be able to track cost through the chain, which will improve the flexibility of the supply chain to respond to rapidly changing technology. The framework

will help in developing product strategy paradigms that encompass the dynamics of the market, in particular with respect to the technology adoption lifecycle.

## **KEYWORDS**

Supply Chain Management (SCM), Management Accounting (MA), Value Chain Analysis (VCA), Active Base Costing (ABC), Cost Modeling, Supply Chain Operation Reference Model (SCOR), Supply Chain Council (SCC), Design Chain Operation Reference (DCOR), Customer Chain Operation Reference (CCOR), Market Chain Operation Reference (MCOR), Visual Basic for Applications (VBA).

## **DEDICATIONS**

I dedicate this research to my father who passed away in 1994 and to my mother who prayed for my success and still praying for me. I also dedicate my success to my wife Nawal for her support and patience. She believed in me when no one did and she guided me when I needed guidance. I will not forget my kids Nader, Noor, Samah and Nasser for their patience and understanding. I will not also forget my brother Ghaleb who was my mentor and helped me to get over many difficulties and my brother in law Jamal who put me on track and supported me through my study. Last but not least I dedicate my reaserch to my brothers and sisters and their children. I love you all.

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## **CHAPTER 1: INTRODUCTION**

The supply chain is the network of customers, distributors, transporters, storage facilities, manufacturers and suppliers that participate in the sale, delivery and production of a particular product. The supply chain is defined by many companies, practitioners, and organizations. Investorwords.com defined supply chain as “the network of retailers, distributors, transporters, storage facilities and suppliers that participate in the sale, delivery and production of a particular product.” Ganeshan and Harrison (1995) define the supply chain as “a network of facilities and distribution options that performs the functions of procurement of materials; transformation of these material into intermediate and finished products; and distribution of these finished products to customers.” William C. Copacino (1997) defines supply chain very simply as the flow of materials and products from source to user. Figure 1 shows the value chain of partners.

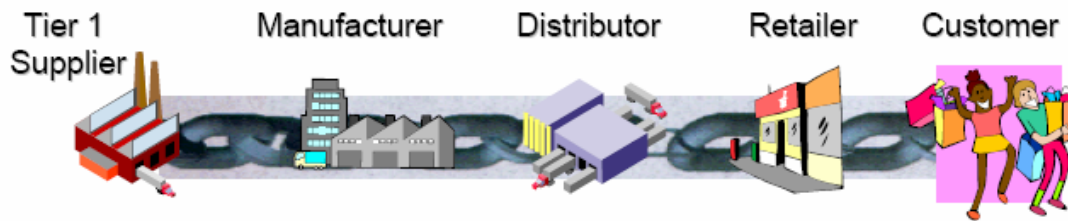


Figure 1: The Value Chain of Partners<sup>1</sup>

The supply chain is the main axis of competition in the new market on the local and global level. Thus the concentration became more active on connecting the firms in one supply chain to survive in the dynamic current market. Included is the need to manage this chain with rising aspects and problems. Lots of research is being done on how to manage a supply chain to become a successful, competitive, and flexible. Researchers defined Supply Chain Management (SCM) as the practice of coordinating the flow of goods, services, information, and finances as they move from raw materials to parts supplier to manufacturer to wholesaler to retailer to consumer (Cooper, Ellram, et al, 1997). This process includes order generation, order taking, information feedback and the efficient and timely delivery of goods and services. Cokins (1999) stated that “Supply chain authorities believe that there are four essential ingredients for successful Supply Chain Management

- Demand driven continuous replenishment
- Electronic commerce (bar coding)
- Category management

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<sup>1</sup> Center for Intelligent Supply Networks (C4ISN)

- True cost information activity based costing (ABC)”

Although a lot of research has been done in the true cost information activity, it still has many opportunities and issues to discuss. Managing the Supply Chain will help the partners in the chain to understand their internal costs. Tracking cost information through the supply chain is very important for cost monitoring, which will assist in the coordination and optimization of activities across firms in a value chain. The accurate cost information will help the managers to understand what the profitable products and services are and how to drive future profits by creating newer strategies. These strategies are not within one firm, but extend to all the partners that will act as one team with one objective. They will collaborate to form one system and the information will leverage to perform as a value chain. Understanding the process along the supply chain will define the low performance partner where the chain will have the option to replace the weak partner. Each partner in the chain will create a cost for the others that can be reduced to improve the total cost. Lots of opportunities are available to improvise saving in the cost within the chain. That is why more firms are now interested in establishing inter-relationships between each other. The relationships will allow exchange of information and cooperation; but need a commitment and acceptance of the risk and rewards of partnering (Dekker and Goor, 2000). More efficient activities will be created within the supply chain and will provide better outcomes, which will increase the competition between chains and individuals within the chain (Cooper, Lambert et al, 1997).



## **1.1 Problem Statement**

Researchers are interested in value chain analysis to identify the different opportunities for cost savings. There is a need to develop a good understanding for the basic concepts that affect the cost of a product through the supply chain. There is a need for a cost model that is responsive to new daily problems. Analyzing cost is very hard and complex, since a variety of products exist in today's market. Many scenarios related to product processes through the supply chain should be considered. Many factors are involved in defining product cost, such as labor efficiency, taxes, facilities requirements, and environmental constraints, which will affect the cost analysis. It is difficult to predict the influence of all these cost effects associated with each product or service, and that will create complexity. We can increase the quality of the product but that will increase the cost, which will create a conflict with our main goal to minimize cost. Trade-offs and decisions have to be made. Other complexities may be due to the dependence of most cost models on historical data, which will make it very hard to predict the cost associated with new product processes. When developing a new product we don't have enough data to support the cost estimation. Other complexity issues will rise from the comparison of alternative designs and the evaluation of strategic choices.

The literature have been narrow in scope and addressed specific problems; however, none has addressed the need for a general framework for a cost model that can be used as a standard template in the supply chain cost management and optimization. The desired

framework should express the cost data in similar terms that can be understood across the firms, firm units, and activities within individual units.

## **1.2 Research Question**

The primary focus of this research will be to answer these questions:

- Can we detect and calculate the cost and identify cost drivers through the supply chain taking into consideration the dynamic changes of the market?
- Can we develop an approach to make the supply chain agile?
- What are the measures of performance for this agile supply chain?
- What are the main activities that we can standardize between supply chain partners to create a framework that can incorporate the cost and cost driver for each activity?

By creating a cost model that can express the cost and cost drivers between partners in the supply chain using similar terms, we can standardize the model to be used for any supply chain. The framework will be used to analyze and monitor the cost, which will be the tool for forecasting and decision making, especially for the upper management. Any change will be detected and treated to add a value for the chain. The flexibility of the model for dynamic market changes will give a chance for high competition. The effect of these changes will be recognized by understanding the relationships of activities and their effect at each other in the chain.

### **1.3 Research Objectives and Importance**

Cost information is very important within the chain of firms that participate in producing a certain product. The information will help in making decisions about pricing, outsourcing, capital expenditures, and operational efficiency. The information should improve competences between supply chains. It should enable the organizations to compare directly the costs of certain activities. The framework being proposed in this research will be a template that can integrate existing supply chain models to monitor and analyze cost within the chain. The framework will drive future profits by creating newer strategies. The framework ontologies will help in defining and distributing cost centers. The ontologies will aid in information sharing through organization units, which will minimize redundancy. The standardization will help in:

- Improving comparability of cost data between firms
- Creating a more flexible chain that will react to the dynamic daily changes
- Creating communication between different management information systems
- Extending the cost reduction to the supply chain level
- Restructuring the activities to be integrated with each other across the firms of the supply chain
- Driving future profits by creating newer strategies
- Recognizing the profitable products and services and eliminating the non profitable ones

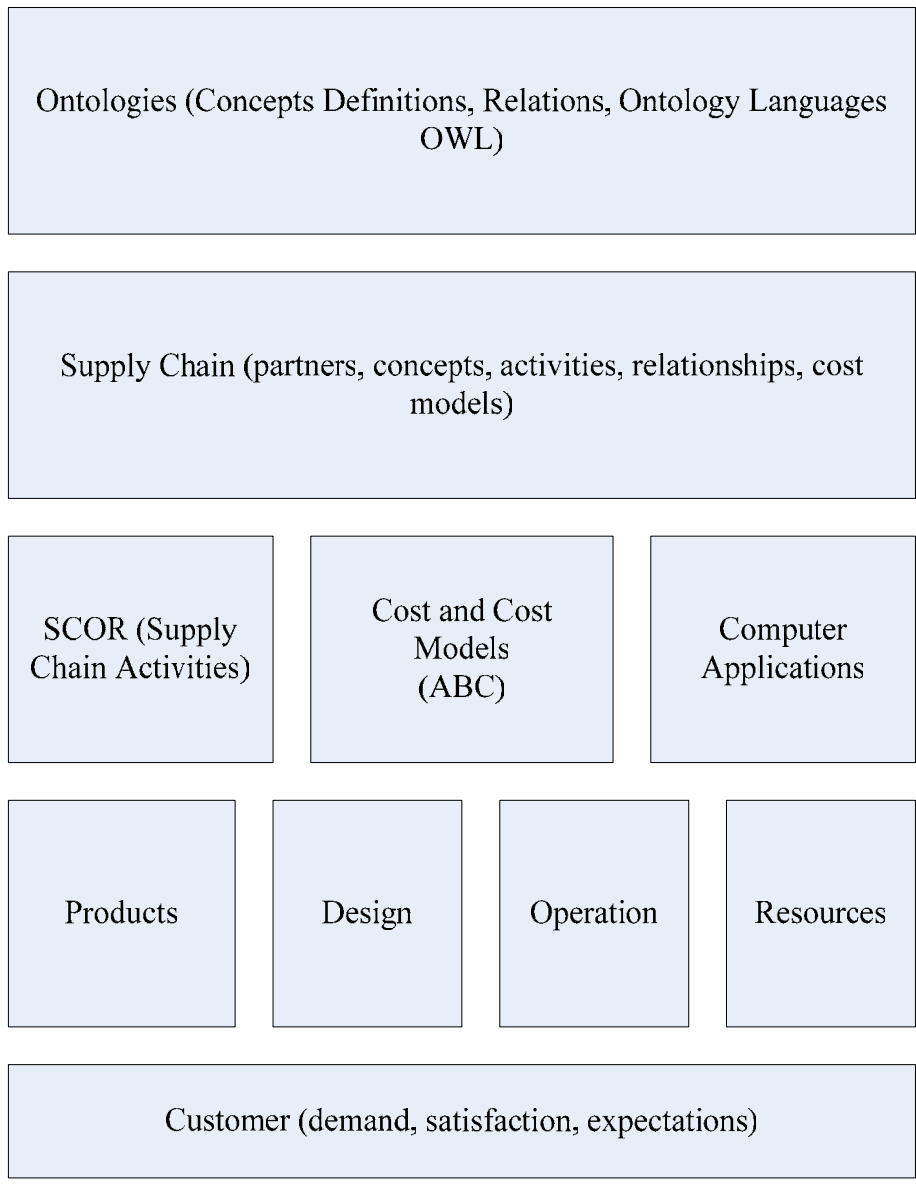


Figure 2: Framework Layer

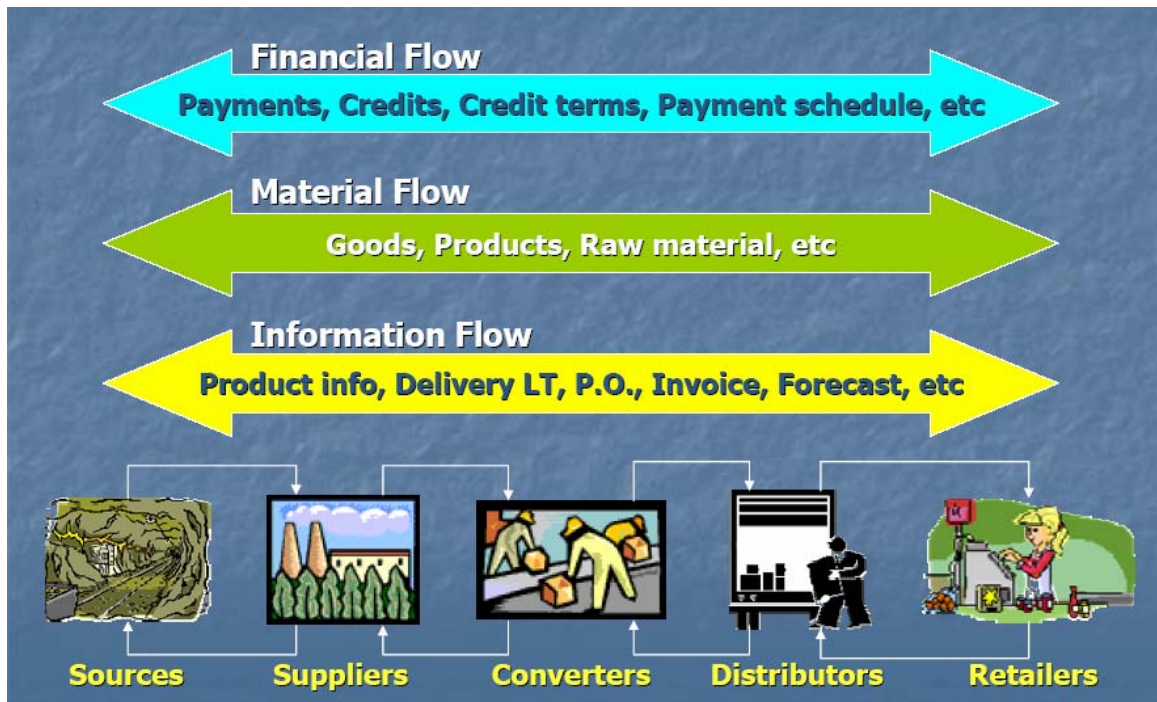


Figure 3: Supply Chain Concepts

Ontologies will coordinate conflicting goals and objectives and will improve performance. Using ontologies will aid in coordinating cost, quality, and efficiency. It is important to control excessive inventory and backlogs. Understanding the concepts and the activities will minimize uncertainties in production planning.<sup>2</sup>

<sup>2</sup> Jung Ung Min, Hans Bjornsson; e AEC research group, CIFE, Stanford (2002)

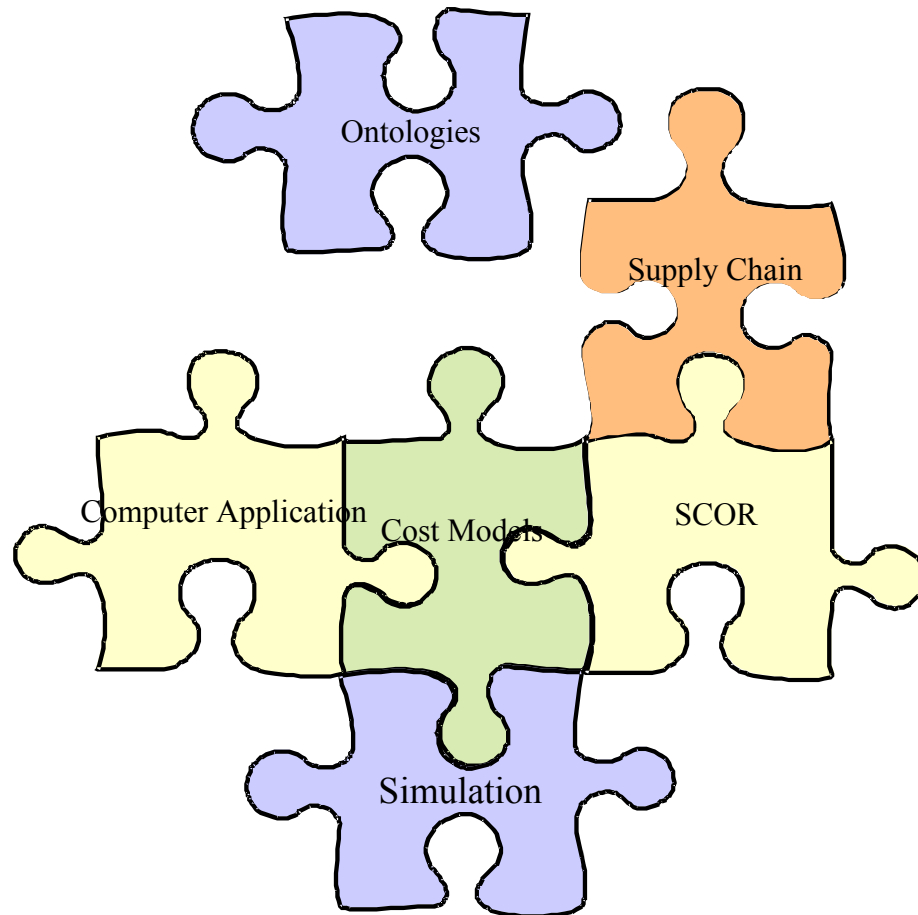


Figure 4: Research Objective

Importance summary:

- Understanding cost will enable the right decision for new strategies
- Existing chains are not flexible enough to react to the dynamic daily changes
- It is important to create communication between different management information systems
- It is important to extend the cost reduction to the supply chain level

## **1.4 Research Contribution**

The research contribution can be summarized as follows:

- Create a framework for a cost model that can be used as a standard template in the supply chain cost management and optimization.
- The framework will track cost in dynamic environment.
- Research framework will aid in information sharing through organization units.
- Through Ontologies the framework will enable easy access to information and will minimize redundancy.
- Use OWL to define cost ontologies.

## **1.5 Relevance of Research**

### ***1.5.1 Management Accounting***

Management Accounting is a variety of theoretical research methods that relates to the interface between internal and external reporting. It plays a main role in establishing the trust of relationships between firms in a supply chain, where they can partner together to perform as one organization. Management Accounting provides the information required by the management for planning, organizing, and control. This information is needed across firms in a value chain to find the opportunities for cost savings and perform cost control on both levels, inter-firm and intra-firm (Williamson, 2003). Management Accounting focuses on strategic issues beyond the traditional cost management. One of the methods that has been commonly used to track cost and provide reports for upper

management to form strategic planning and decision making is the Activity Based Costing (ABC) method. The following section explains ABC.

### ***1.5.2 Activity Based Costing and Cost Modeling***

Activity Based Costing is an accounting methodology that assigns costs to activities rather than products or services. In order to correctly associate costs with products and services, ABC assigns costs to activities based on their use of resources and then assigns costs to cost objects. The process of identifying the activities and their relevant costs is called Value Chain Analysis; in addition to that the revenues and assets will be assigned to these activities. In Value Chain Analysis we can understand the economic behavior of the supply chain by locating the cost drivers for each activity. We define the activity as any process or task that happen over time and has a role in the chain. Activities are considered the common factor between business process improvement and information improvement; that is why it is important to understand the activities within the firm or group of firms to improve the flow of material between different units. The SCOR model will be used to help identify supply chain activities.



### ***1.5.3 Supply Chain Operation Reference (SCOR) Model***

The SCOR-model has been developed to describe the business activities associated with flow of product or service through the partners of the supply chain, starting with the raw materials and ending with a satisfied customer. The model is designed around five main management processes: plan, source, make, deliver, and return. The structure of the model is shown in figure 5. By describing supply chains using these process building blocks, the model can be used to describe supply chains that are very simple or very complex using a common set of definitions. The model will help firms to link their activities and find the effect of these activities through the supply chain. The model has been able to successfully describe and provide a basis for supply chain improvement for global projects as well as site-specific projects. Hence it can be used to associate the cost data for the firms and partners of the chain. This model will be my guide to establish the cost model that will represent the whole supply chain all the way from supplier(s) to customer(s). Not all activities will be used for all partners.

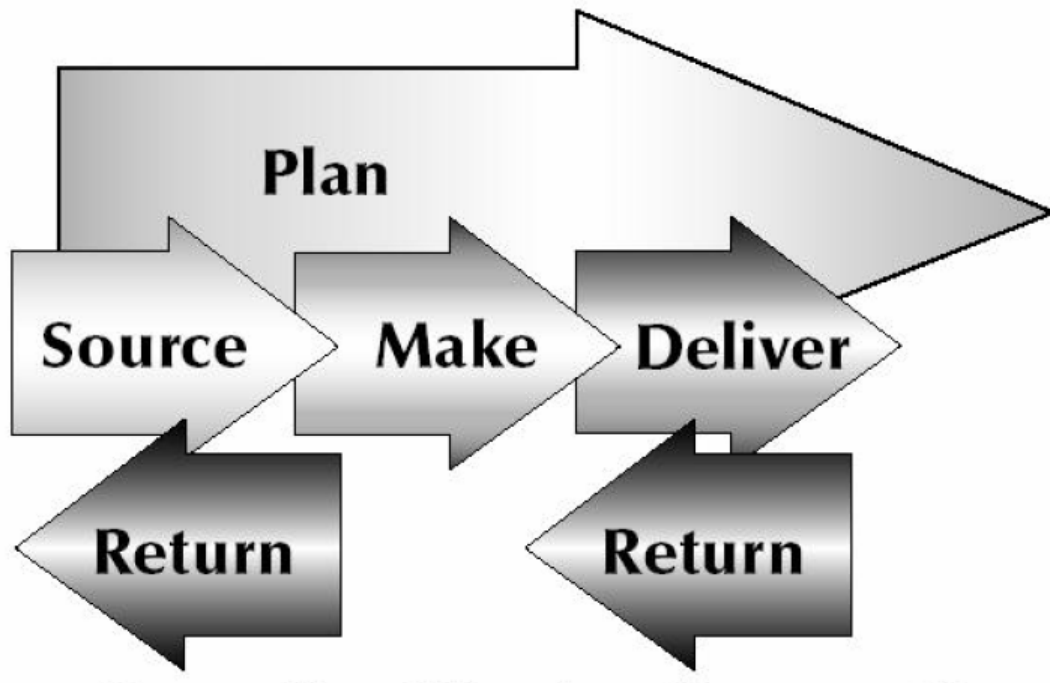


Figure 5: SCOR Model Main Management Processes

The supply chain complexities arise from conflicting objectives that result in trade-offs, uncertainties in demand, globalization of the market, and short product lifecycles. Many distribution functions have been used to represent the supply chain and partners' relationships, which will increase complexity to include all partners. The complexity of the supply chain with the need for a fast response for the dynamic market addressed the need for a decision support system to help the management in conveying the right decision in the right time.

#### ***1.5.4 Ontologies***

*Ontology* is a philosophical word that describes the nature and organization of being or reality. The notion of ontology as a formally specified conceptualization shared by a

community of practice is now well established and is used and applied in several areas, including knowledge management, knowledge acquisition, information retrieval and extraction, knowledge engineering and knowledge modeling. Ontologies will be used to define and specify the main domain concepts for the framework developed in this research. The essential role of ontology is to support reuse, which can take place in different scenarios. For instance ontologies have been used to support the specification of reusable libraries of problem-solving components, to drive model-based knowledge acquisition, to allow semantic information retrieval, and to structure collaborative decision-making processes. Based on Gruber (1993) ontology is a formal, explicit specification of a shared conceptualization. Also Fishwick and Miller (2004) defined ontology as a knowledge representation used to capture information and knowledge about a subject. Gomez-Perez (1998) identified four main types of ontologies: domain ontologies, task ontologies, meta-ontologies, and knowledge ontologies. Domain ontologies are defined as the ontologies that provide a vocabulary for describing a particular domain. The domain is a specific area of knowledge that is typically the focus of a certain group or community. Task ontologies provide a vocabulary for the terms involved in a problem solving process. Meta-ontologies provide basic terms to arrange domain and task ontologies. Knowledge ontologies provide tools and methods for supporting knowledge management, relying on sharable and reusable knowledge. The supply chain cost model is considered domain ontologies, which describes the terms, standards, their definitions, and their relationships through the supply chain. Concepts

and terms include partners, activities, resources, cost drivers, and their relationships to produce the total cost of a product.

The purpose of the cost model ontologies is to provide common understanding of the product cost through the supply chain from raw material to the finished product. The ontologies will document the concepts with modeling primitives and semantic relationships. The model ontologies should be expressive enough to represent the formal semantics, which will help in sharing, using and reusing information (Lacy, 2005).

## **CHAPTER 2: LITERATURE REVIEW**

In this chapter, several papers are reviewed that address the importance of this research. The review will be divided into five parts based on the related topics that were explained in chapter 1. The review will start with the supply chain management summarized into certain points that relate to the research framework. This will be followed by three more sections that will identify the work that has been done in cost modeling through the supply chain with the emphases on ABC costing. Then a review for the SCOR model importance in tracking the activities through the supply chain. The fifth section will be the work that has been published in relation to parallel and distributed simulation of a supply chain.

### **2.1 Supply Chain and Supply Chain Management**

Supply chain has been the center of interest to researchers for the last three decades. Ganeshan and Harrison (1995) defines the supply chain as “a network of facilities and distribution options that performs the functions of procurement of materials; transformation of these material into intermediate and finished products; and distribution of these finished products to customers.” William C. Copacino (1997) defines supply chain very simply as the flow of materials and products from source to user.

In the last 80's and beginning of the 90's rose the term Supply Chain Management. Cooper, Elram et al (1997) define supply chain management as the management of the flow of production from raw material to the finish product including disposal process. Cooper's goal was to view and understand the firms as an integrated whole system. In her paper with others she mentioned difficulty associated with achieving this goal. She said: "Few organizations, if any, even have a good understanding of how the various functions, terms, and other units within their own organization interact."

The book *Introduction to Supply Chain Management*, by Robert Handfield and Ernest Nichols (1999), highlights the important issues related to Supply Chain Management and explains them in a very logical and understandable way. The book explains the significance of supply chain management for the firms and what the requirements to manage the supply chain are. Then it addresses the major developments in global markets and technologies, which necessitate this integrated approach to supply chain management and make it clear that it is critical for future competitiveness. One of the most important management issues is cost management where we monitor the cost and cost drivers in the chain.

Supply Chain Management aims to reduce total costs through the chain that includes raw material and acquisition costs, logistics cost, facility and manufacturing costs, and distribution costs (Shapiro, 2001).

## 2.2 Management Accounting

Williamson, 2003, defined Management Accounting as the firm planning and organizing of both internal and external cost information. He says that information is needed to analyze and report the actual cost of products or services. The originated reports will help the management in decision making and will establish standards of performance.

Management accounting has an important role in establishing common terms of cost through firm units and firms across the supply chain. Seal et al (1999) stated that the common terms will develop new behaviors and understanding of the cost drivers which will lead to the existence of a “commonly understood management accounting methodology.” Seal et al concluded that “the specification and sharing of cost data can play a central role in inter-organizational negotiations as both sides in a manufacturing partnership learn about and respect each other’s financial and commercial constraints and objectives.” So Management Accounting actually plays a very important role in building a trust relation across the chain that might extend to very deep inter-firm activities. Seal in his paper provided evidence of possible collaboration and better understanding of the cost management. He said “An ideal role for management accounting would seem to be in an open book agreement whereby both parties can inspect each partner’s revenues and costs.” The firms involved in his research couldn’t reach the stage of detailed open book agreement, although there was an acceptance of the idea from involved parties. But on the other side there was a good understanding of the cost and performance measures,

which created a need to look for tools and techniques to establish a long term relationship between the partners of the supply chain.

Dekker (2003) states that “inter-firm relationships introduce new challenges for management accounting. One such challenge is the provision of information for the coordination and optimization of activities across firms in a value chain.” He focuses on the use of Value Chain Analysis (VCA) in buyer-supplier relationships for coordinating supply chain interdependence. The importance of his study comes from the point that it reviews the implementation of an ABC model that was developed by a company to support its Supply Chain Management practices with a group of suppliers. Lea and Fredendall (2002) published a paper about the impact of management accounting on manufacturing performance and some of the systems used in management accounting. The authors included a table (see table 1) of the comparison of some management accounting systems.



Table 1: Comparison of Management Accounting Systems<sup>3</sup>

	Traditional full costing	Activity-based costing	Throughput accounting
Time of introduction	1900s	1970s	Late 1980s
Type of production	Mass production that has volume related overhead	Any type of production	Production that has insignificant overhead and labor costs
Variety of products	Homogeneous and limited variety	Homogeneous and heterogeneous	Homogeneous and heterogeneous products with high material costs
Automation/technology usage	Low and limited	Low to high	Low
Overhead allocation	Usually volume related	Based on activity usage	None
Costs included in product cost computation (the difference between cost and selling price is the profit used in product mix algorithm)	Direct material Direct labor Factory overhead (both variable and fixed)	Direct material Direct labor Factory overhead (both variable and fixed) Sales, general, and administration	Direct material

In 2003 a survey was made by Ernst and Young<sup>4</sup> and the Institute of Management Accountants<sup>5</sup>, (Cooper, Richtermayer, and Frigo, 2003), to understand the role of Management Accounting today. The survey addressed some of the important issues that face companies nowadays: How is MA changing as a result of the competitive economy? What new accounting methods have emerged and how fully have today's companies adopted these new management tools and initiatives? And what are the barriers to adoption of these tools and methods in organizations?

The survey was launched in January 2003 and closed five weeks later. It was distributed electronically to the members of IMA (23,034 members) who were identified as senior

<sup>3</sup> B.-R. Lea, L.D. Fredendall / Int. J. Production Economics 79 (2002) 279–299

<sup>4</sup> Ernst & Young was formed in 1989 from the combination of Arthur Young & Co. and Ernst & Whinney, both companies were accounting firms.

<sup>5</sup> IMA Members are today's leaders, managers, and decision makers in management accounting and financial management

level financial executives. The survey was able to elicit significant responses from all industry sectors of the IMA membership (around 2000 responses). Forty percent of the responses represented manufacturing companies while 16% represented the financial services/consulting companies. The other 44% represented other sectors of service and industry as shown in figure 6.

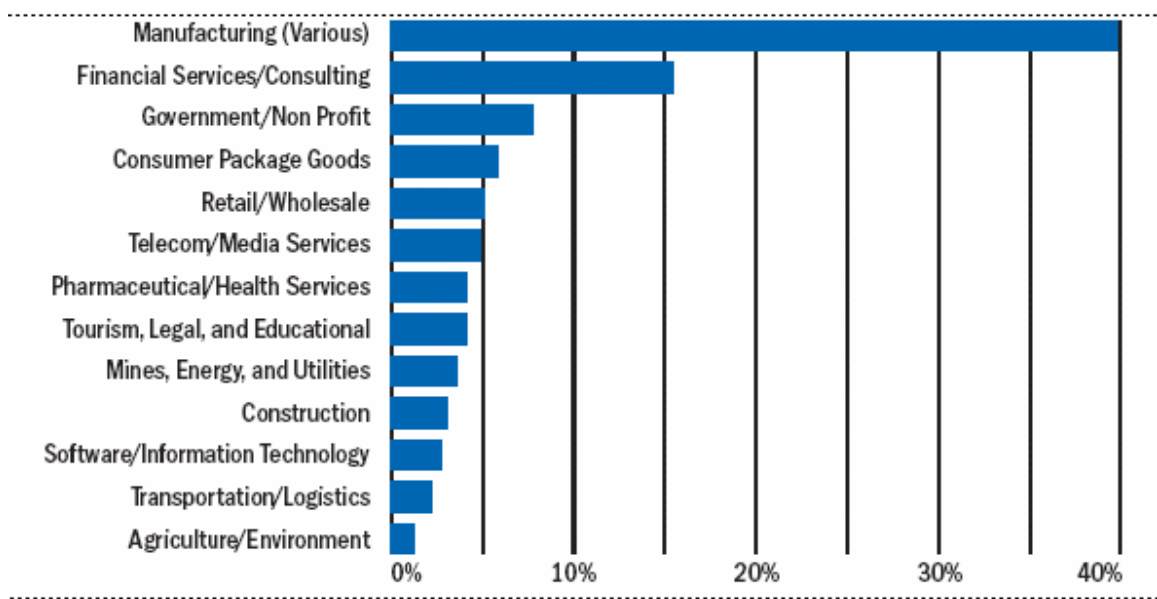


Figure 6: Survey Respondent Sectors<sup>6</sup>

The average represented a company with revenues of about \$300 million and 1750 employees. Thirty-six percent of the respondents were from companies with revenues of \$1 billion or more. Figure 7 shows the classification of the companies based on revenues.

<sup>6</sup> Ernst and Young LLP, Survey 2003 Management Accounting

### Company Size

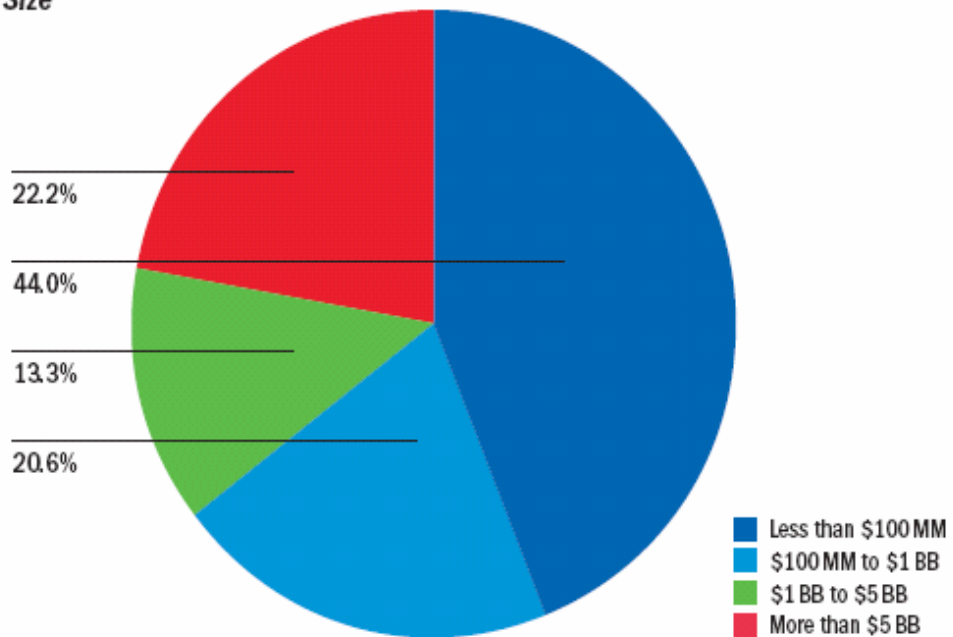


Figure 7: Company size based on their revenue<sup>7</sup>

A large segment of the respondents (nearly 31%) were decision makers, and the rest were classified as decision enablers.

The survey revealed very important findings that were summarized in the following six points:

1. Cost management is regarded as a key contributor toward achieving strategic objectives. Eighty percent of the respondents reported that cost management was important to their organization's overall strategic goals. Seventy five percent believed that the state of the economy has generated greater demand for cost management (Figure 8 and 9).

<sup>7</sup> Ernst and Young LLP, Survey 2003 Management Accounting

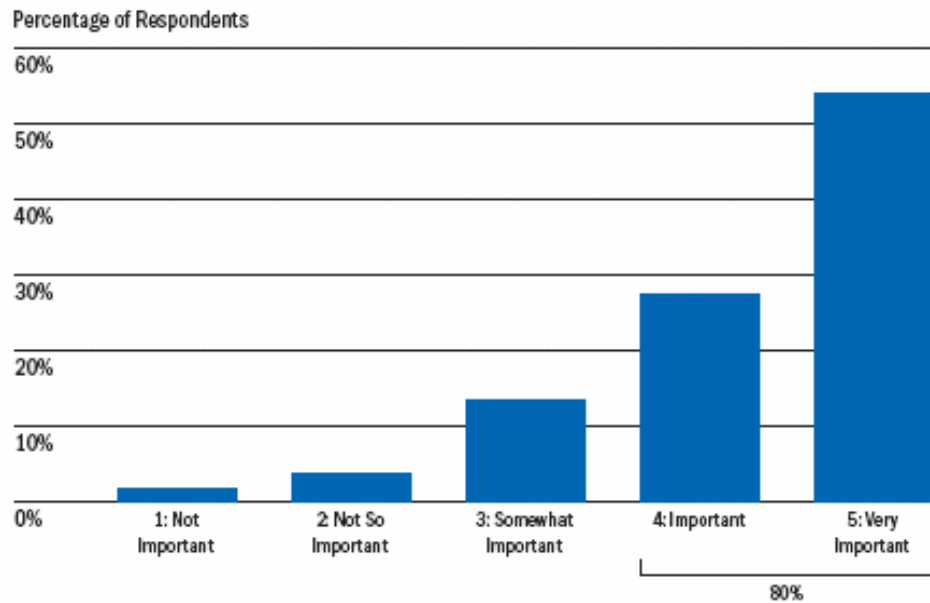


Figure 8: Importance of cost management for respondent organizations

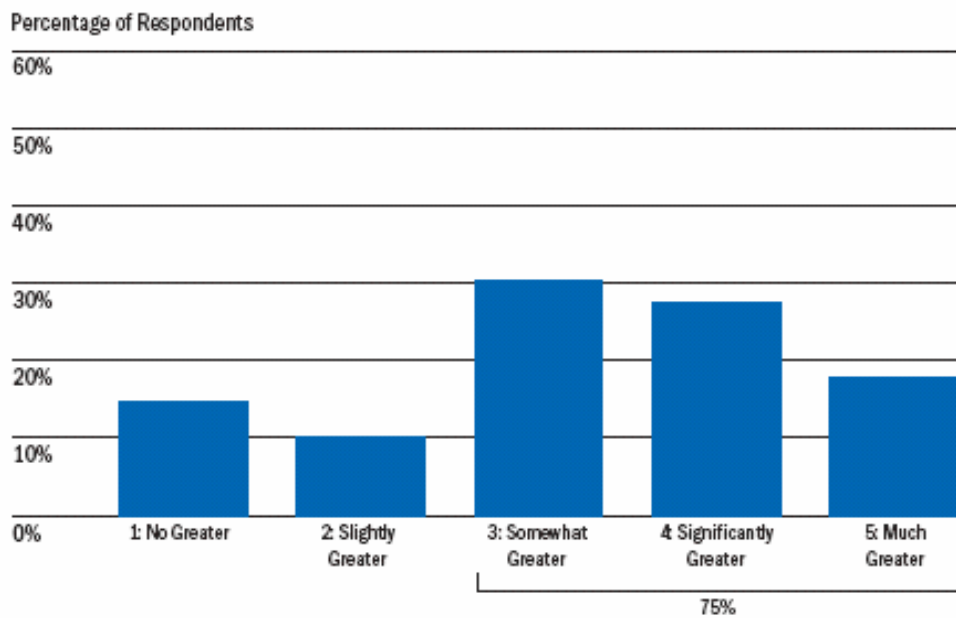


Figure 9: The effect of the state of economy on the demand for cost management<sup>8</sup>

<sup>8</sup> Ernst and Young LLP, Survey 2003 Management Accounting

2. Decision makers and enablers emphasized the need for what they name “actionable” cost information to be their top priority and cost reduction to be the second top priority (Figure 10).

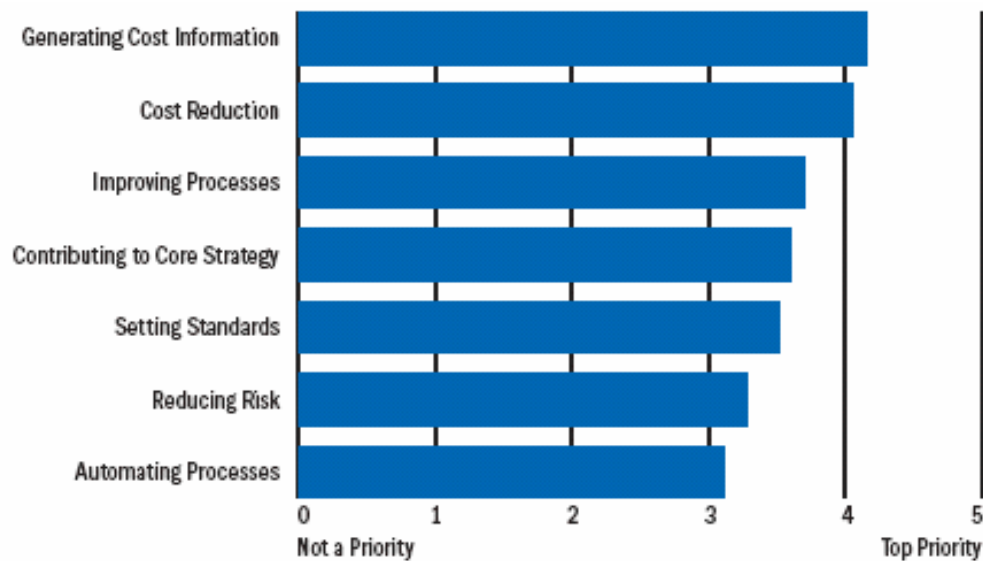


Figure 10: Generating cost information and cost reduction considered the top two priorities in cost management<sup>9</sup>

Data might be quantitative that can be counted and expressed as ratios. Other types of data might be qualitative that represent opinions, attitudes, satisfaction, etc. This type of data cannot be used in calculation or ratios and is called “soft” data. George (2004) stated in his article that was published in the Six Sigma LLC that “In visual explanations, Edward Tufte demonstrated how the NASA Challenger disaster may have been avoided if the Morton Thiokol engineers had displayed their temperature vs. o-ring failure data in a meaningful way. They had all the data they needed - but it didn't get translated into

<sup>9</sup> Ernst and Young LLP, Survey 2003 Management Accounting

information.” So to display technical derived data to decision makers will require explanations that may overshadow and obscure the actual information to be conveyed. The key is to make the data understandable especially to decision makers. For example, if a comparison of two numbers that has decimals were to be made the scale will not serve to prove the point. But converting these numbers into percentages will allow easy understanding of the information and the variation between the two numbers. Making these data understandable is what is called actionable information, where the information can be translated to be followed with the necessary action. Also Dan Farber (2003), in his article that he published on zdnet.com, addressed the need to turn the huge amount of data that we have into actionable information.

3. The survey revealed various distortion factors that affect the visibility into true costing in most organizations. One of the most significant factors identified was overhead allocations, followed by shared services and greater product diversity (Figure 11).

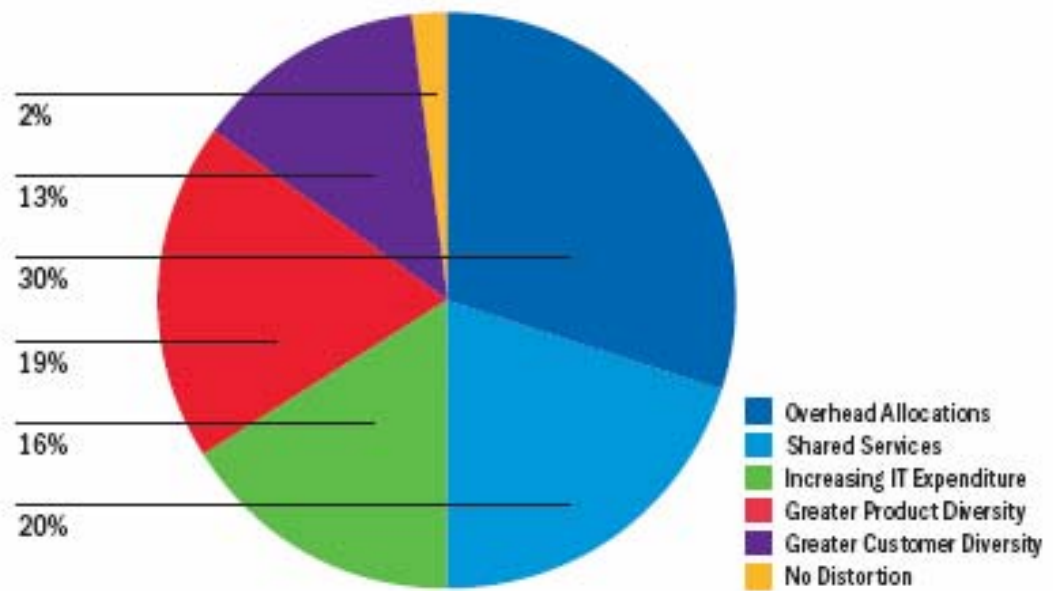


Figure 11: The most important distortion factors that affect the visibility into true costing<sup>10</sup>

- Most companies are still using budgetary procedures and ERP in spite of the current economic environment. New cost management systems are still in the process of being accepted (Figure 12).

<sup>10</sup> Ernst and Young LLP, Survey 2003 Management Accounting

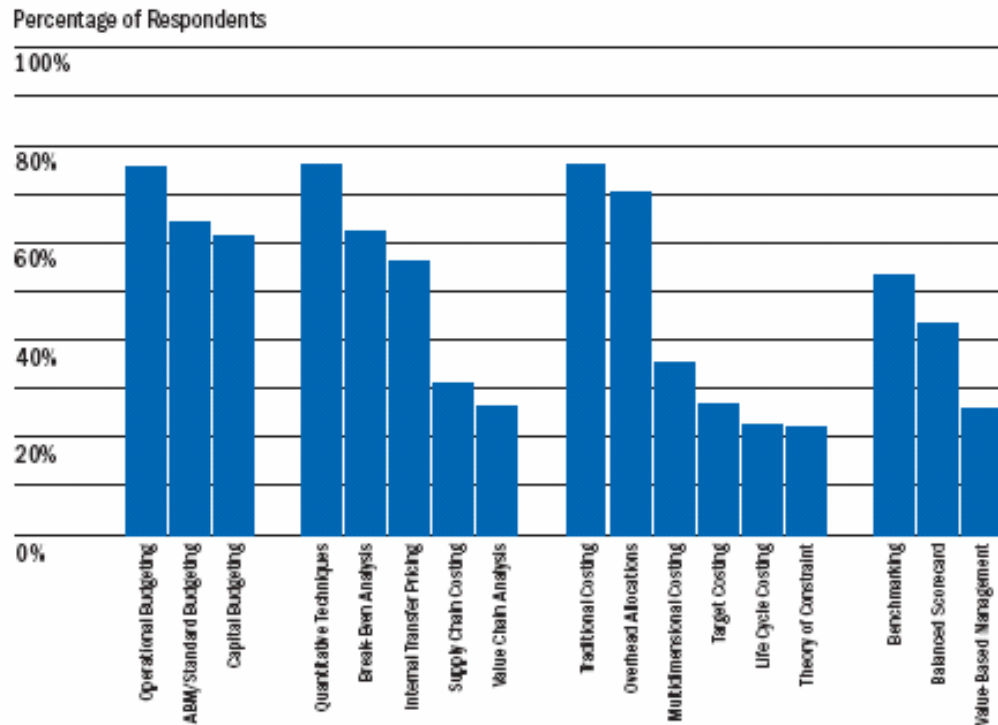


Figure 12: Tools that are being used extensively (not considering new tools)<sup>11</sup>

5. Companies and organization are do not easily change their tools from traditional management accounting to modern non-traditional tools. Modern tools such as Target costing, Value-Based Management, and Theory of Constraint Analysis are still struggling to be accepted and adopted by companies (Figure 13).

<sup>11</sup> Ernst and Young LLP, Survey 2003 Management Accounting



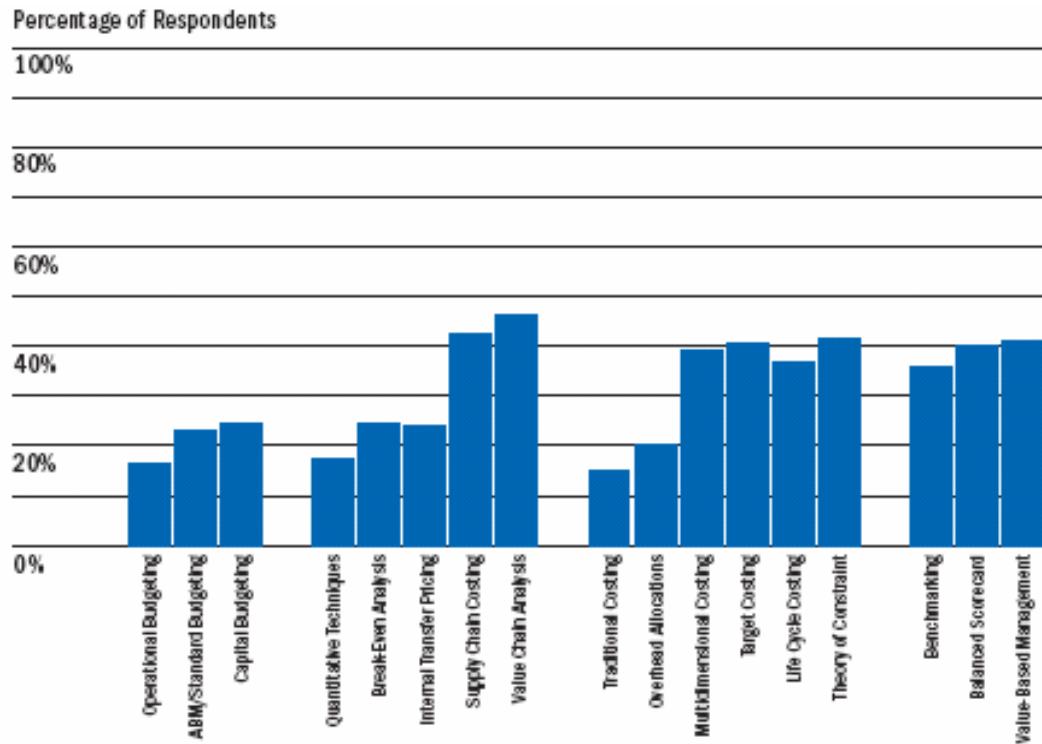


Figure 13: Replacement tools<sup>12</sup>

- The implementation of a new technology or methods requires in-house expertise for support and adoption. A clear vision including value of implementation should be given, provided that there is lack of adequate technology and management commitment (Figure 14).

<sup>12</sup> Ernst and Young LLP, Survey 2003 Management Accounting

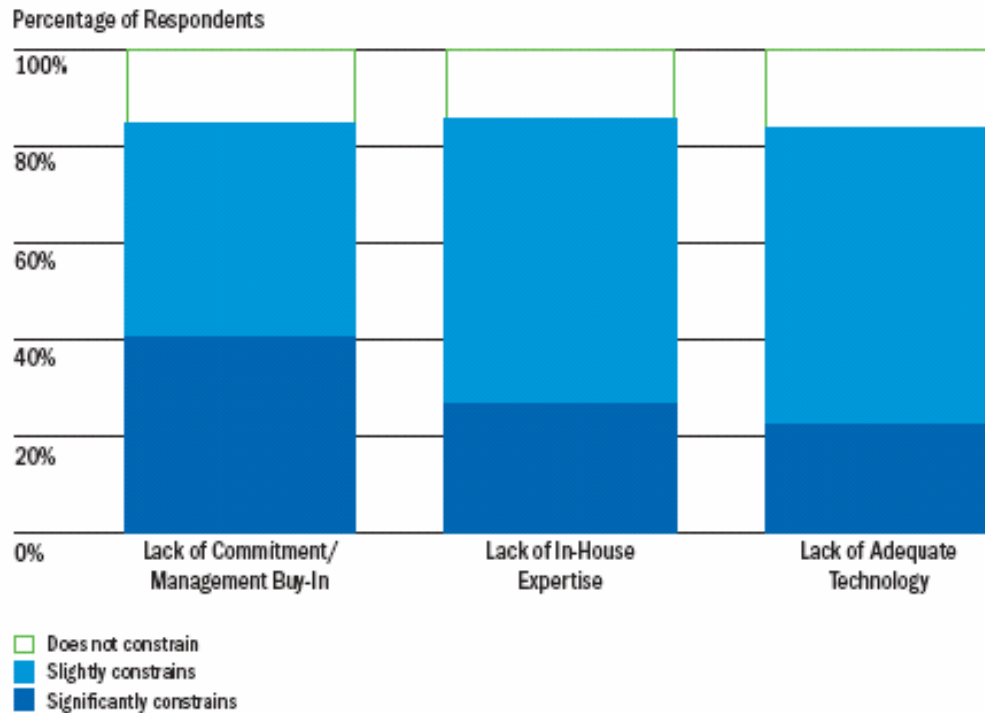


Figure 14: Lack of commitment, support, and adequate technology<sup>13</sup>

### 2.3 Activity Based Costing (ABC) and Cost Modeling

LaLonde and Pohlen in 1996 stated that ABC methodology can be implemented internally within the firm but it will not provide the same results on a supply chain level. Dekker and Goor (2000) explain the scarcity of papers that describes the implementation of ABC in Supply Chain Management. They demonstrated with a small model built by a group of firms within a large Dutch drug organization the implementation of ABC at the

<sup>13</sup> Ernst and Young LLP, Survey 2003 Management Accounting

inter-firm level dealing with logistics within the supply chain. The model is shown in Figure 15.

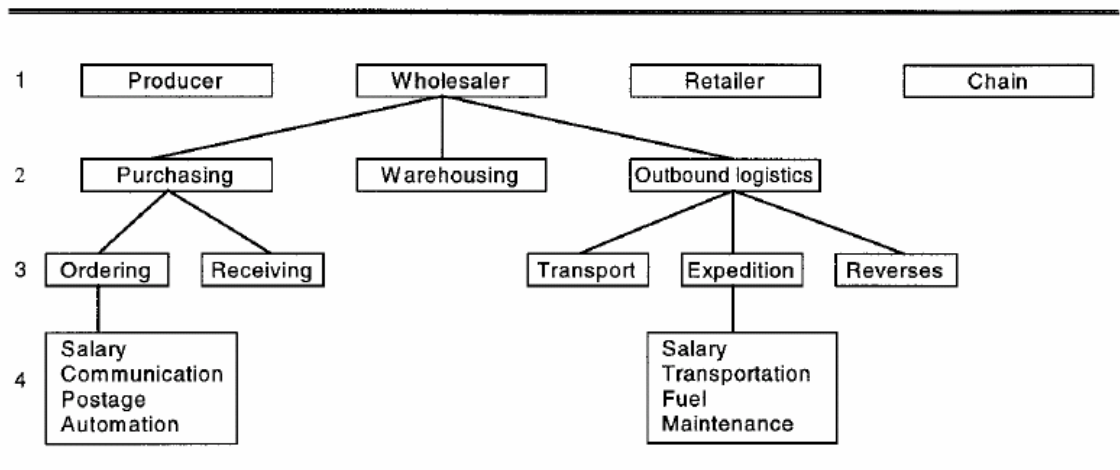


Figure 15: ABC Model for Logistics Activities for group of firms within a large Dutch drug organization<sup>14</sup>

The model was constructed after an analysis of activities and cost data from the cost accounts of the organizations. The goal of the model was to analyze the retailers' costs at the group level. The model, as Dekker said, "was too rough to give exact calculation but it was useful indication of expected cost changes." Although there was some limitation to the model it did prove that it can be used as an indicator for cost improving.

<sup>14</sup> Henri C. Dekker and R. Van Goor. International Journal of Logistics: Research and Applications, Vol. 3, No. 1, 2000

This model gives us the idea of looking at the firms as a chain that is linked together with activities that extend from the beginning of raw material all the way to the end user. The chain of partners are connected with different relationships. Porter in 1985 defined three types of relations in the value chain: relations between activities, relations between business units of the firm, and relationships between the firm and its buyers and suppliers. The relationships are shown in Figure 13. Managing these relations is the key factor of reducing the cost through the supply chain. A good understanding of the cause and effect of the activities on each other can facilitate the management of cost and the opportunities to optimize cost reduction. A Value Chain Analysis may be the tool that can be used to analyze and understand the link between the activities and their effects through the value chain. ABC is one of the common Value Chain Analysis methods.

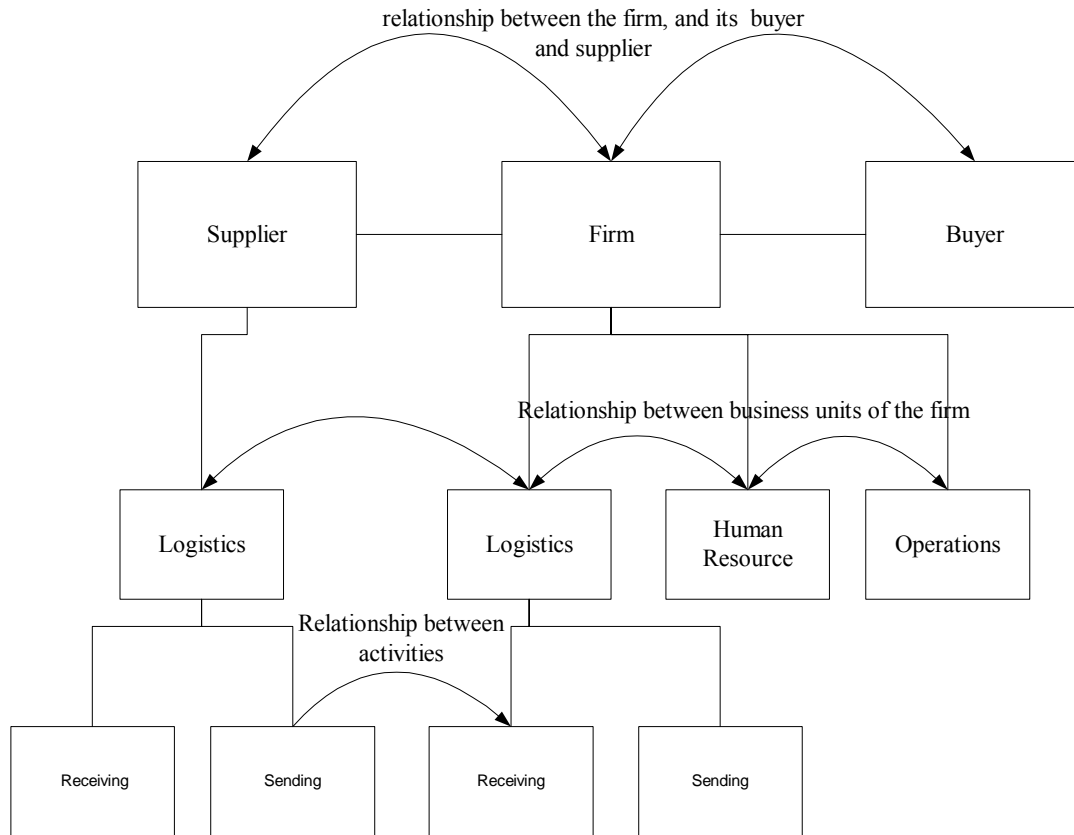


Figure 16: The types of relationships as defined by Porter (1985)

But what constraints do we have on these relations? How deep could we get in trading information? Most of the companies are not willing to share information of their own firm unless they understand the benefit that they will gain from this cooperation and information swap. The process will be an investment plan where the supply chain partners would like to see their share of this investment (Dekker, 2003). Another opportunity was offered to Dekker in 2004 while one of the representatives of a United Kingdom retail firm (J. Sainsbury) was presenting on the use of ABC information for SCM practice, and Dekker decided to take advantage of the case to examine a real life VCA practice. It was a chance for him to take a closer look at the relationship and

information swap between the firms in that supply chain. The company created their own model that deals with information coordination with their suppliers as shown in figure 17.

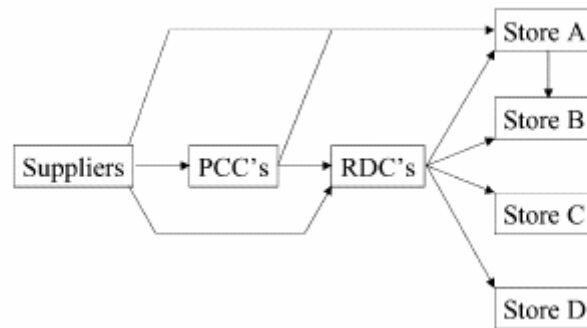


Figure 17: The structure of Sainsbury's supply chain (PCC: primary consolidation center, RDC: regional distribution center)

The objective of the model was to provide the management with understanding of the total supply chain process, which will lead to better grasp of the cost associated with each activity between the firm and their suppliers. The expectation of the company was to create a model to achieve better cost control and cost reduction through analyzing the relations between activities within the supply chain. The model was designed to contain several sections that will reflect the chain value between Sainsbury and its suppliers. From the design they found that there were lots of commonalities between activities in the different firms; some of them were used, and other activities were not used. They used the model to manage cost cooperatively with suppliers by integrating cost data across the supply chain. The model was showing lots of success that has been made by the retailer company through analyzing and integrating the cost data between firms. But providing Sainsbury with the needed information raised a concern within the supplier

company, since the information revealed the low efficiency in the supplying company. The supplier was concerned that Sainsbury will demand efficiency change or replace them with another supplier. The information also provided Sainsbury with a potential advantage of price negotiation.

#### **2.4 Supply Chain Operation Reference Model (SCOR)**

SCOR was developed by Supply Chain Council (SCC) an independent non-profit organization that was established in 1996. The organization was formed by a global management consulting firm (PRTM)<sup>15</sup> and a market research firm (AMR)<sup>16</sup> in Cambridge, Massachusetts.

The organization started with 69 voluntary companies and now is close to 1000 members. The objective of the organization was to develop a standard supply chain process reference model that enables effective communication among the supply chain partners. The methods to achieve that goal were first to use a standard terminology to better communicate and learn the supply chain issues, and second to use standard metrics to compare and measure the partners' performances.

The supply chain reference model was proposed to track and identify different activities within the chain on both levels, inter-firm and intra-firm. The primary use of SCOR is to

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<sup>15</sup> The global management firm is Pittiglio Rabin Todd and McGrath (PRTM)

<sup>16</sup> The market research firm is Advanced Manufacturing Research (AMR)

describe, measure, and evaluate supply configurations. It links process elements, metrics, best practices, and the features associated with the execution of a supply chain in a unique format. The model focuses on the activity involved, not the person or the organizational element that performs the activity. There were different versions of the SCOR model; the latest version, 6.0, was released in 2003. Figure 14 shows the main management processes that the SCOR model is based on (Plan, Source, Make, Deliver and Return).



Figure 18: The Main Management Processes that the SCOR Model is based on<sup>17</sup>

<sup>17</sup> Supply Chain Council 2003



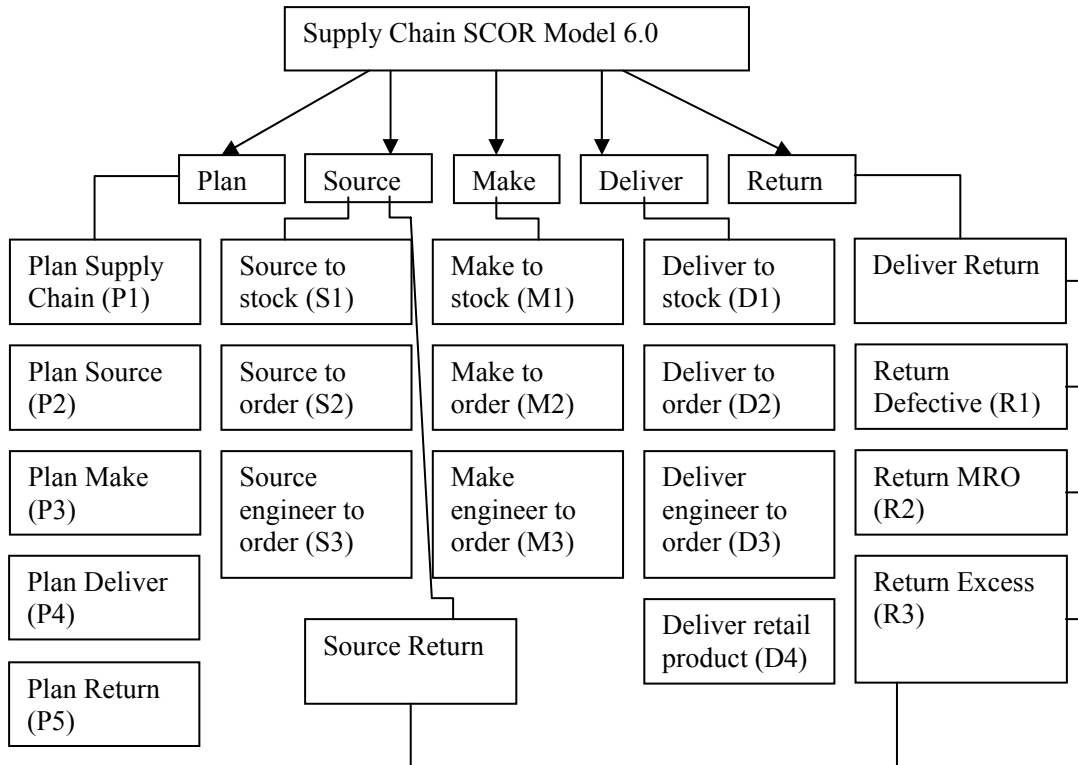


Figure 19: The hierarchy of the SCOR model<sup>18</sup>

## 2.5 Ontologies

As mentioned in chapter 1, Gruber (1993) defined ontology as a formal, explicit specification of a shared conceptualization. The ontologies were developed as more detailed standards to enable the construction of the semantic web. It is very challenging to represent and share the information on the web. The semantic web provides new

<sup>18</sup> The differences between D1 and D4 are the processes associated with selecting and routing carriers, picking product, and consolidation of items into a final delivery that are not included in D1. D4 also includes the checkout process to capture the unique and specific activities in delivering a retail product.

information representation features that facilitate the use of information through the web. Ontologies are the key that enables the existence of the semantic web. DARPA (Defense Advanced Research Project Agency) was the first to develop such standards and ontologies. These standards were given the name DARPA Agent Markup Language. Another group in Europe was working on developing standards for the semantic web, and they called it Ontology Interchange Language or OIL. Today's ontologies are the integrated form of both standards (Gomez-Perez, et al 2002). The W3C's Web Ontology Group focused on the standard language elements required to support the explicit semantics of the Semantic Web. The competition of all parties was the consequence of the birth of the new Web Ontology Language (OWL), which was released in February 2004. Using OWL, Lacy (2005) extended the definition of Gruber where he stated that ontologies are represented by an OWL-encoded web-distributed vocabulary of declarative formalisms describing a model of a domain. In all, ontologies communicate a common understanding of a domain, declare explicit semantics, make expressive statements, and support sharing of information.

Jones et al (2001) described the effort of making software applications talk to each other between different computers on the Internet. Communication between the applications on the web needs a very well structured framework, which is called the semantic web (Berners-Lee, 1999). Jones addresses the need of away to connect the businesses through software applications. These applications should be able to find each other and establish a dialogue to exchange information. Jones described this ability as the self-integration of

businesses. Jones describes three projects for building self-integration software applications: ontologies for cooperation product engineering, semantic resolution, and service coordination. The objective of these projects was to provide the required infrastructure for the interaction among different parties of businesses.

In 2001 Slade and Bokma wrote about developing ontologies as a principle for integrated information and knowledge management. The ontologies will aid in information sharing through organization units, which will enable easy access to information and will minimize redundancy. The ontologies were introduced in Burma-X project, which was funded by the European Commission. The expectation was to improve the way that businesses relations are being handled in the extended enterprise. The ontologies will be used as a cataloguing system for information by referring to these information sources using appropriate links.

In 2001 Li et al published a paper about the use of ontologies for modeling and analyzing enterprise competence. The paper was based on the Toronto Virtual Enterprise project (TOVE), which used a reusable and extendable concept library that can specify a set of activities and resources and time constraints of activity in a specific enterprise so that the model of this enterprise can be built. The project ontology was divided into three ontologies, one for product competence, a second for activity competence, and a third for resource competence. Based on the resulted ontology they manage to provide a decision

support system for enterprise bidding, which will help in bid formation and updates. The enterprise will be able to respond quicker and more accurately for bid requests.

Ontologies have been used in a variety of applications. Ontologies were used to enhance web searching as stated by Garcia-Serrano et al (2001). Also they were used for automatic target recognition by (Kokar and Wang, 2002), photo annotation by (Schreibe et al, 2001), and conceptual models for XML documents by (Erdmann and Studer, 1999). Some research has been done to create ontologies for the supply chain in general, but the literature doesn't show any use of ontologies for cost concepts through the supply chain. To the best of my knowledge, the literature lacks research that addresses a cost model that covers the whole supply chain from supplier(s) to the end user(s).

	Management Accounting	ABC and Cost Modeling	Cost Modeling in the Supply Chain	SCORE	Ontology
Dekker, 2000 Dekker and Goor, 2001 Dekker, 2003	Importance of management Accounting	Case Study using ABC	Only logistics firm and supplier		
SCOR				2003 version 6.0	
Lalonde & Pohlen, 1996		ABC versus Traditional			
Ernst & Young LLP, 2003	Survey Importance				
Lea & Fredendall, 2002	Comparison of MA Systems				
W. Seal, 1999			Suggested Common terms for cost		
Claribel Castillo		Cost Modeling System for IC Packing			
Outi Manunen			ABC Model for Logistics Operations		
Berners-Lee, 1999 Jones et al., 2001					need for framework to link applications
DARPA (DAML) And OIL					Ontology standards development
Li et al., 2001 Garcia_Serrano et al., 2001 Slade and Bokma, 2002 Fishwick, 2004 Lacy, 2004					Ontologies importance, & definition
Yousef 2006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 20: Research Gap

## **CHAPTER 3:    METHODOLGY**

### **3.1    Conceptual Model**

Developing a framework with common terms and measures that can be used across the supply chain, including cost information and terms, requires first to define the domain of the supply chain, which is the type of the chain based on the product or the service provided. Second, it requires identifying all the concepts involved in that chain. This will include identifying the super class, the classes, the subclasses, and their attributes and relationship. Once we identify these concepts, a common definition that can be recognized by all parties of concern will be added to the framework. The relationship between concepts will be defined to be understood for everyone using the supply chain. All the information is saved in a base knowledge for everyone to share, and that is the general framework. Figure 21 shows the approach that has been used to develop the framework.

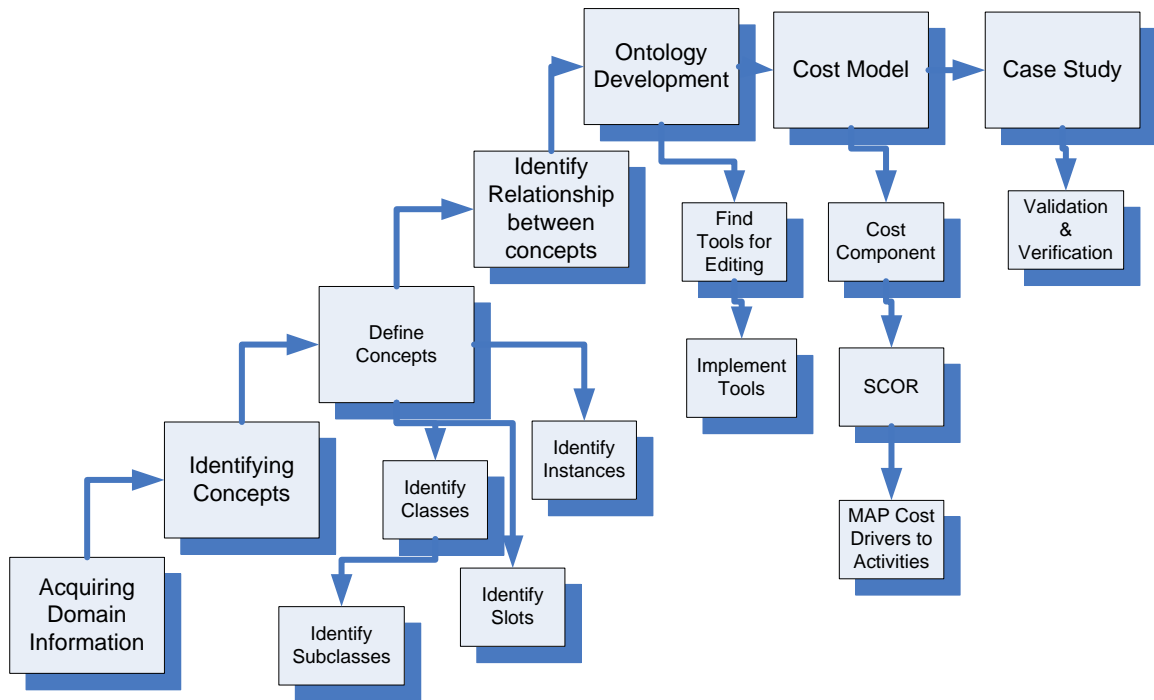


Figure 21: The approach of developing the Framework

## 3.2 Approach

### 3.2.1 Acquiring Domain Information

In this step the domain will be defined and all the information will be gathered. Any data that has been used or is being used will be taken into consideration. A full understanding of the domain will be developed to assist in identifying domain concepts and their attributes. The experts will be interviewed to make sure that nothing is being left behind. It is important to understand the dimensions of the domain and the different concepts involved.

### 3.2.2 Identifying Concepts

In this step the concepts will be recognized and classified as main concepts or sub concepts. A full understanding will be developed for the concept, its functionality, and the different characteristics associated, as shown in the following figure.

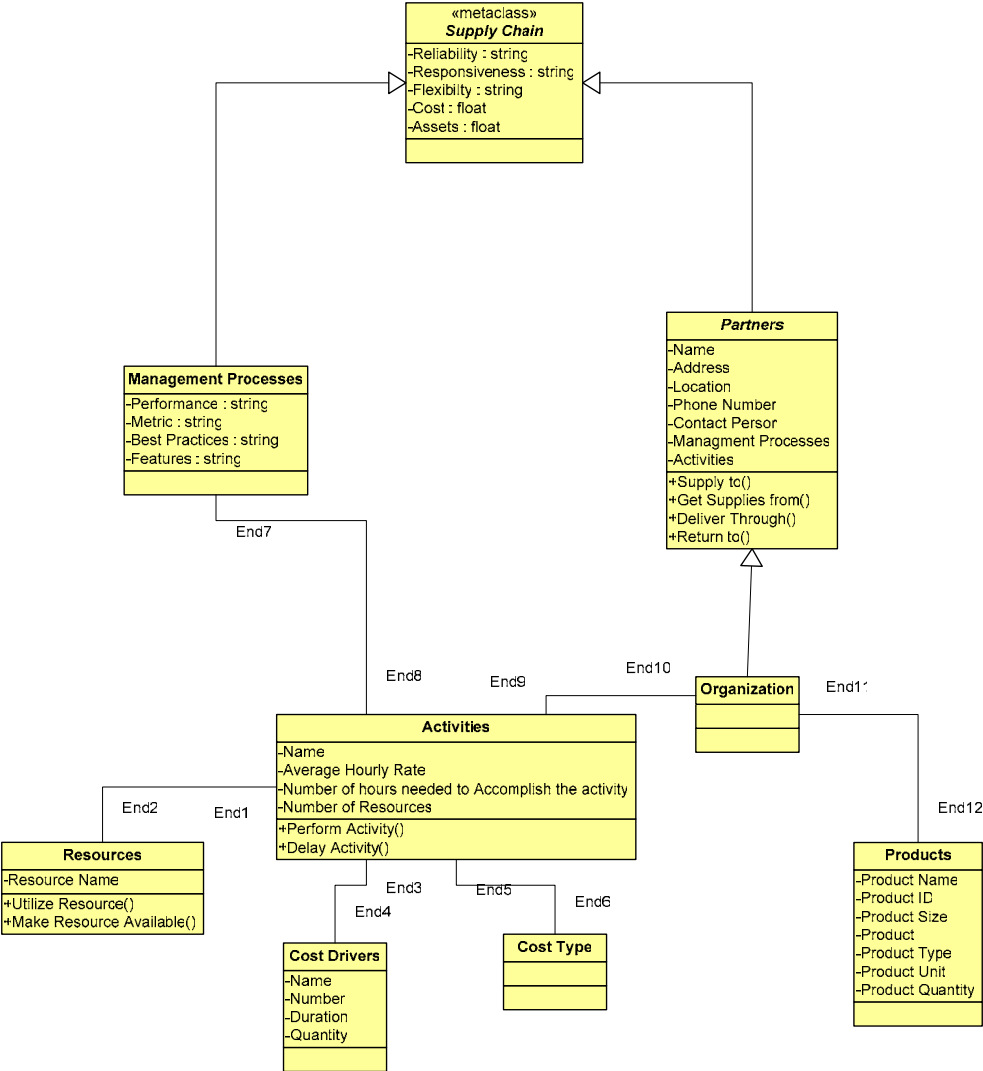


Figure 22: Cost Model Class Diagram



### ***3.2.3 Concept Definition***

Each concept will be defined and all the attributes will be listed. Sub concepts will be also defined. Sub concepts will inherit some of the attributes from the related main concept and other specific attributes will be added separately. The concepts, their attributes, and their definitions will be entered into the software.

### ***3.2.4 Identify Relationships between Concepts***

Once the domain has been defined and the domain concepts have been recognized and defined, a relationship between these concepts will be established. This will enable the ease of communication and the understanding of each concept role within the domain.

### ***3.2.5 Ontology Development***

The vocabulary of common terms and concepts, their definition and their relationships with each other are called ontologies. The ontologies will serve as a base knowledge that has all the information of the supply chain and the cost within that chain. There are four different types of ontologies: domain ontologies, task ontologies, meta ontologies, and knowledge ontologies. The supply chain is considered a domain ontology. The ontologies will aid in information sharing and the ease of access to the information. Defining the concepts will minimize redundancy and improve relations between different units within the supply chain. Different tools are being used to develop ontologies such as ontology

editors that can be used to build and edit ontologies, ontology-based annotation, which uses pre-defined concepts in ontology to mark-up a document, and ontology based reasoning. Some of the common software that has been used in the market for ontology editing is Protégé 2000, OntoEdit, and OIEd (Fensel et al, 2001). In this research Protégé-2000 will be used as a tool to develop the cost model ontology.

Protégé-2000 is an integrated software tool that was developed by Stanford University and is used by system developers and domain experts to develop knowledge-based systems. Applications developed with Protégé are used in problem-solving and decision-making in a particular domain (Protégé-2000 user guide). The software has a uniform graphical user interface (GUI) whose top level consists of overlapping tabs for compact presentation of parts and for convenient co-editing between them. The following figure is a snapshot of the software user interface.

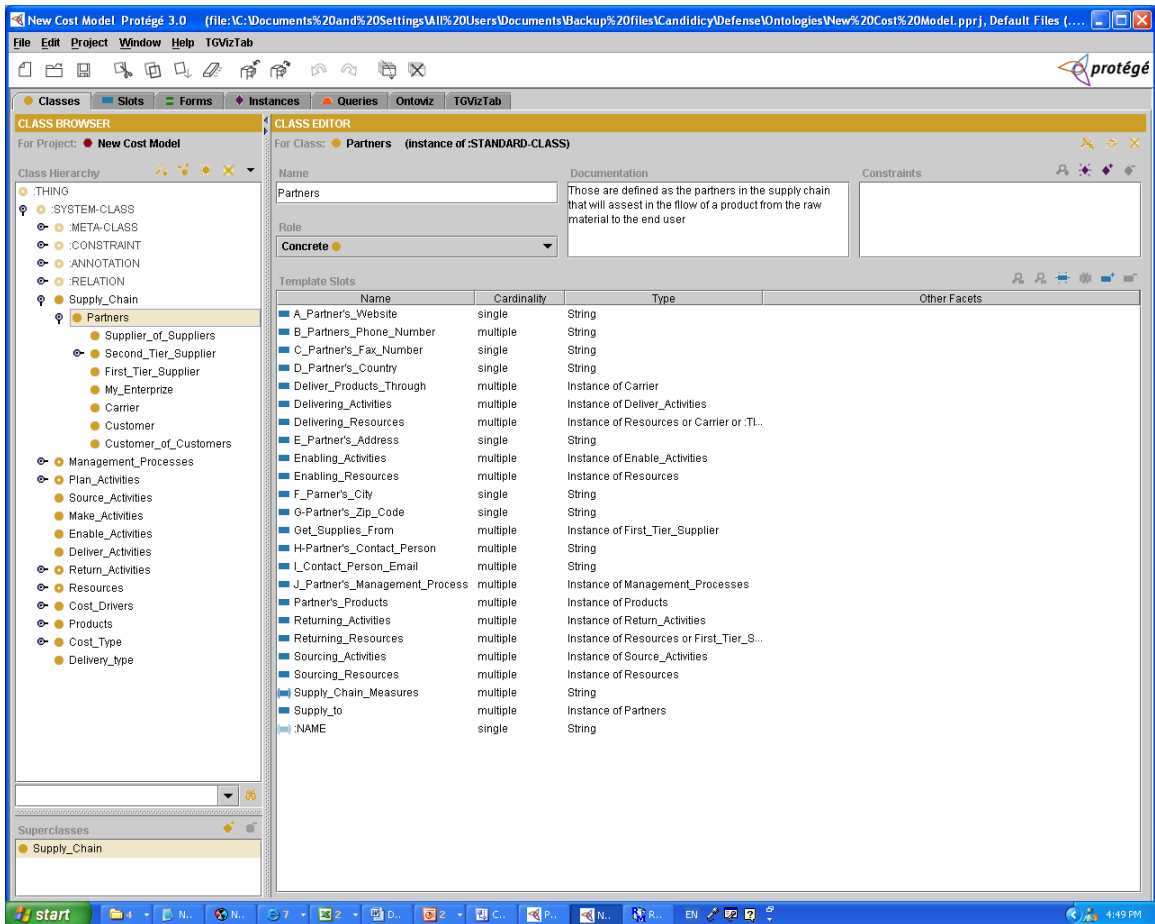


Figure 23: Protégé-2000 GUI

The tabs that are used in the GUI to build domain ontologies are:

- **Classes:** Representations of a group or set of individual objects with similar characteristics. In protégé-2000 the system class “Thing” represents the main super-class that all domain classes belong to.
- **Slots:** The properties of a domain concept, which can be associated with a class or manipulated independently. The user can define or edit the attributes of slots in terms of name, value type, cardinality, and/or any specifics related to the slot

type. Slot types are any, Boolean, class, float, instance, integer, or symbol value (Ahmad, 2003).

- Forms: Created during the creation of a class, slot or an instance, and they help in editing their properties.
- Instances: Allow the user to model actual data, i.e. a specific knowledge base. In other words, the classes can model domain concepts, the slots model the properties of classes and the relationships among the various classes, whereas instances utilize classes and slots to model a particular knowledge base belonging to the domain area modeled using the ontology. The instance form may be used to define or edit the various attributes of the selected instance
- Queries: Allow the user to create, run, and save queries. A query is simply locating the instances that match the query criteria. Queries are not part of the knowledge bases, but they can be used to make inferences regarding the knowledge base. Upon running a query, a search results pane is displayed with instances matching the search criteria defined in the query.

### **3.3 Cost Model Ontologies**

From the different definitions of ontology types the research will consider the supply chain cost model as domain ontology. The SCOR model will be used to identify the main concepts and will keep the ontologies within a frame of standards. The chain consists of partners of the supply chain, the activities that will assist in the product flow, resources that are being used to achieve these activities, and the cost drivers that drive the cost for

each activity. Once the concepts have been identified and recognized, they should be defined to assist in classifying each one of these concepts. The framework for cost ontologies is shown in the following figure.

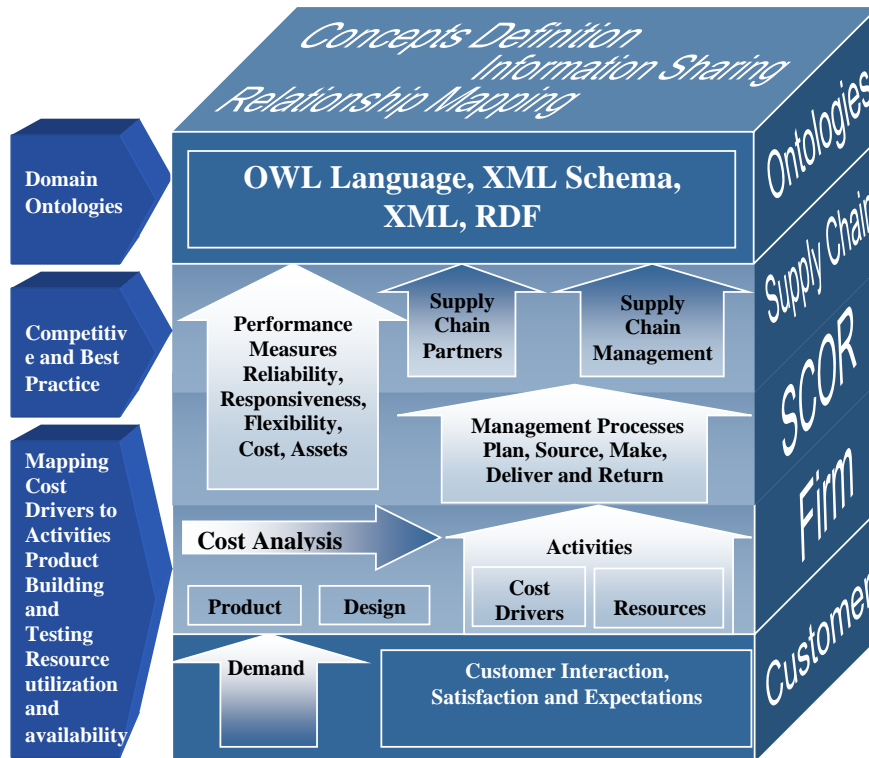


Figure 24: Framework for Supply Chain Cost Ontologies

The following concepts can be identified in a supply chain cost model:

- Supply Chain: The flow of material from supplier to end user (SCOR).
- Partners: Firms, businesses, companies, manufacturers, and end users that participate in the flow of a certain product through a chain of activities such as:

- Suppliers: Supply the chain with the raw material needed to build an intermediate or finished product, or to provide a service.
- Manufacturers: The partner that transforms raw materials into finished goods for sale, or intermediate processes involving the production or finishing of semi-manufactures.
- Distributors: Partners that assist in the distribution using distribution centers. These partners might be merged within another partner of the supply chain.
- Carrier: Used to move materials and goods between different locations within the chain.
- Retailers: Businesses that sell goods directly to the public (customers). Manufacturers, suppliers, distributors, and retailers use warehouses to store their raw material or finished goods.
- Customers: A person, company, or other entity which buys goods and/or services produced by another person, company, or entity. Each one of the partners has five main management processes as described by SCOR – plan, source, make, deliver, and return.

The following figure shows the ontologies that have been built for supply chain partners using Protégé 2000.

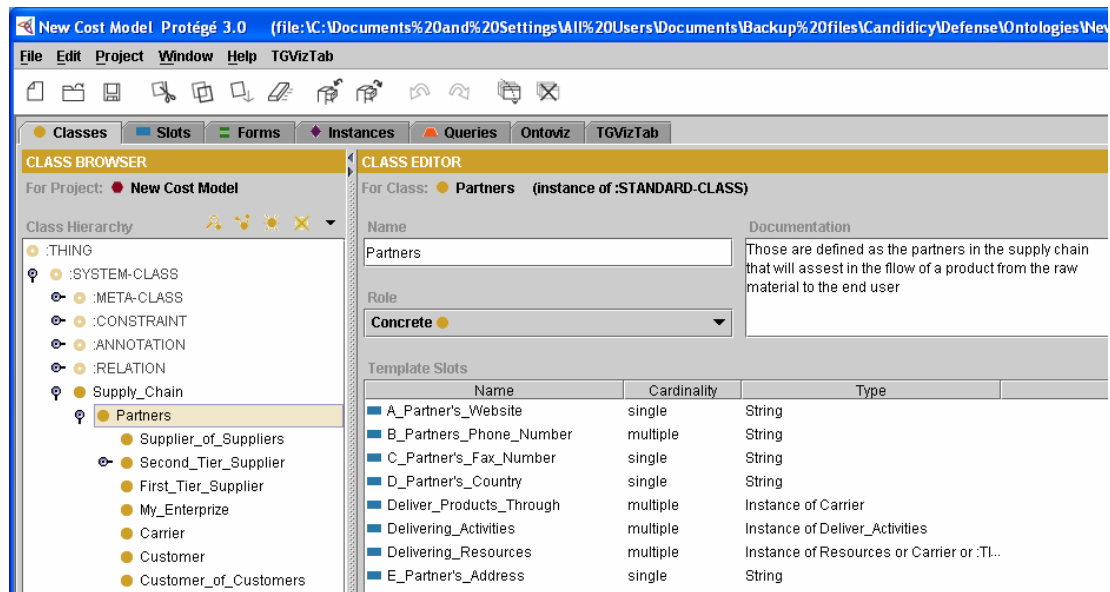


Figure 25: Partners Ontologies using Protégé 2000

- Processes: Series of events that cause changes in certain areas. There are three different types of processes: planning, execution, and enabling process. The SCOR model lists the following main management processes:
  - Plan: A process that aligns expected resources to develop a course of action which best meets expected demand requirements. The planning process can affect the response time of a supply chain.
  - Source: All processes that assist in the procurement, delivery, receipt, and transfer of raw material items that participate in making a product.
  - Make: All processes that transform product to a finished state to meet planned or actual demand.
  - Deliver: All processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management.

- Return: All processes associated with returning or receiving returned products.

Table 2 Model Notations based on SCOR Model<sup>19</sup>

Plan Elements	P
Source Elements	S
Make Elements	M
Deliver Elements	D
Return Elements	R

The score model has three process types as shown in the following table:

Table 3: Process Types in SCOR Model

Planning Process	A process that aligns expected resources to meet expected demand requirements
Execution Process	They are triggered by planned or actual demand that changes the state of the product such as scheduling and sequencing, transforming materials and services, and moving products
Enabling Process	The process that prepares, maintains, and manages information and relationships upon which planning and execution rely

<sup>19</sup> Supply Chain Council SCOR Model 6.0



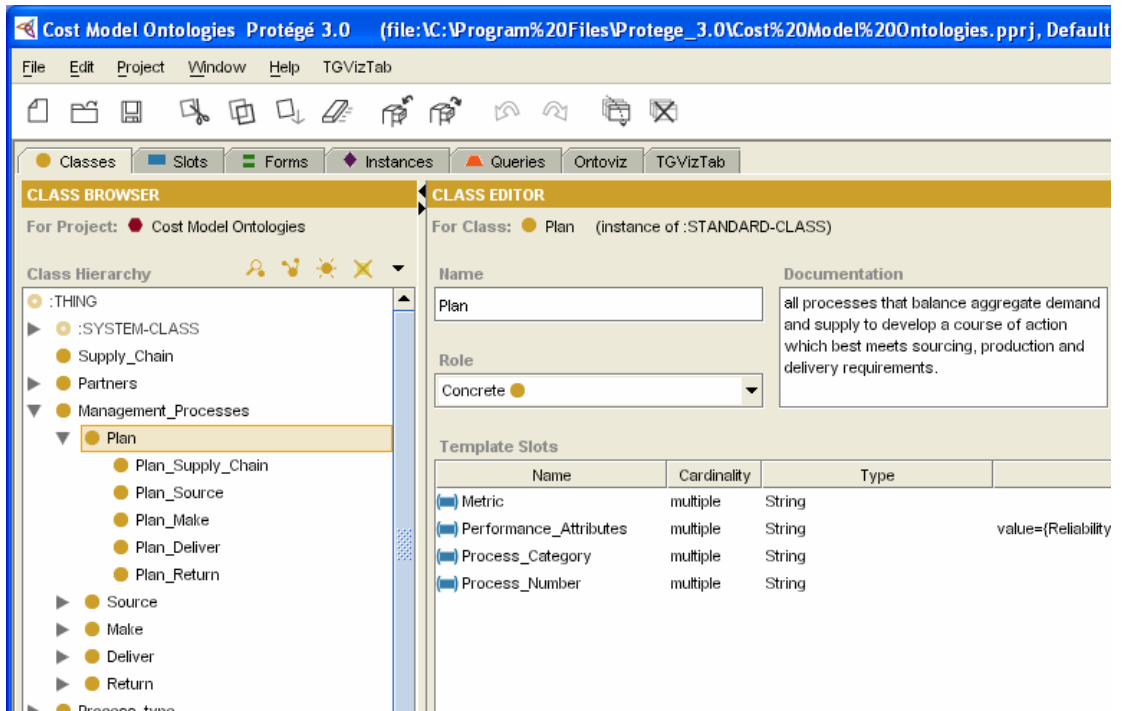


Figure 26: Management Processes Ontologies

Also process types will be included in the model ontologies as shown in the following figure.

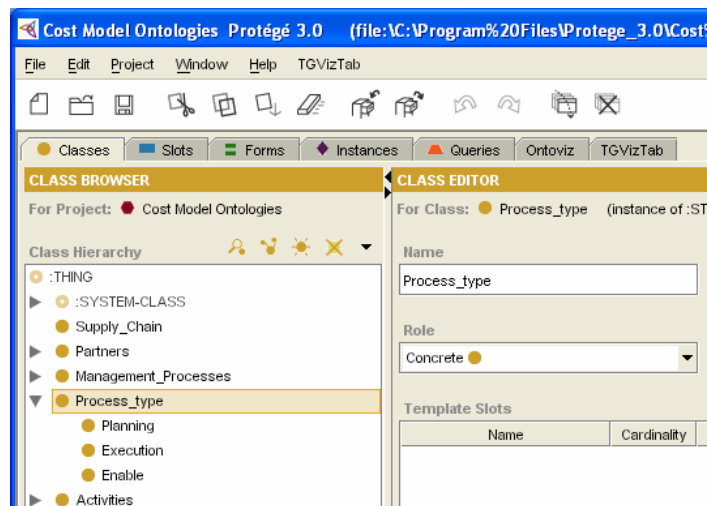


Figure 27: Process Type Ontologies

- Activities: A type of work or function that achieves a certain goal. The activities could be classified into four different types: Main activities which are defined as a major type of work or function. Sub-activities which are the lower level type of work or function that supports the main activity. For example, purchasing raw material is considered as a main activity, while preparing purchased orders is a sub-activity that supports the purchasing activity. Another type of activity is a task, which is defined as a minor type of work that supports a sub activity. Following up with the same example, we can consider calling vendors to prepare purchase order to be a task. The last type is sub-tasks that are part of tasks that support the main task, such as dialing a vendor's phone number (<http://www.maaw.info>). The activities are being operated and achieved by using resources such as people, equipment, facilities, land, money and raw material, which is explained in the following section. The following figure shows the activities ontologies that were built using Protégé 2000.

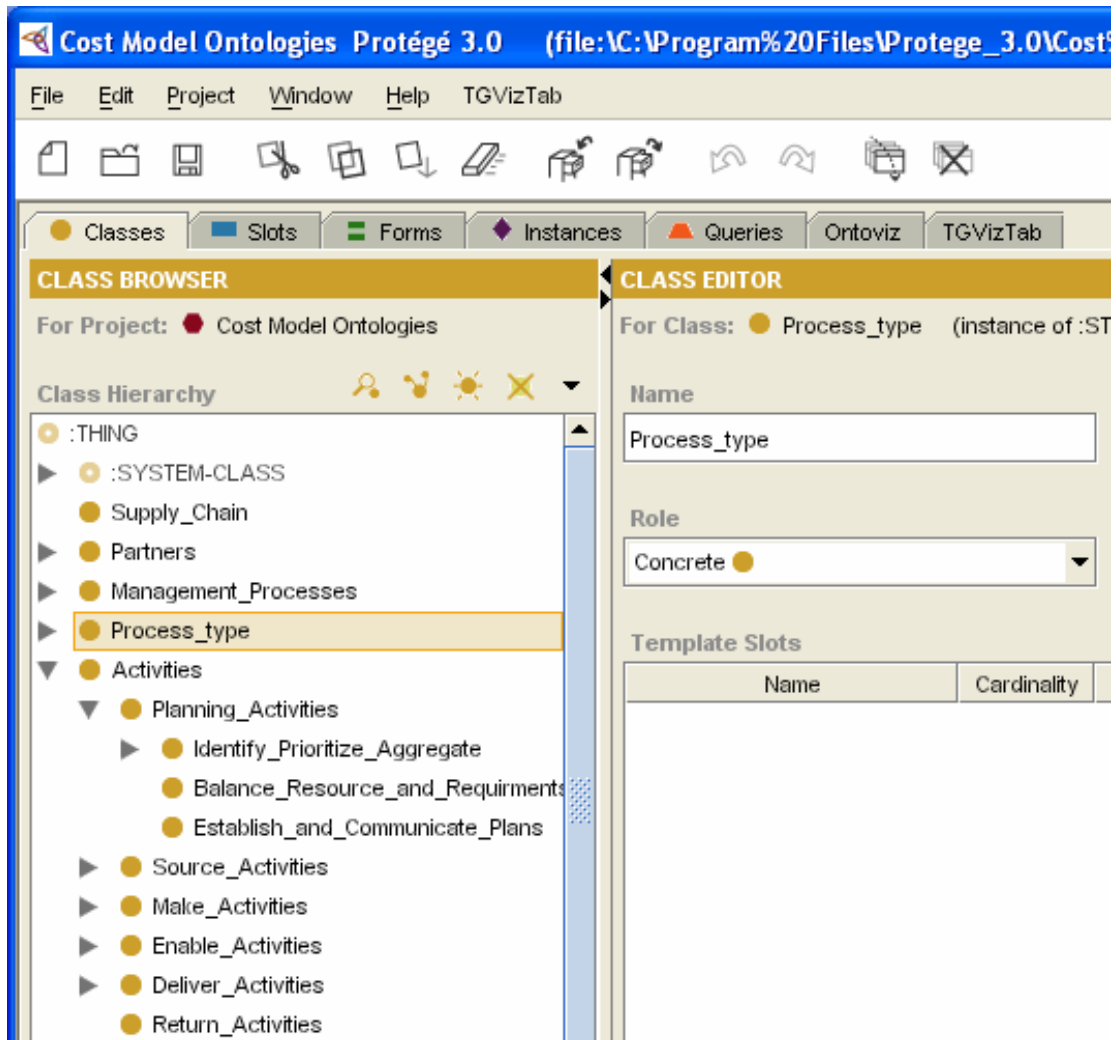


Figure 28: Activities Ontologies

- Resources: Used to achieve or operate an activity such as:
  - People
  - Equipment
  - Facilities
  - Land
  - Money
  - Raw Material

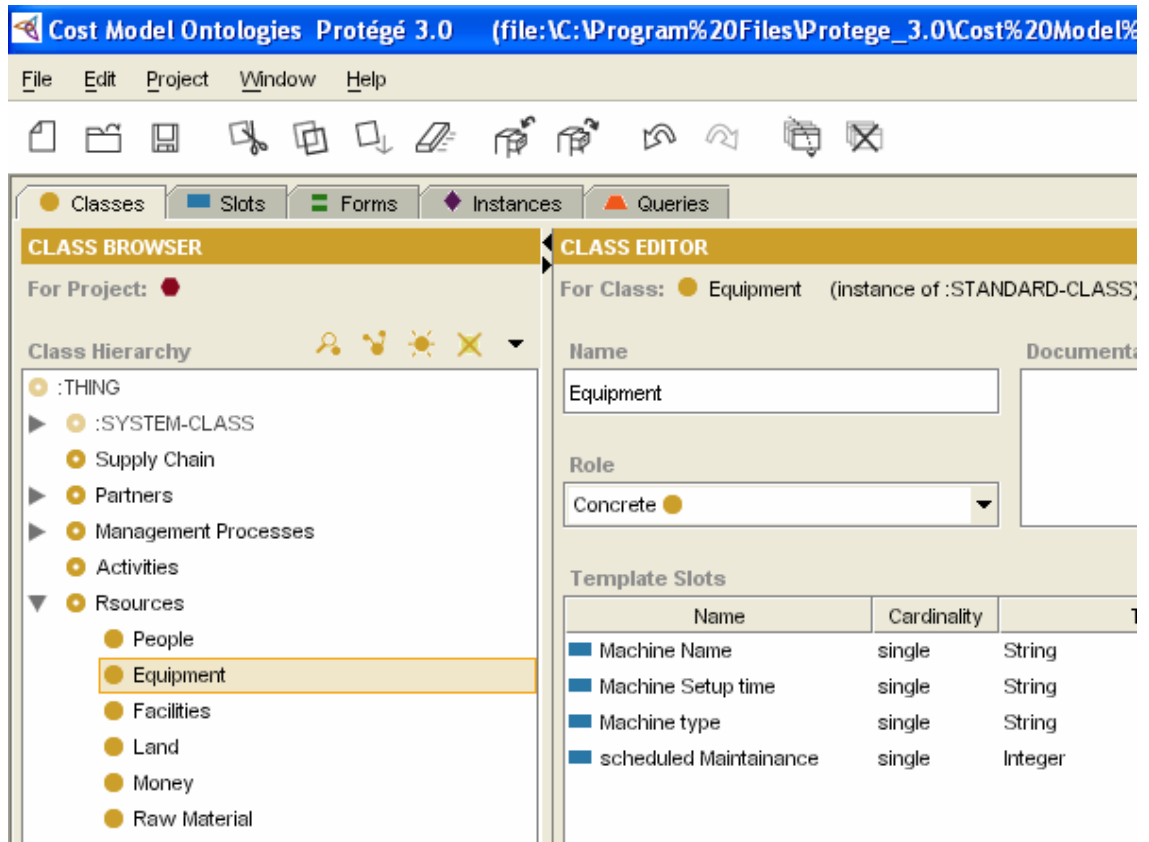


Figure 29: Building Resources Ontology using Protégé 2000

- Products: The intermediate or the finished items that result from the series of activities, and they can be either physical products or services. The physical products are three types: stocked, make-to-order, and engineer-to-order products. Traditional production systems produce products and stock them as inventory until they are sold (make-to-stock). In order to reduce inventory and increase the level of customization, some firms have designed their production systems to produce a product only after it is ordered. Such systems are referred to as make-to-order. If the product is highly customized to meet customer requirements and company constraints it will be called engineer-to-order.

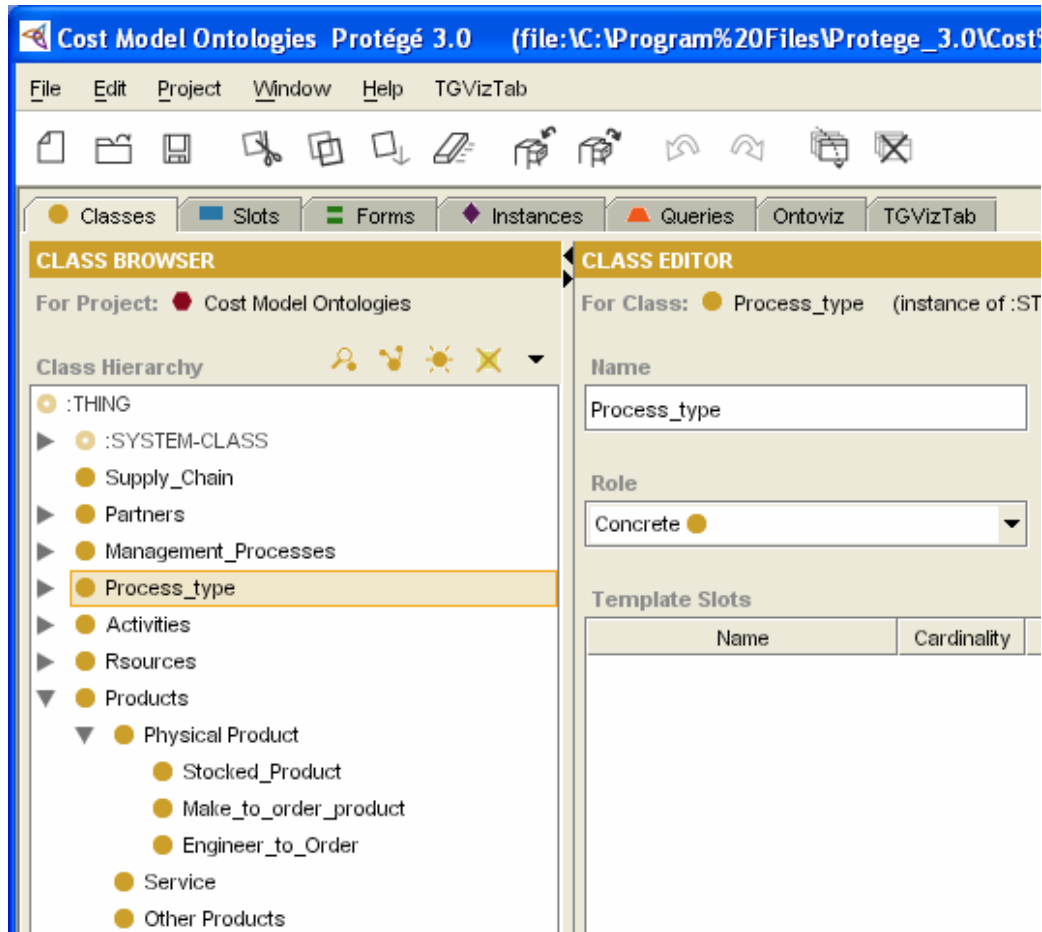


Figure 30: Product Ontologies

- Cost drivers: The events or actions that trigger the activity and can be the basis for the calculation of unit costs. They are also defined as the factors responsible for variation in the cost of an activity. The cost drivers can be frequency, duration, or physical measures as shown in the following table. Other measures that might not be included under any of the previous measures, such as time of the year, should be considered.

Table 4: Types of cost drivers, their definitions, and some examples

Driver Type	Definition	Example
Frequency Drivers	The number of times an activity is performed	Number of inspections, number of times for handling material
Duration Drivers	The time consumed performing the activity	Material handling hours, machine setup time
Physical Drivers	The quantity of a resource processed by an activity	Pounds shipped

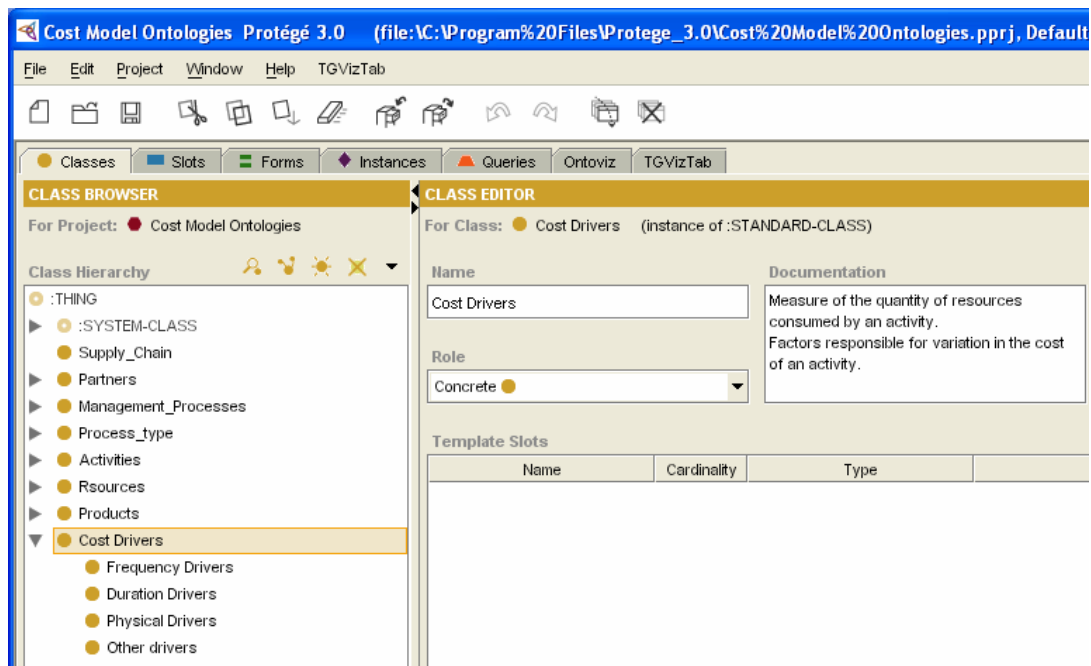


Figure 31: Cost Drivers Ontologies

- Cost Types: Based on the relation between the activity and a product. If the activity is directly related to the product, then it is a direct cost; otherwise it's indirect.

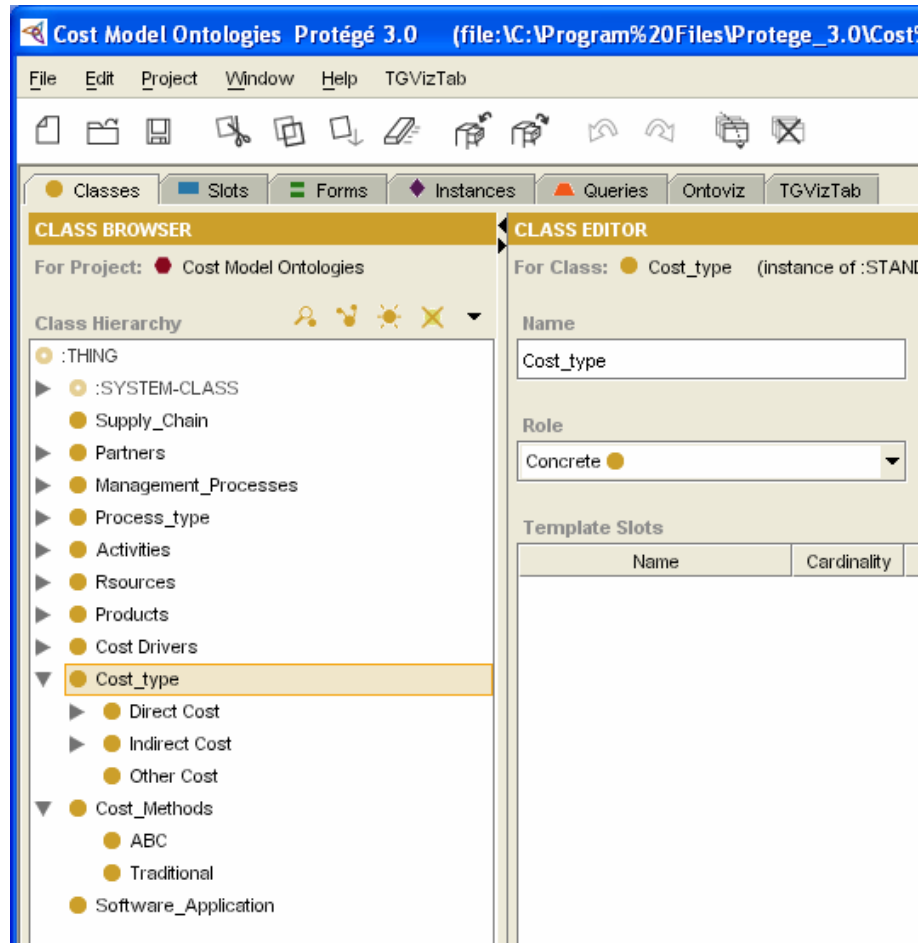


Figure 32: Cost Type, Cost Methods

The activities will be analyzed and the depth and detail of analysis will be determined by activity decomposition until the analyst reaches the desired output from that activity. Once this is done, the activity will be recognized and identified as a value or non-value added activity. The objective will be to minimize the non-value added activities and eliminate the unnecessary ones.

The attributes and characteristics of each concept will clarify the relationship between the activities. These attributes will be used to identify the resources needed to accomplish each activity and will be used to map cost drivers to their corresponding activities. Activity Based Costing uses the mapping for the needed calculation. More details will be discussed in the following section.

Ontologies will serve as a knowledge base system for powerful communications. Lacy in his book OWL that was published in 2005 stated that “Ontologies provided definitive and exhaustive classifications of objects and their relationships in all spheres of being.” The concepts are defined through sets of classes or objects that represent the system. Relationships can be established between these objects based on their attributes and functionalities. The ontologies can be represented by a hierarchy that consists of classes, subclasses, and instances. Each of these classes and subclasses has values and can inherit attributes from each other. The following figure shows an example of ontology hierarchy.



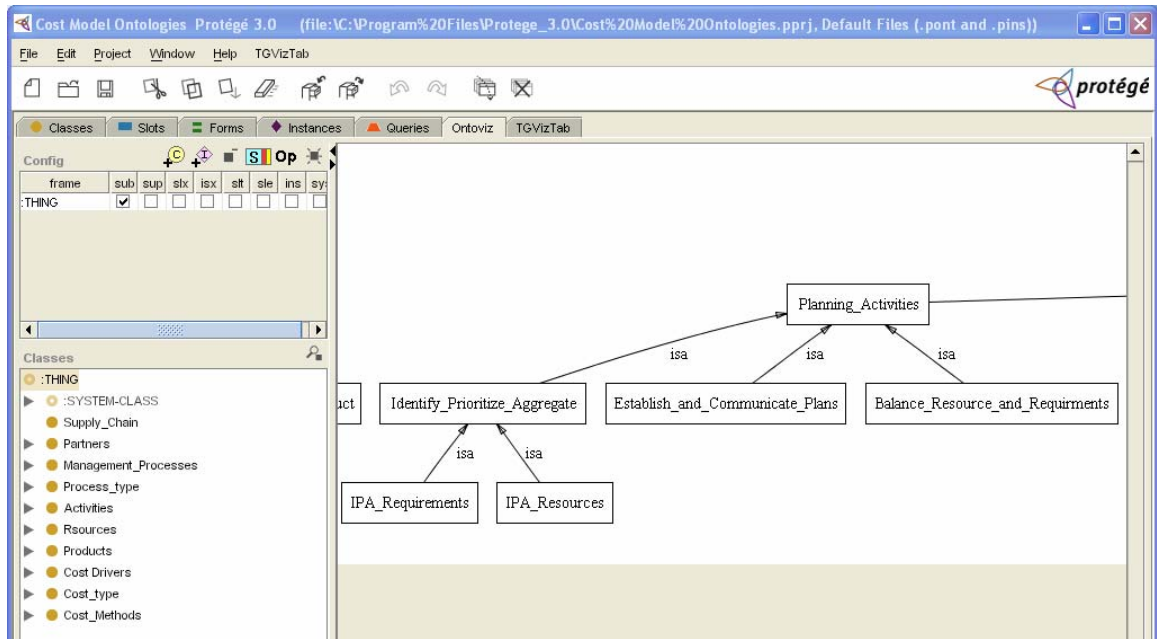


Figure 33: Example of Ontology Hierarchy

In the figure the activities are super-class while planning activities and identify\_prioritize\_aggregate are subclasses that inherit the attributes from each super class. IPA-requirements are an instance of identify\_prioritize\_aggregate activity, which also inherits some of the attributes from the parent class. The cost model ontologies are shown in the following figures.

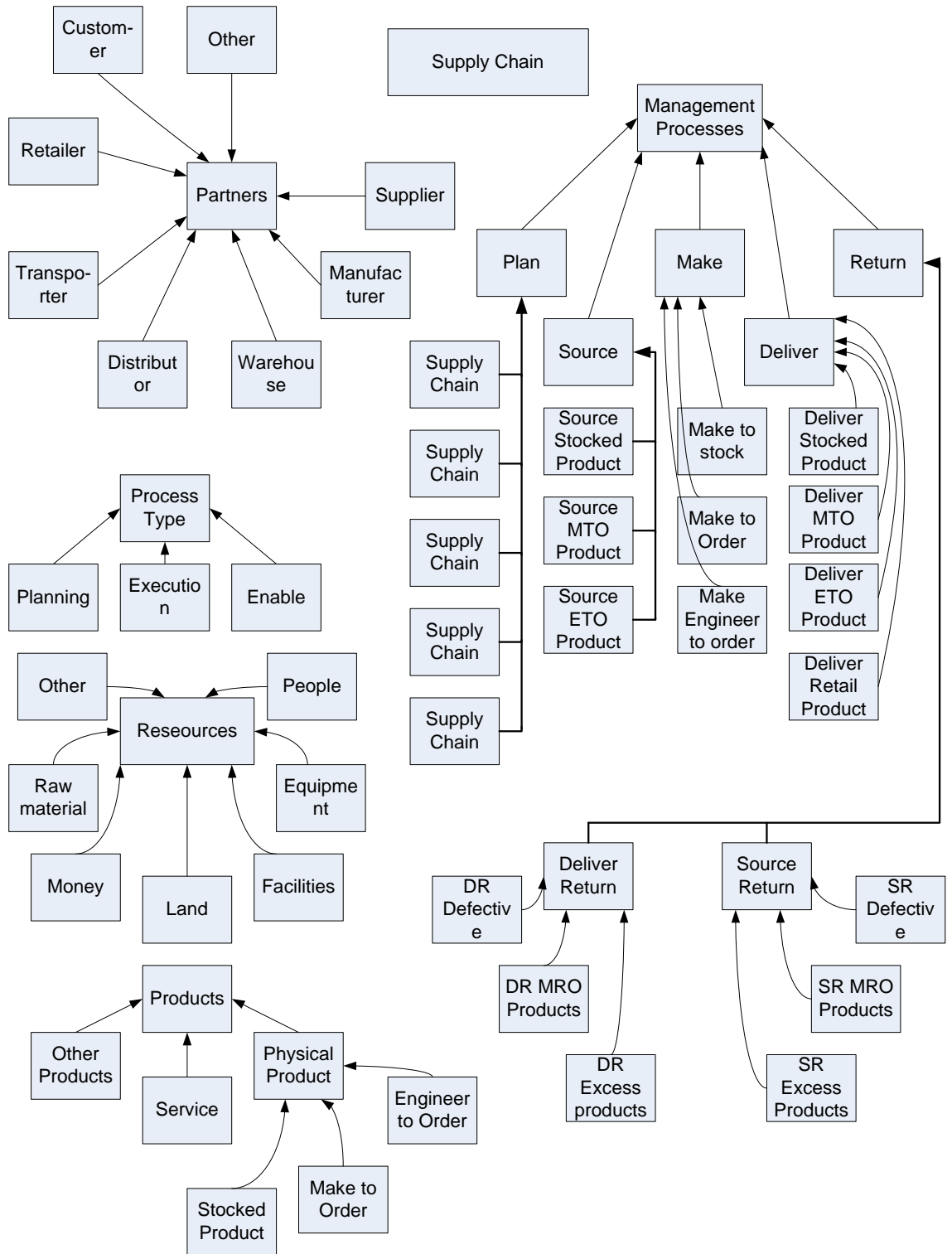


Figure 34: Cost Model Ontologies Hierarchy

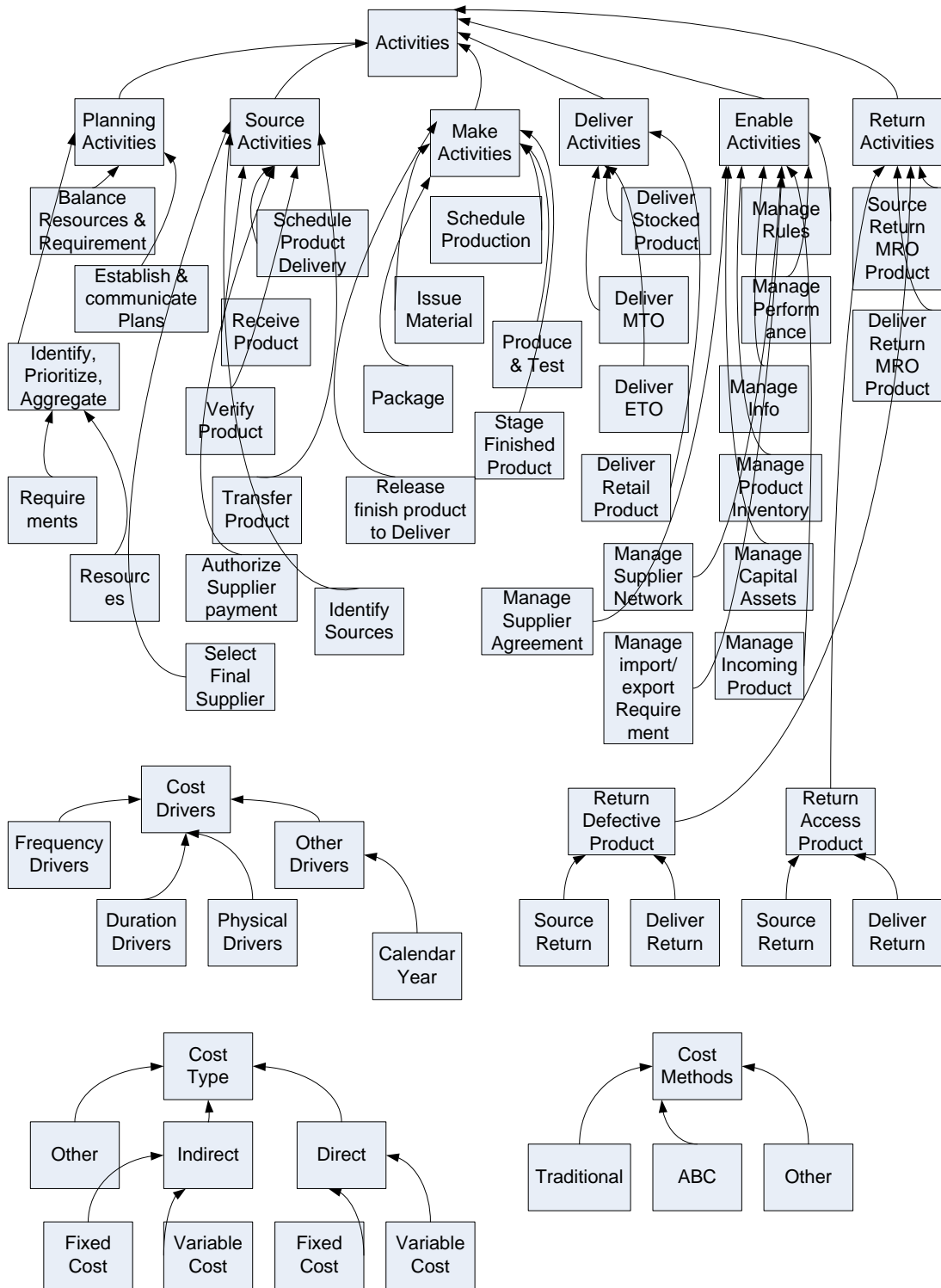


Figure 35: Cost Model Ontologies (Cont.)

### 3.4 XML and OWL

The rising demand of using application and information sharing through LANs and Internet created a need to develop a web language to translate the documents and link the applications. XML, or eXtensible Markup Language, is one of the languages that were developed for such a purpose. XML is a framework for defining markup languages. It is not limited with a fixed collection of markup tags. Tags can be defined and customized as needed. XML has a common set of generic tools for processing documents and can be described as tailor-made markup that is platform independent. The common framework for structuring information is provided by the separation of syntax from semantics (Moeller and Schwartzbach, 2002).

Although XML provides features for representing and sharing information, it is not enough for supporting web requirements because it defines syntax, not semantics. Also XML descriptions are not clear for software application. With XML the same thing can be describes in a variety of ways, which can make it confusing (Lacy, 2005). RDF (Resource Description Framework) language was developed to overcome the problems of XML. The idea was to create and develop a language to describe the semantics of data to make it easy for sharing. RDF can be used for publishing database contents on the web. Still, RDF has shortcoming and could not be used to describe more complex semantic expressions. The interchange of data needs a serialization format that was not provided by RDF. To address the problem of serialization, a new format was created which is a

common XML format for storing RDF and was called RDF/XML. The new format is defined as a standard linear notation for serializing the RDF model and exchanging RDF statements. RDF/XML still lacks the ability to represent and describe more complex relationships. An extension was needed to provide mechanisms for describing groups of related resources and their relationships. RDF schema were used to provide the basic structure for the expanded vocabulary.

On top of all these formats and structured languages, there was a need for a language to restrict some properties. There was a need for more complex descriptions and additional vocabulary. More rules and more advanced semantic concepts are needed for researchers to infer new facts. Ontology Web Language (OWL) came to address these problems and represent information in the semantic web. This language is used to define ontologies for a particular domain. The language includes a set of axioms describing classes, properties, and relationships between them (Lacy, 2005). The domain is being defined and the concepts will be translated into classes that have certain attributes. The classes as objects can be reused and the attributes can be inherited. The relationships between these concepts can be identified and documented for easy sharing. This will create a connection between the concepts and the software applications used in the domain. The Ontology Web Language is very rich with expressions which enable better inference from the data.

To develop the code the domain requirements have to be specified to develop a common domain description. Using the approach in figure 20 in section 3.1.1 the information of

the domain will be collected and the main concepts will be identified. Concepts, resources and attributes will be defined and connected with various relationships. A code has been developed using OWL to represent the domain as shown in the following figure.

```
<?xml version="1.0"?>
<rdf:RDF
  xmlns:protege="http://protege.stanford.edu/plugins/owl/protege#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns="http://www.owl-ontologies.com/unnamed.owl#"
  xml:base="http://www.owl-ontologies.com/unnamed.owl">
  <owl:Ontology rdf:about="">
    <owl:imports rdf:resource="http://protege.stanford.edu/plugins/owl/protege"/>
  </owl:Ontology>
  <owl:Class rdf:ID="Deliver_Stocked-Product">
    <protege:constraints>
      <protege:PAL-Constraint rdf:ID="Cost_Model_Ontologies_Instance_10088">
        <rdfs:label>Cost Model Ontologies_Instance_10088</rdfs:label>
```

Figure 36: Domain OWL Language

The coding includes the supply chain cost model as a domain for the ontologies. The ontologies are represented in RDF/XML format. That is the reason for the declaration that specifies the version of XML being used in the encoding as shown in figure 36.

As stated before, the supply chain, partners, processes, process types, activities, resources, products, cost drivers, cost types, cost methods, and software applications are considered as common concepts that are included in the domain of interest. The following code shows a class representation for a concept called “partners” as an example for OWL language.

```
</owl:Class>  
<owl:Class rdf:ID="Partners">  
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"  
  >Those are defined as the partners in the supply chain that will assist in the flow of  
    a product from the raw material to the end user</rdfs:comment>  
</owl:Class>
```

Figure 37: The Partners Class as an Example

Partners were declared as a class using the OWL language and then was identified by using the rdf:ID identifier. The RDF schemas were used to provide additional description for the class as shown above. The Ontology Web Language and the coding for the whole model classes, attributes, and relationships is shown in the appendix.

### 3.5 ABC Cost Model

The common management accounting methods used to calculate the cost through an enterprise is Activity Based Costing (ABC). As stated earlier in this research, ABC cost model depends mainly on identifying the processes and activities through the knowledge domain. The SCOR model can identify the main management processes, the most used activities, the resources needed to achieve such activities, and the driving measures for these costs. The domain ontology will describe all these concepts and their relationships among each other. The supply chain cost model base knowledge will include:

- A list of the supply chain partners with the most common activities for each partner.
- A list of the resources and the cost drivers associated with each activity
- Activity information
- Cost information

There are a variety of applications that might use information in this knowledge-base. The research is interested in an application or a system for analyzing product cost and pricing. The information might be used also in analyzing the partners of the supply chain and assist in the decision-making of replacing or adding a partner.

To start building ontologies that track cost through the supply chain, a large amount of information will have to be collected to extract the major concepts. The ontologies will be flexible enough to adapt with any changes in the supply chain and can be implemented for new supply chains.



“Activity-based costing allows managers to more fully understand the true cost of each product, identify excess capacity in their operations, and make informed decisions to improve efficiency” (Helms and Grace, 2004). The implementation of this technique across the supply chain will create an agile supply chain that responds just in time for the changes in the dynamic market. It is very important for the finance management to understand current product costs more fully before they introduce new products. A starting point will be to find and document the supply chain partner’s practices, methods, measures, costs, and their interrelationships at a particular level and at a certain time.

Activity inputs and outputs across the firm units and across the partners of the supply chain will be identified. Some examples for common activities that might occur between the supply chain units are:

- Purchasing and their relation with sales (quote and order activities)
- Accounting units in both firm and supplier (invoicing and collection activities)
- Logistics also in both firm and supplier (shipping and receiving activities).

The built ontologies helped in analyzing activities within the supply chain. Each activity was defined as a class or sub-class and resources were assigned to these activities. The ontology of the model also provided the definition of cost drivers and there measures. The next step will be to gather costs related to each activity, then trace cost to activity to make sure that no cost was lost during the gathering. Then establish output measures and analyze costs for each product based on the activities that a certain product or service

goes through. Opportunities for cost reduction could be identified, followed by a process of eliminating non-added value activities. ABC will help in recognizing the actual dollar costs against individual activities. The ABC model is implemented through the following five steps

- Analyze Activities
- Gather Costs
- Trace Costs to Activities
- Establish Output Measures
- Analyze Costs

The first step has been already implemented in the previous section and this section will go through the rest of the steps. Figure 21 shows the cost assignment based on ABC logic.

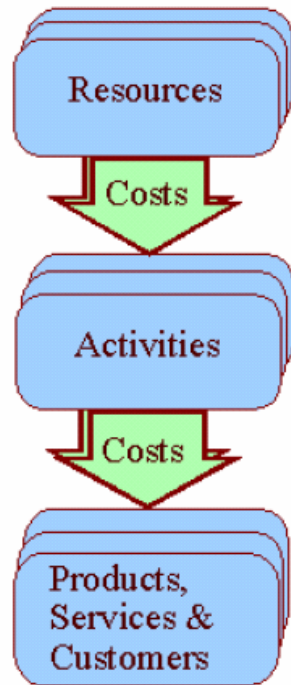


Figure 38: Cost Assignment Based on ABC Logic<sup>20</sup>

The SCOR model identified lots of the activities and sub-activities in a supply chain. The process elements in the following table shows some of the activities that are being extracted from the SCOR model for the enable plan process.

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<sup>20</sup> Activity Based Product Costing. Ch.7 <http://www.maaw.info>

Table 5: Main Activities for the Enable Plan Process

Management Processes	Process Category	Process Number	Process Elements	Process Elements Number	Performance Attribute	Metric
Plan	Enable Plan*	EP	Manage Business Rules for Plan Processes	EP.1	Cost	Total Supply Chain Costs
			Manage Performance of Supply Chain	EP.2		
			Manage Plan Data Collection	EP.3		
			Manage Integrated Supply Chain Inventory	EP.4		
			Manage Integrated Supply Chain Capital Assets	EP.5		
			Manage Integrated Supply Chain Transportation	EP.6		
			Manage Planning Configuration	EP.7		
			Manage Plan Regulatory Requirements and Compliance	EP.8		
			Align Supply Chain Unit Plan with Financial plan	EP.9		

Some common activities on the supply chain level are listed and defined randomly in Table 6. The table includes the activity measures, or cost drivers, and the level of unit being used in measuring that activity.

Table 6: Randomly chosen activities, their cost drivers and unit level

<b>Activity</b>	<b>Activity Measures or Cost Drivers</b>	<b>Unit Level</b>
Purchasing	Number of Purchase Orders or Ordering Hours	Product or Batch Level
Receiving and Storing	Number of Purchase orders or ordering hours	Product or Batch Level
Engineering	Number of Engineering Work Orders or Hours	Product Level
Packing	Number of Shipments, Number of Cubic feet or Packing hours	Product or Batch Level
Shipping	Number of Pounds Shipped	Product or Batch Level
Machine Setup	Number of setups or setup time	Batch Level
Material Handling	Number of times handled or material handling hours	Product or Batch Level
Inventory Control and Material Planning	Number of part numbers or administrative hours	Product or Batch Level
Inspecting and quality Control	Number of Inspections or Inspection times	Product or Batch Level

The cost drivers can be clustered into primary drivers or secondary drivers. The primary drivers are defined as the initial cause of an activity that requires resources. The

secondary drivers are defined as the cause of a sub-activity that also consumes a resource. In general the cost drivers can be defined as the unit of measure chosen to represent an activity volume.

Once the activity has been identified, the different costs associated with each activity will be gathered with the product or the service as the outcome. These costs are used as the baseline activity costs. For example, the inspecting activity and overhead activity that will happen when receiving the parts for a product and just before inventorying these parts. This activity will involve inspection hours and the cost drivers can be the number of hours for inspection or the number of inspectors that are being used for this activity. Once we identify all costs associated with activities, then we can calculate total cost per activity. Costs will be traced to different activities. The results of analyzing activities and gathered firm inputs and costs are brought together, which represent the total cost for each activity. The total costs associated with an activity will be calculated in a simple way, taking into consideration the time that has been consumed by a firm unit on each activity adding to any indirect cost. The process will apply for each partner in the supply chain.

Although activities may have multiple outputs, only one will be identified as the primary output. The actual activity unit cost will be calculated by dividing the total input cost, including assigned costs from secondary activities, by the primary activity output

volume. A list of all activities with their associated cost will be generated. Then the total cost for all activities will be defined.

In the last step the list of activities and their cost will be used to identify the opportunities for cost saving, i.e. eliminating non-added value activities. Other opportunities will appear for cost improvement. The different charts and analysis will provide managers with different percentages for each activity and which one consumes the most. Once the costs are defined, a process of tracking products to activities will be performed. The total cost of a product will be calculated based on the total cost of the activities that the product went through from raw material stage to finished product delivered to customer in addition to other management costs. The price will include any chance of return for defective, or excess or maintenance products.

The following is a small example of a computer production line with some activities, their cost drivers, and gathered cost. The information is shown in the following table. The example addresses few activities to explain the big picture of the ABC cost model implementation. The calculation should reveal the product cost per unit based on the activities that the product was involved in.

Table 7: Table 7: Example for Activity and Cost Break Down

Activity	Cost Driver	Cost	Desktops	Laptops
Production Assembly	# of assembled unit	\$210,000.00	2000 units	1000 units
Material Handling & Requisition	# of parts	\$640,000.00	8000 parts	16000 parts
Packaging & Shipping	# units shipped	\$120,000.00	1800	700
Total Overhead		\$970,000.00		

Production Assembly rate:  $\$210,000 / (2000+1000) = \$70.00/\text{assembled unit}$

Material handling rate:  $\$640,000 / (8000+16000) = \$26.66/\text{part}$

Packaging and Shipping rate:  $\$120,000 / (1800+700) = \$48.00/\text{unit shipped}$

To produce and assemble a desktop it will take 2.5 hours, while to produce a laptop it will take 4.5 hours. Material handling will take one hour for a desktop and 2.5 hours for a laptop. Packaging and shipping will take 1.5 hours for the desktop and 1.75 hours for a laptop.

Resulting ABC-based Product cost is shown in the following table.

Table 8: Calculation for Product Cost per Unit

Activity	Desktops cost	Laptops cost
Direct Labor	\$48.00	\$70.00
Direct Material	\$213.28	\$426.56
Production Assembly Overhead	$70.00 \times 2.5$	$70.00 \times 4.5$
Material Handling & Requisition Overhead	$26.66 \times 1$	$26.66 \times 2.5$
Packaging & Shipping Overhead	$48.00 \times 1.5$	$48.00 \times 1.75$
Cost Per unit	\$534.94	\$962.21



Analyzing the cost, we can identify the opportunity of saving cost if shipped by patches instead of individual units. This cost saving will affect the supplier, the distributor, and the customer. The saving will leverage the service quality and direct the money in other important directions. Also other opportunities can be found in material handling where it will cause the birth of a new material handling strategy. Such opportunities are what we are searching for when creating this model.

### **3.6 Case Study**

#### **Case Study: Computek Inc. (Out of Business Now)**

The case study used in this section represents a small assembly computer company. Computek Inc is a computer company that was established in 1991 in Charlotte, North Carolina and started to thrive in the mid nineties with the spread of personal computers. The production line assembles three types of personal desktop computers: Pentium 4, Celeron, and AMD. The supply chain of this firm is shown in the following figure.

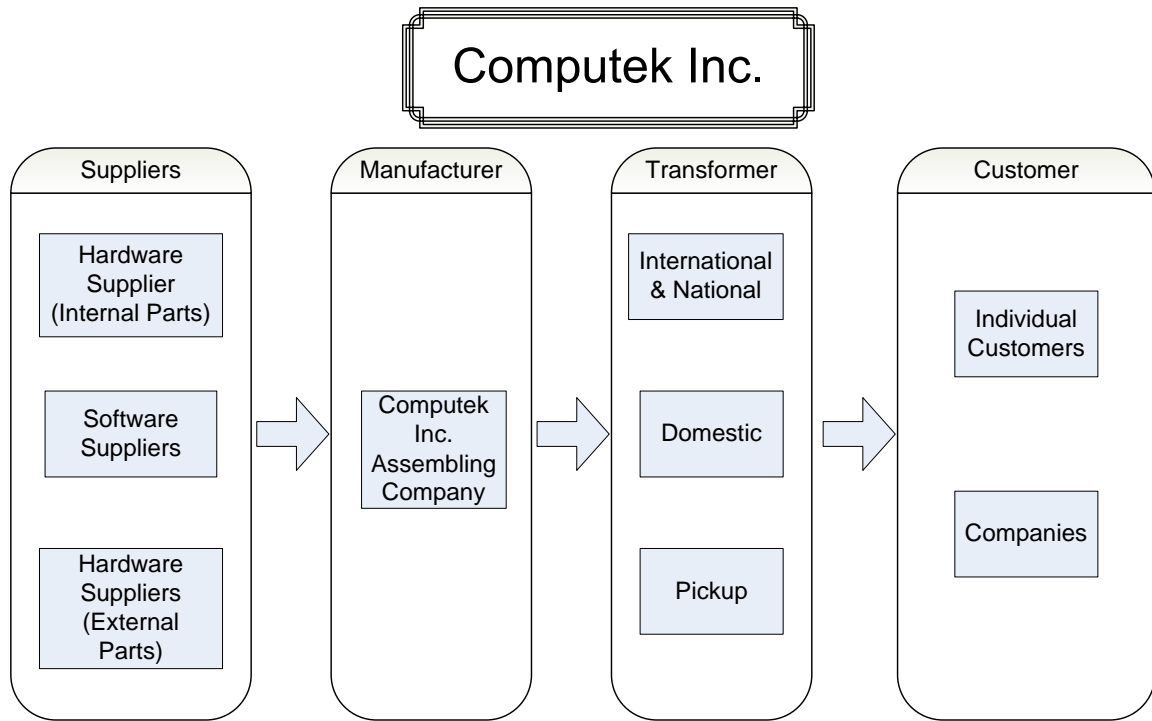


Figure 39: Supply Chain of a Computer Company

The hardware was split into internal and external. The internal hardware refers to the internal component of a computer such as hard drive, CD ROM, Floppy, memory, CPU, motherboard etc. External hardware includes all parts that are used from the outside to communicate with the CPU box such as mouse, keyboard, printer etc. Software suppliers are suppliers of operating systems and computer applications such as Microsoft. As soon as the parts are received, the assembly will begin. Ninety percent of the orders come from walk-in the store customers and local companies. The option of delivery or pick up is offered for the local customers. Shipping is offered for national and international customers through a third party shipping company such as FedEx, UPS, or DHL.

The company has three administrators in management positions to take care of the planning and scheduling part of the company four salary employees for accounting, human resources, marketing, and network support. Also the company has thirteen employees for assembly, inspection and support. The assembly is based on make-to-order or make-to-stock. The make-to-stock product has standard processes for assembly, while the make-to-order product is customized based on end user requests and goes through different processes. Computek Inc has the following suppliers for internal and external hardware and software:

- Mylab Inc.
- Computer Warehouse Distributor (CDW)
- Tiger Direct
- Tech Data
- Ingram Micro
- Max Group

These companies are not the manufacturer of the hardware parts but retailers and distributors.

To identify the different processes and activities the SCOR model will be used. The level 1 process based on SCOR is the plan, source, make, deliver and return. In level 2 these main processes are broken down into more detailed actions as shown in the following figure.

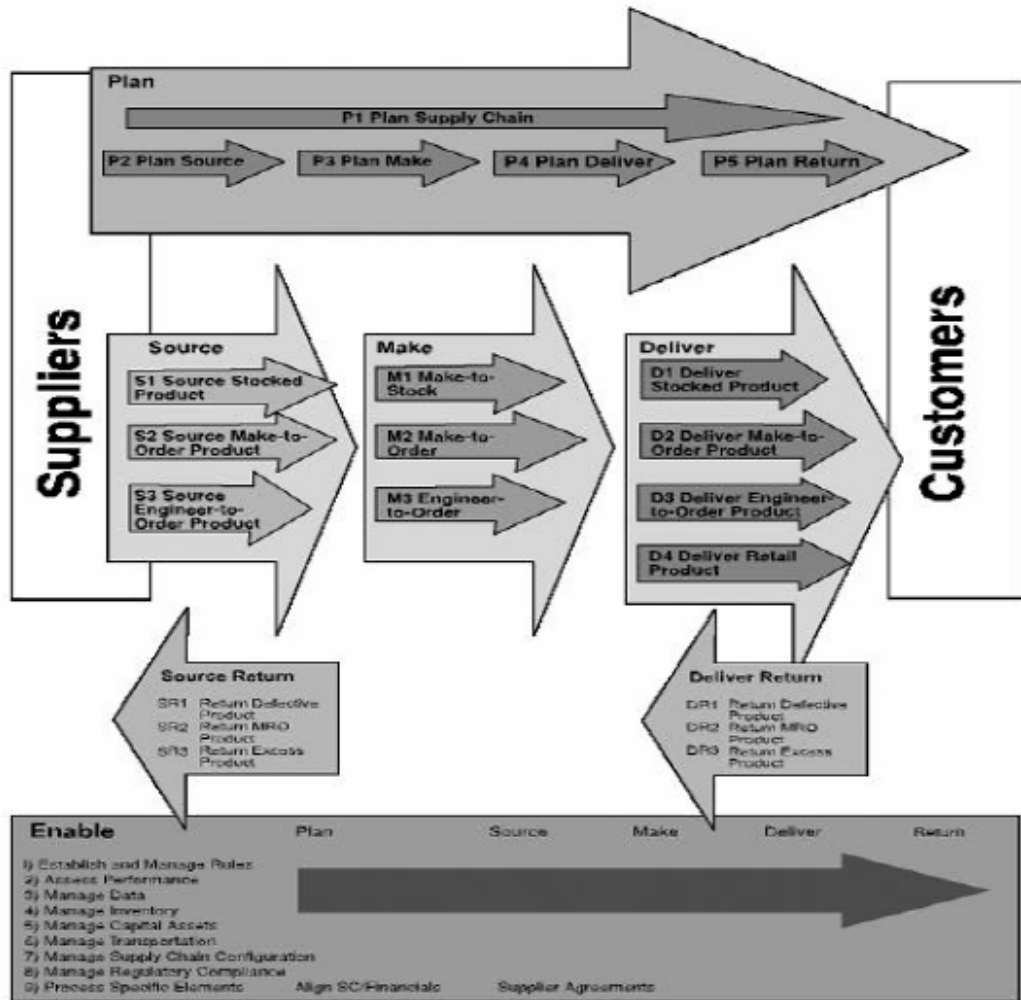


Figure 40: Level 2 Toolkit SCOR Model<sup>21</sup>

<sup>21</sup> Supply Chain Council (SCOR 6.0)

## **CHAPTER 4: IMPLEMENTATION AND CASE STUDY**

### **4.1 Ontology description and details**

As mentioned in the suggested methodology in chapter 3, the domain will be defined and all the information will be gathered. The domain of interest in this case study is a computer assembly domain. The data that was used in the computer assembly company and its partners were gathered to be used in developing the ontologies. A full understanding for the domain will be developed to assist in identifying domain concepts and their attributes. The experts will be interviewed to make sure that nothing is being left behind. It is important to understand the dimensions of the domain and the different concepts involved. Some of the common concepts involved in such a domain are as follows:

- **Supply Chain of Computer Assembly Company:** The first main concept that will represent group of firms that will collaborate to provide a customer with a product or a service. In this case a computer supply chain that will provide the customer with three different products (desktops): the Pentium 4, the Celeron, and the AMD processors. The three products have different hardware, efficiency, reliability, and capability.
- **Partners:** This concept will represent all the partners of the supply chain. Partner is an echelon in the supply chain that has a unique name, description, and contact person. Each partner has the following attributes (slots):

- Partner's name, website, phone, fax, country, address, city, state, and zip code.
- Partner's contact person, email, management processes, supply chain measures, and products.
- Partner's planning, sourcing, making, delivery, enabling, and returning resources and activities.
- Included in the attributes also are the deliver product through, get supplies from, and supply to; these attributes will help in making the links between different partners within the chain.

These attributes will be inherited by the subclasses and extracted from this main class. The following snap shot from protégé 2000 shows the partners attributes.

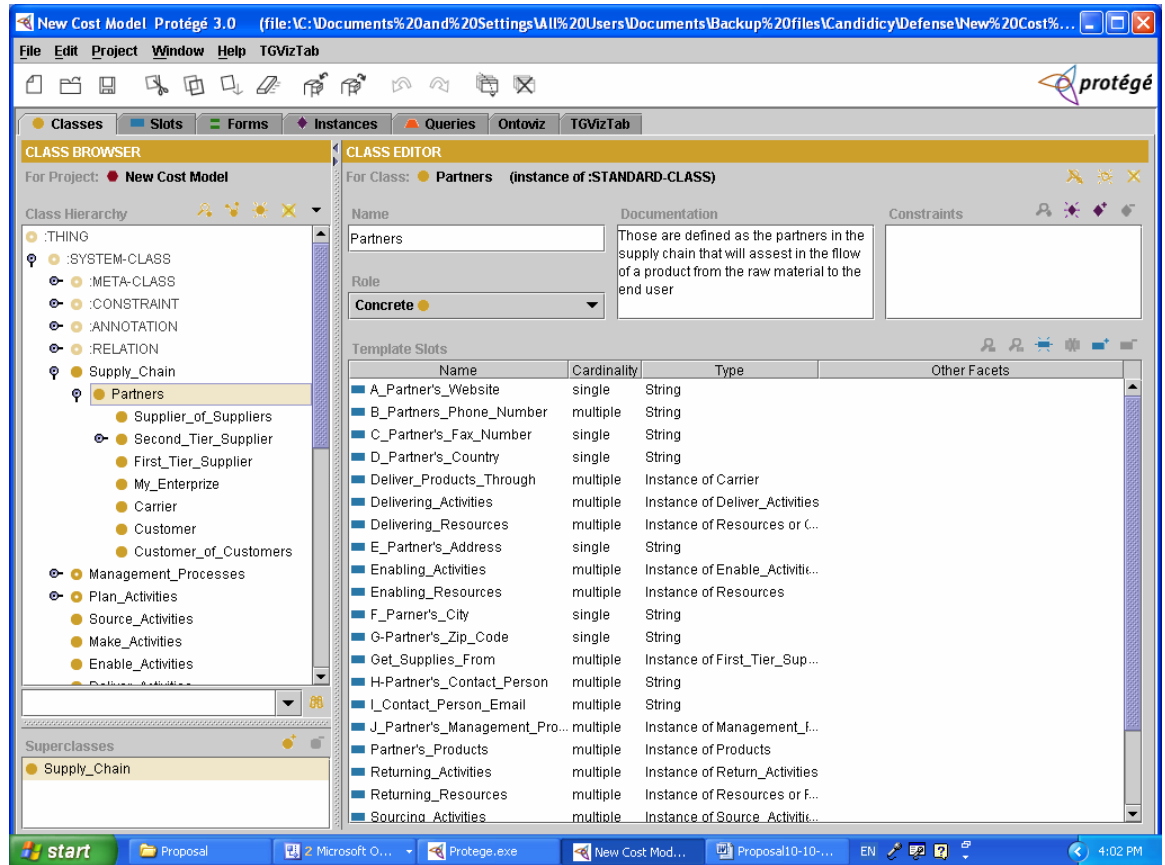


Figure 41: Snap shot of the Partner's Attributes

A supplier is an instant or subclass of the main class partner. The supplier is the source of raw material or components of a product in a supply chain. Due to the components of the computer, the supplier tier can be divided into three levels or sub tiers. First tier suppliers contain retailers only for computer parts such as Mylab Inc, Computer Warehouse Distributor (CDW), Tiger Direct, Tech Data, Ingram Micro, and Max Group. Second tier suppliers contain the manufacturers for the components of a computer such as hard drive, motherboard, CPU,

memory, and other parts manufacturers. Some of the names that might appear in that layer will be Seagate, Maxtor, Western Digital, Intel, AMD, and many other companies. The following two figures show first and second tier suppliers.

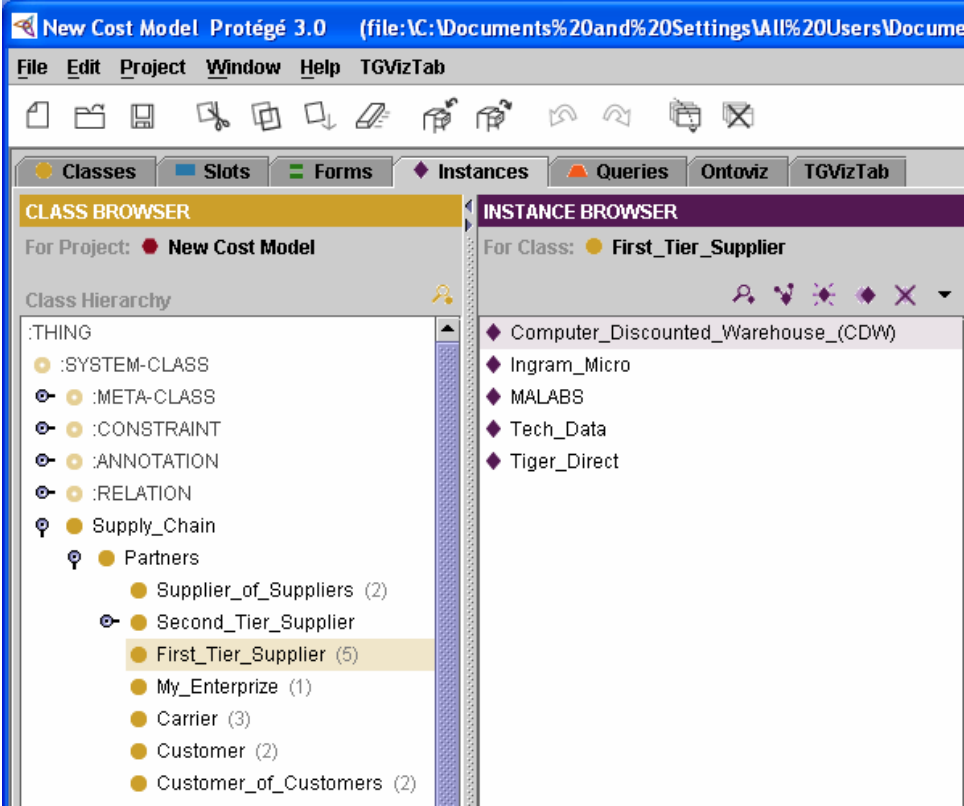


Figure 42: First Tier Suppliers



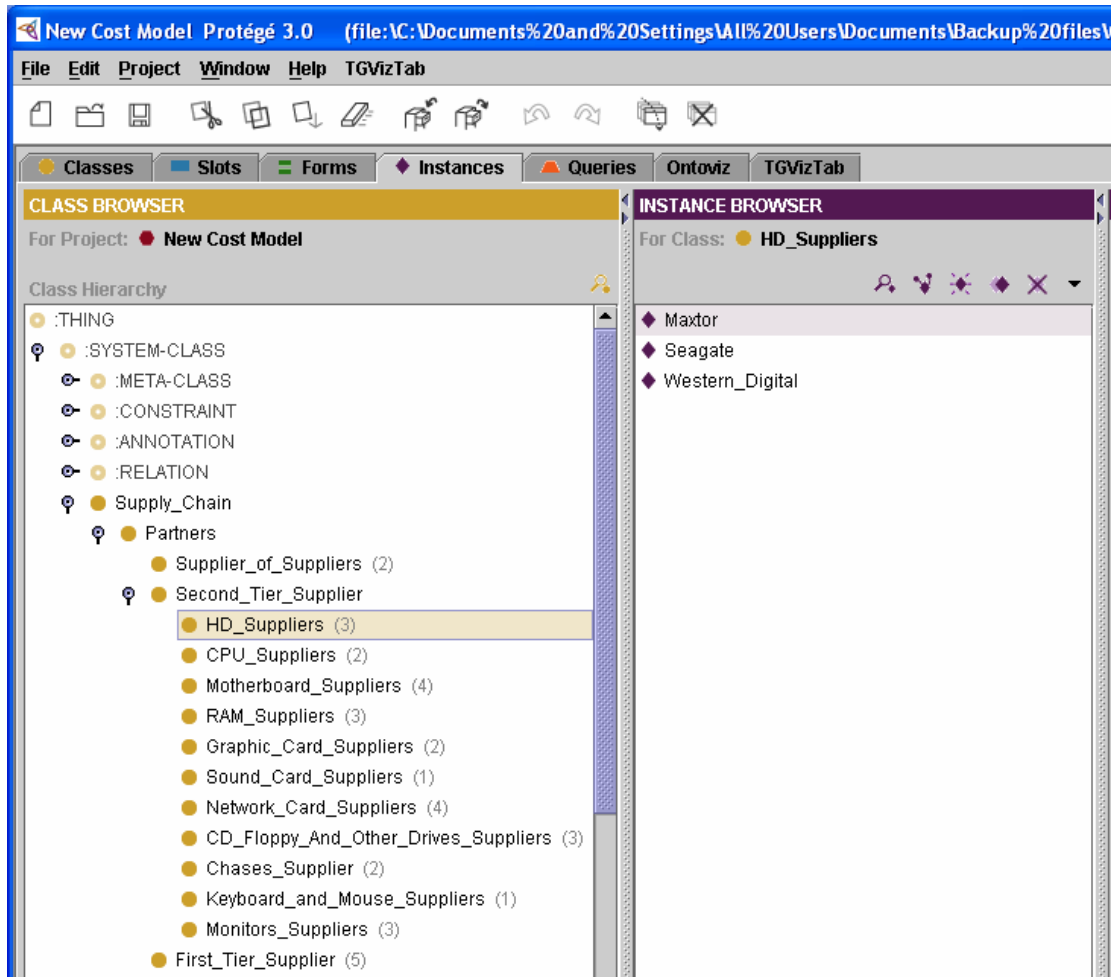


Figure 43: Second Tier Suppliers

The last tier of suppliers is supplier of suppliers, which provide the basic components for a computer such as integrated circuits, capacitors, transistors and resistance. The following figure shows the different layers of the supply chain of a computer assembly domain.

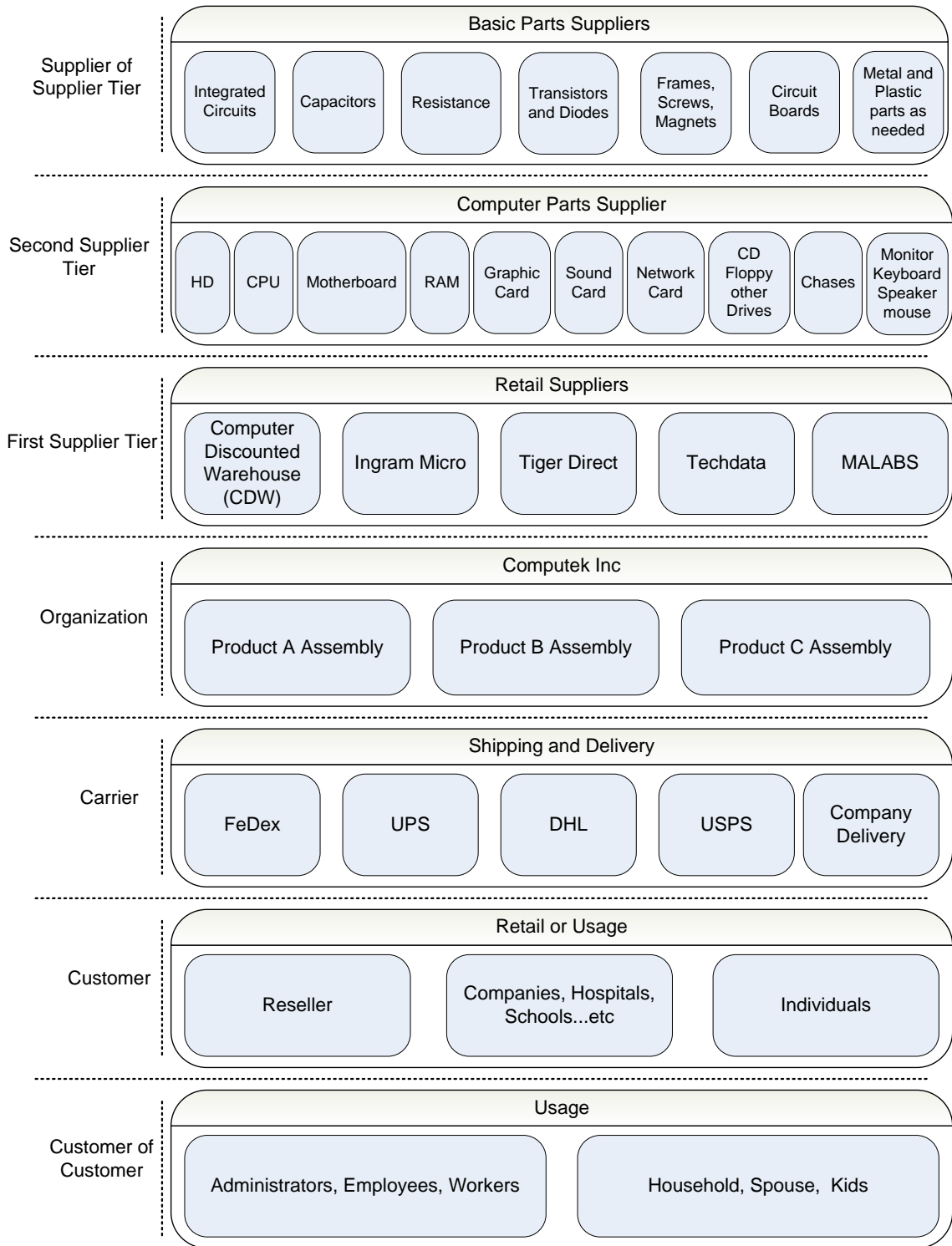


Figure 44: Computer Assembly Domain Layers

The manufacturer is another instant from the partner class and is defined as the partner that transforms raw materials into finished goods for sale. It will inherit attributes from the parent class. In this case the manufacturer is the assembly company (Computek Inc.) which will transform the computer components into a desktop that can be used by consumers. The finished product can be delivered through different channels and carriers such as FedEx, UPS, DHL, USPS, or through the company delivery van. Each of which has many option and types of delivery. They are considered the transformer that transfers items between different parts of the supply chain. Products of the supply chain are delivered to a retailer store or directly to customers. Customers are defined as a person, company, or other entity which buys goods and services produced by another person, company, or other entity.

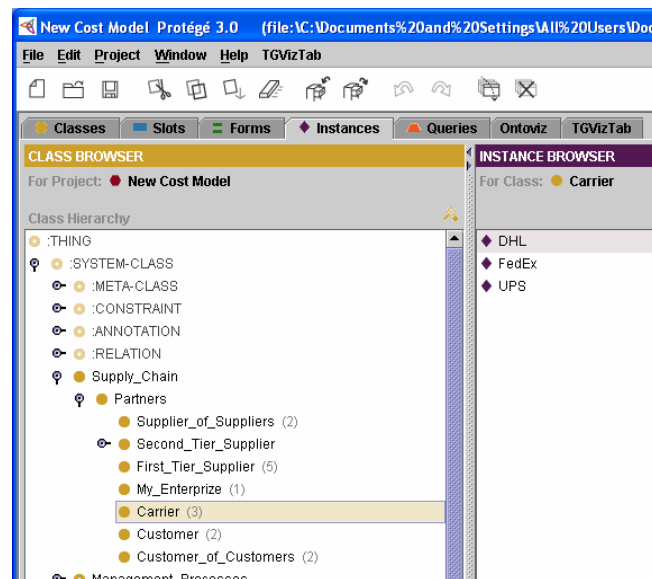


Figure 45: Snap shot of Carriers

- Management Processes: Another concept that is recognized in the supply chain. The management processes are listed in the SCOR model as plan, source, make, deliver, and return. The management processes class has name, description, performance attributes, metric, and best practices as slots that identify that class and can be inherited by subclasses. The plan process is defined as a process that aligns expected resources to meet expected demand requirements. The plan process includes five sub-processes that will help in the planning of different parts of the supply chain from the source to make, deliver, and return processes. The management processes for Computek Inc. are been explained in the following few pages with more detail.

#### ***4.1.1 Plan***

In this part of the model the company will plan to develop courses of actions specified by a certain period of time to project the proper resources used to satisfy the supply chain requirements (SCOR). The time response for the order should be competitive with perfect fulfillment and a high delivery performance. In other words, the actions should be able to identify, prioritize, and aggregate supply chain requirements then identify, assess, and aggregate supply chain resources, and lastly balance resources with requirements. These actions will be linked to other courses of action in the planning process. This includes:

- Actions for the make of the product and the different material and resources needed for the make

- Actions for sourcing to find the best supplier for the items establish communications, create data, and order the items
- Actions to schedule production which leads to the ability to identify the availability of the product and determine the time of delivery
- Actions that identify production capacity
- Actions to establish company policies and rules

Consistency and quality of the product should be taken into consideration. The received items will be thoroughly inspected. The company will plan for the needed actions for inspection and the return if necessary. The most common resources that can be identified in most chains are as follows:

**People:** This class contains three subclasses: hourly employee, salary employee, and management employee. The first subclass contains the people that work on an hourly basis. Those employees works 40 hours per week and any extra time is considered overtime. The attributes for people are shown in the following figure.

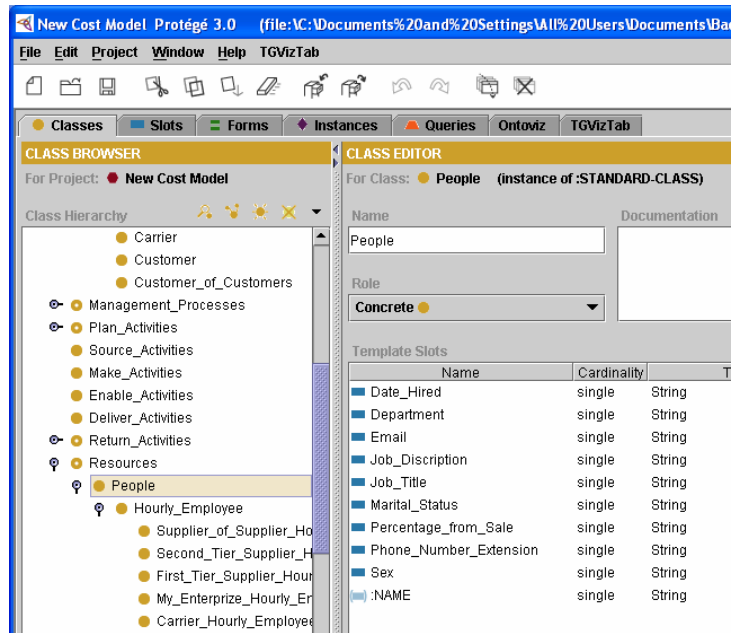


Figure 46: Snap Shot of People Attributes

Another subclass is the salary employees that have a fixed annual salary with no overtime options. The third subclass is the management employees which have an annual salary but work in the planning part of the company. Each partner in the chain has an instance or a subclass of the mentioned above employee sub classes under which they have the employees' names that belong to the category. This part of the resource class is very important since it will give the number of hourly, salary, and management employees that can accomplish an activity. The number of employees will be one of the cost drivers in such activities. The following table shows the list of hourly employees at Computek and their hourly wages as an example of the people resources in a firm.

Table 9: Computek Hourly Employees Table

<b>Resource Name</b>	<b>Job Title</b>	<b>Department</b>	<b>Hourly Wages</b>	<b>Percentage from Sales</b>
Adam	Computer Technician	Service	7.5	
Brian	Computer Technician	Service	7.5	
Chen	Computer Technician	Service	7.5	
Jason	Computer Technician	Assembly	7.5	
Jim	Computer Technician Inspector	Assembly	8.0	
Michael	Computer Technician	Assembly	7.5	
Steve	Computer Technician	Assembly	7.5	
Victor	Computer Technician Inspector	Assembly	8.0	
John	Custodian	Inventory/ Warranty	8.5	
Katherine	Sales Person	Sales	6.0	1%
Sam	Sales Person	Sales	6.0	1%
Nicole	Sales Manager	Sales	8.0	2.5%
Ronda	Clerk	Accounting	7.5	

Table 10: Computek Management Employees Table

<b>Resource Name</b>	<b>Job Title</b>	<b>Department</b>	<b>Salary</b>
Campblle	President		\$70,000.00
Fred	Director of Human Resources	Human Resource	\$55,000.00
Nabeel	Programmer/Analyst	Assembly and Service	\$50,000.00

Table 11: Computek Salary Employees Table

<b>Resource Name</b>	<b>Job Title</b>	<b>Department</b>	<b>Salary</b>
Chris	Market Analyst	Marketing	\$40,000.00
David	Network Admin	Network/Support	\$38,000.00
James	Accountant	Accounting	\$55,000.00
Ray	Assistant Director	Human Resource	\$36,000.00

**Facility:** The space needed to contain the equipment, people, and other resources to achieve the firm’s goal. It might be the company’s main office or a plant for manufacturing or even a warehouse. The attributes associated with the facility resource is its location, size, rental or mortgage amount, taxes, power consumption, water consumption, and communications bill. Computek has a space of 4000 square feet that is used for assembly, inventory, and office space. The attributes values for Computek as an example for one of the supply chain partners are listed in the table below.



Table 12: Computek Facility Attribute's Value

Attribute	Attribute Value
Location	Charlotte, NC
Size	4000 sq.ft.
Annual Power Consumption	\$4,800.00
Annual Water Consumption	\$600.00
Annual Communication Bill	\$2,400.00
Annual Rental or Mortgage	\$44,400.00
Taxes Amount	\$10,000.00
Name	Charlotte Facility

**Equipment:** All equipment used to accomplish the firm activities. The equipment can be divided into two subclasses: the stationary and the moving equipment. An example of stationary equipment is a milling or grilling machine. An example of moving machines is the fork lift or the delivery van. Attributes associated with equipment are machine setup time, machine type, machine name, number of hours if rented, hourly rate if rented, monthly payment if bought, fuel consumption, number of setups per week, and duration of scheduled maintenance. Machine setup time is very important in calculating the cost of the product that is produced using this equipment. Other attributes can be main cost drivers that drive the cost of a product through the supply chain such as number of setups and fuel consumption. The only equipment that was used in Computek is the delivery

van. The fuel amount varied based on the number of orders that were delivered per week and the distance between the company and the customer.

**Raw material:** The basic material from which something is manufactured, in this case the basic parts needed to build a desktop computer. The attributes for such a resource are the amount, the name, the supplier, the size of the material, and the weight. The amount, size, and weight in this case will determine the cost of shipping, which will affect the cost of a product also.

**Money:** The assets used to start and run the business. The attributes associated with this resource are the type, the amount, the financial institution that provided the money, and the interest rate.

**Land:** The property of land used to store firm items; in our computer assembly example no land was used.

Once the resources are identified, the management will balance resources with requirements. The management also will plan for the production to meet customer demand. Part of the planning is to identify the sources of the needed raw material then select the final supplier and negotiate. This process is the second management process and is called sourcing.

#### **4.1.2 Source Activities**

Sourcing includes all processes that procure goods and services to meet planned or actual demand (SCOR). In this management process the following activities could be identified:

**Supplier and logistics selection:** In this activity the purchasing person will define, from the different quotes, the best supplier for each item needed in product assembly. The items will be assigned to be ordered from suppliers. The logistics selection will be based on how fast the item is needed for the assembly line. One person is needed for this activity and the number of purchase orders will be the cost driver.

**Item Receiving:** The item will be received and entered into the company's data. One person is needed for this activity and the number of receivings will be the cost driver for this activity.

**Inspection:** The item will be inspected and tested to make sure that it is not defected and that it matches the item ordered. One person will verify the items upon reception, and the time needed to perform one inspection will be the cost driver.

**Transfer item:** The items will be given a number and inventoried to be available for the assembly. One person will be responsible for transferring the received items.

**Authorize supplier payment:** The accounting manager will authorize the supplier payment based on the terms and conditions with that supplier. The clerk will process the paper work and complete the payment.

The same activities apply for both stocked and make-to-order products. The company does not have engineer-to-order, which was dropped from the activity analyses that have been done in this research. Still, the manager has to manage and supervise the activities within the source process (Enable Source). The following figure shows a snapshot of the source activities created by the ontologies.

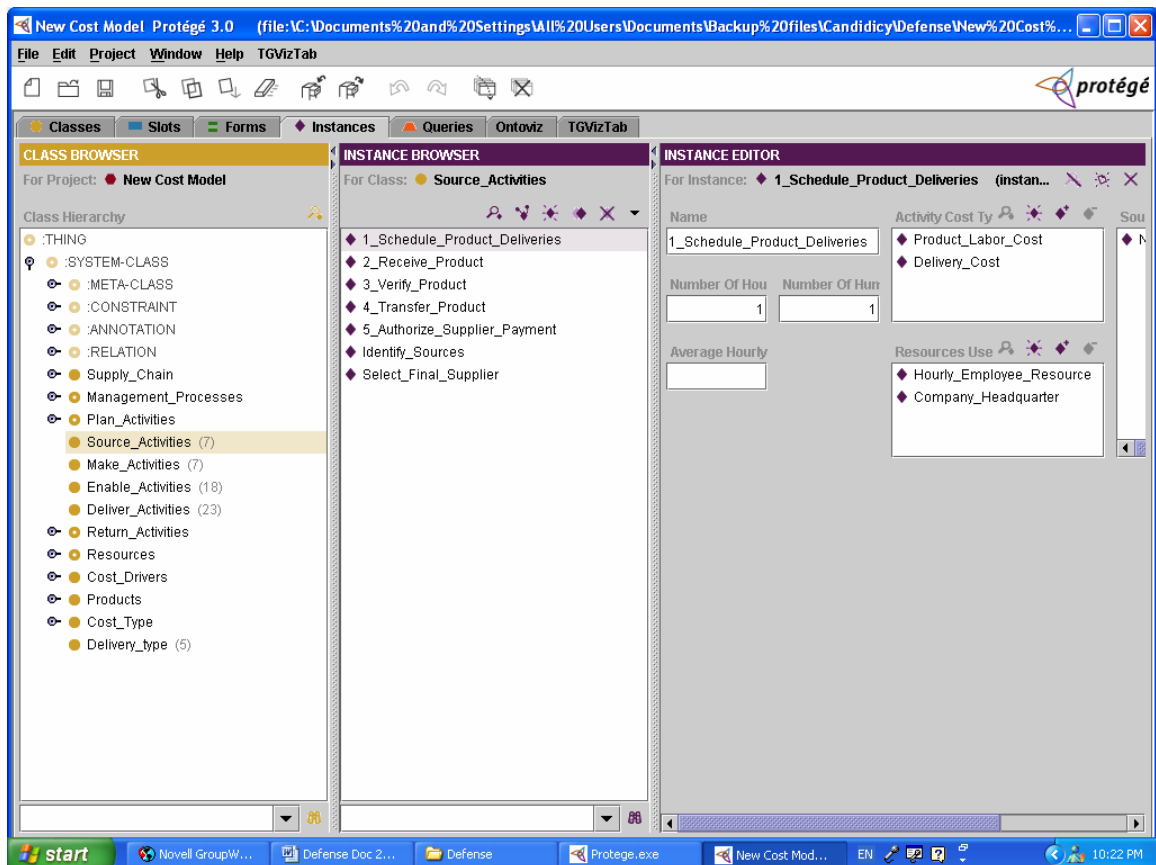


Figure 47: Snap Shot of the Source Activities

### ***4.1.3 Make Activities***

The make process is divided into make-to-stock and make-to-order activities (SCOR). Although the main activities in both are the same, the lengths of some activities are not the same due to the customization option which will make the duration different. In this process a value will be added for the products by assembling all the parts to work together as one machine which will be shipped or delivered from the shelf to the customer.

In the make the following activities could be identified:

**Schedule production activities:** The assembly manager will specify the quantities and plan for product availability based on the number of orders received. The production time depends on the customer demand for custom made products, in this case different computer specs like adding certain hardware or software in the assembly process. The process includes scheduling for operations to be performed to accomplish these plans. The scheduling is based on the sequence of operations needed in the assembly process and the layout of the facility. Intermediate production activities are coordinated prior to the scheduling of the operations to be performed in product assembly.

**Issue material:** Once the order is received raw material will be released from the stock room to the production floor. The flow of components from the stock room will be edited in the database to keep track of quantities available for future orders. The low

number of an item or the non existence of an item will trigger a flag to adjust inventory. That will send the process back to sourcing activities; otherwise, the assembly process will start.

**Produce and test:** The produce process is the series of activities of converting components to a finished product with greater value, in this case a desktop computer including a running operating system. The test process is the series of activities involved in the validation of the product performance to ensure that it meets the specification and requirements of standard systems. This falls under inspection category which will be measured by either the duration of the inspection for a produced item multiplied by the number of items being produced or by the number of inspections made multiplied by the cost of a single inspection. The finished products will be Celeron, Pentium, and AMD desktop computers. The information of the finished products such as the dimension and the weight will be added to the data base and will be used later to calculate delivery cost.

**Packaging:** The process of putting the finished products in containers for storage or delivery to end-users. The company will generated a serial number to keep track of the hardware/software installed on each system and its warranty.

**Stage finished goods:** The process of moving the finished products to a holding location and waiting for the movement to a finished goods location. Since the company is a small

business, this process was eliminated. The finished product will stay in the same site until delivery or sale.

**Release finished products:** The process of choosing a delivery carrier and delivery type and releasing the product to the customer. This process will be linked to the generated information for the new product, such as the weight and the size, then delivery information will be gathered and the cost of the shipping will be added. The following figure shows a snap shot of the activities associated with a make process as has been created with ontologies.

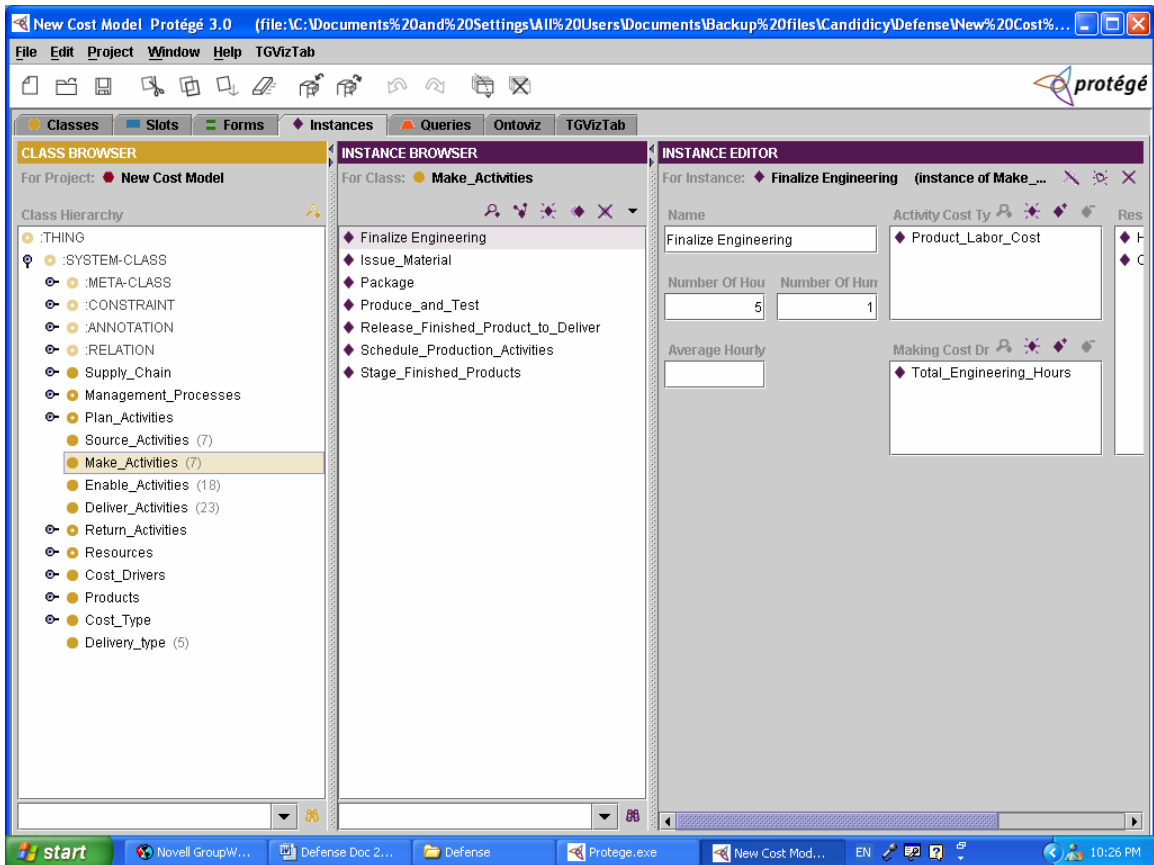


Figure 48: Snap Shot of the Make Activities

#### ***4.1.4 Deliver Activities***

The deliver process is defined as all processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management (SCOR). Deliver as a main class is divided into four subclasses or instances:

- Deliver Stocked Products: The process of delivering a product that is maintained in a finished goods state prior to the receipt of a firm customer order (SCOR).
- Deliver Make-to-Order Products
- Deliver Engineer-to-Order Products
- Deliver Retail Products

None of the partners in the computer assembly supply chain use the deliver engineer-to-order subclass. The first two are the most commonly used subclasses, while the deliver retail product is occasionally used in cases such as printer delivery.



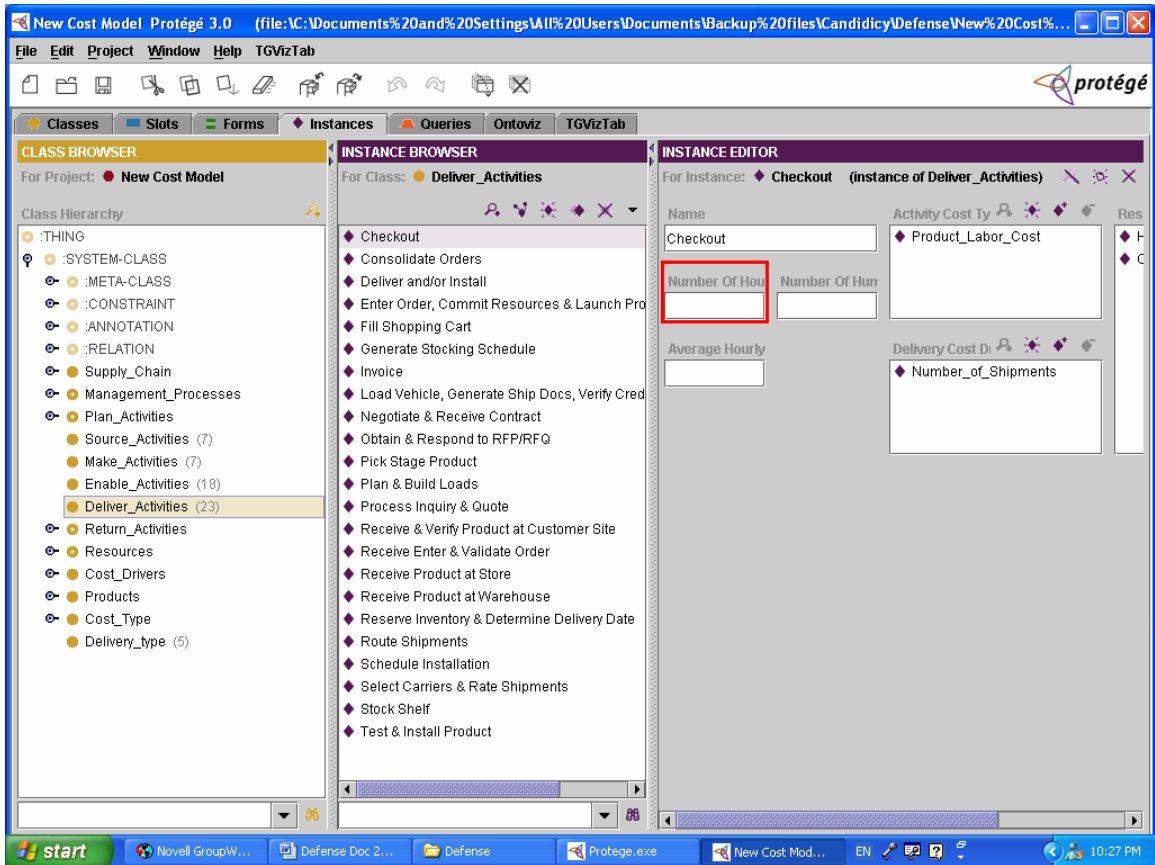


Figure 49: Snap Shot of Deliver Activities

#### 4.1.4.1 Deliver Make-to-Order Products

**Process Inquiry & Quote:** This activity includes receiving and responding to general customer inquiries and quotes. The computer specs will be developed in this process and a final quote will be sent to the customer to decide. The customer will review and submit the order to move to the next activity.

**Receive, Enter, and Validate Order:** The process of receiving the order from the customer then entering the order into the company processing system. The customer has the choice to submit his order through phone, fax, or internet. Once the confirmation receives the parts for building, the product will be reserved and delivery time will be determined.

**Reserve Inventory and Determine Delivery Date:** In this process inventory is identified and reserved for specific orders and the delivery date is committed and scheduled. This process links to the make process and the material will be issued for production.

**Select Carriers and Rate Shipments:** Specific carriers are selected to deliver the stage products for there destination. The choice will be based on either lowest price or customer preference. Shipments will then be rated and tendered.

**Pick and Load Vehicle and Generate Documents:** The carrier will pickup the product, load it into the vehicle, and generate the documents of shipment including tracking number, source, and destination.

**Receive and Verify Product at Customer Site:** One of the activities included in the deliver process is the reception and verification of the product at customer site. If the

product is ok and meets customer specifications then it will be installed or used; otherwise it will be returned to the source. At this part it will link to the deliver or source return activities to process the return authorization. If the product meets the specification, an invoice will be sent to the customer.

#### **4.1.4.2 Deliver Stocked Products**

In this chain the option of deliver stocked products is not frequently done, and if there were some stocked product it would go through the same processes as make-to-order products. Also there will be no deliverly of engineer-to-order products.

#### **4.1.4.3 Deliver Retail Products**

Deliver retail products includes the activities to acquire a product and sell at the retail store. Before the retail store had to be a physical location that sells the actual product or provide the service. With the revolution of modern technology, the retail store doesn't have to be physical but can be online where the company can pick the products, add to cart, choose shipment, and checkout. Even the collection of payment can be online with a secure server that can process the payment through financial institutions. Once the payment had been processed, the retailer can provide the invoice on the spot with the online capabilities.

The activities included in the deliver retail products will be as follows:

- Generate stocking schedule
- Receive product at the store
- Pick product from pack room
- Stock shelf: In the new technology this activity and the activity before can be replaced with loading received products to the website database.
- Fill shopping cart: This can be done through the Internet.
- Checkout
- Deliver and install

#### ***4.1.5 Return Activities***

If any item or product fails inspection, it will be called a defective product and will be returned to the source for replacement or credit. The return process is divided into deliver return for authorization and source return for replacement and credit. The activities of the process are as follows:

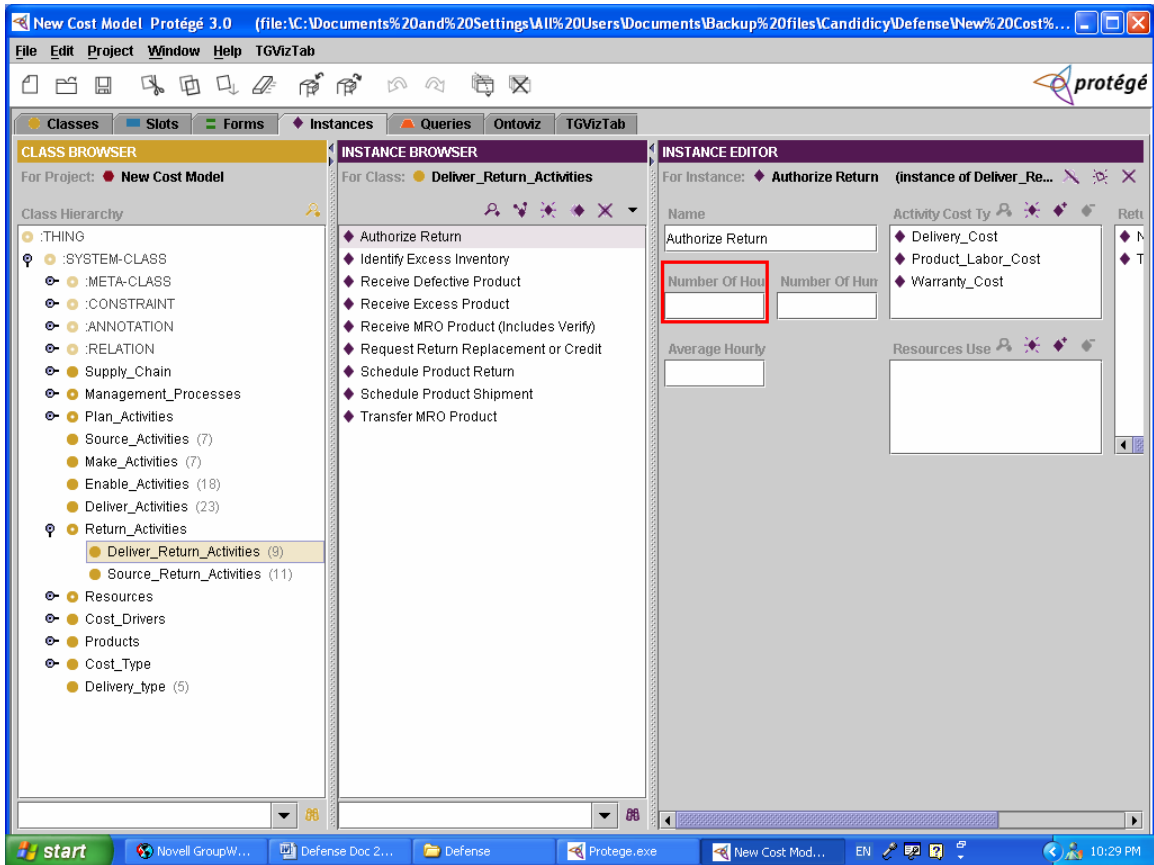


Figure 50: Snap Shot of Return Activities

**Deliver Return:** In this process the customer, an end user or a firm, will call to get return authorization and will request replacement or credit. The process has constraints and limitation based on the product warranty or recall which will include the appropriate replacement. The warranty will be validated, approved, and recorded. The activities within this process are as follows:

- Request return replacement: The process and actions required to determine return replacement or credit.
- Schedule defective product return: The process of scheduling the return and the delivers based on the warranty claim.

- Receive defective product: After scheduling the return and the delivery of the defective product, it will be shipped back to the source. The source will receive the defective product and match it with the records that have been created in the authorization process.

**Source Return:** The source will receive the product and start the activities of testing and verifying the product is defective, and a replacement or credit should be issued. The activities involved in this process are listed as follows:

- Verify defective product: The defective product will be tested to verify the cause of deflection and the actions needed to be taken based on that.
- Disposition of defective product: The rework process to bring the defective product back to operational and specifications.
- Authorize replacement or credit: Actions will be taken to authorize the replacement or credit to customer.

The activities for the chain are shown in the following figure.

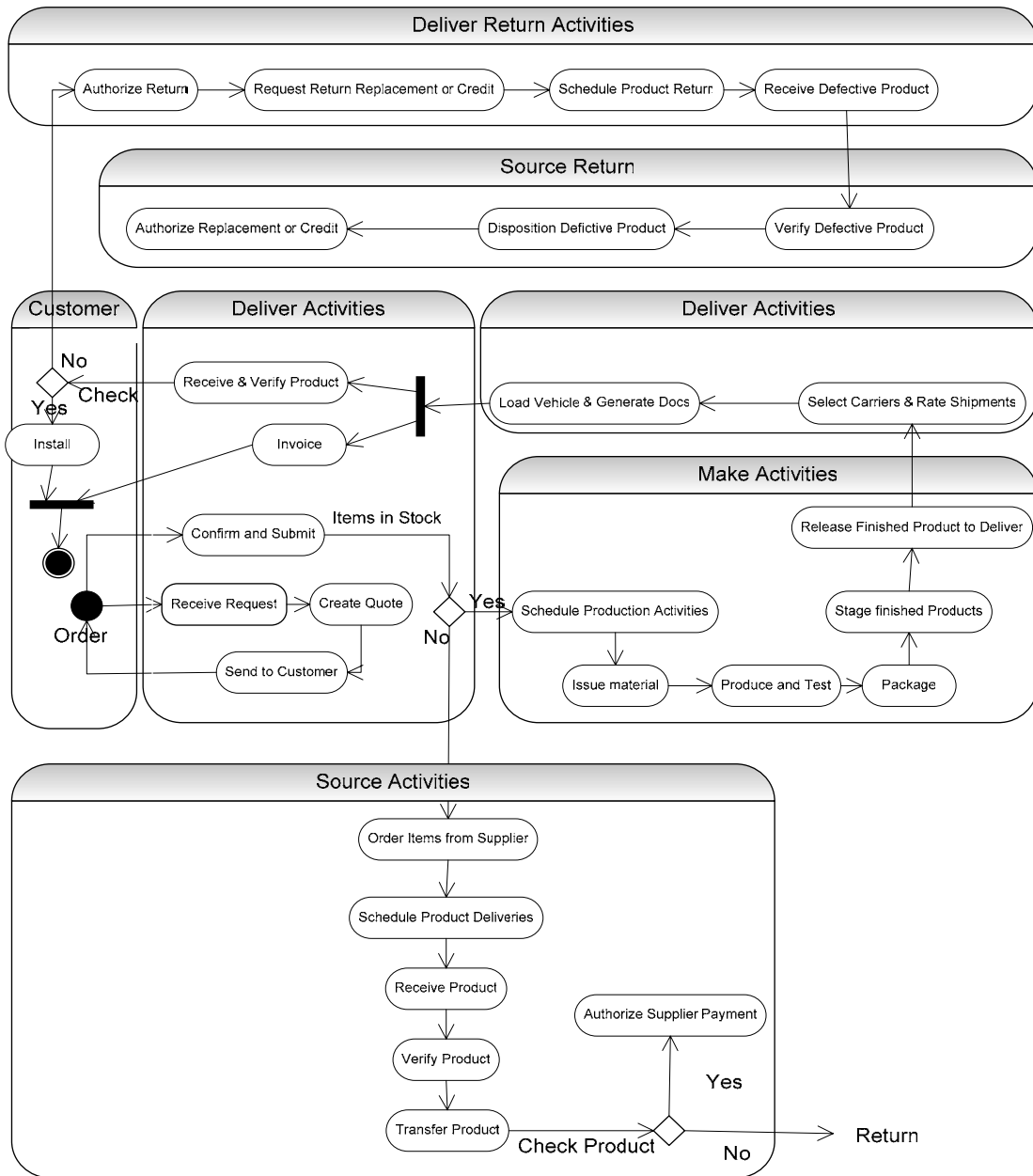


Figure 51: Activity Diagram for Assembly and Production

The activity diagram above shows how the customer will request a quote, verify the specs and confirm the order. The source will receive the order and check on the availability of

the parts. If the parts are not available an order will be created to get these items from suppliers. If available the parts will be reserved for this order and delivery date will be determined. The production activities will be scheduled to meet the delivery date and the material will be issued for assembly. The product will be produced and tested, packaged and staged waiting to be released for delivery. The carrier and the rate of shipment will be selected and the documents will be created. The product will be delivered to the customer where it will be verified and tested. If it passes the inspection, it will be used; otherwise, it will be returned to the source based on the written agreement between the two parties. In this situation, an authorization for replacement or credit will be generated and the return will be scheduled. If there was no return and the product passed the inspection, an invoice would be issued to collect the payment. The following sequence diagram shows the main functions through the order process.



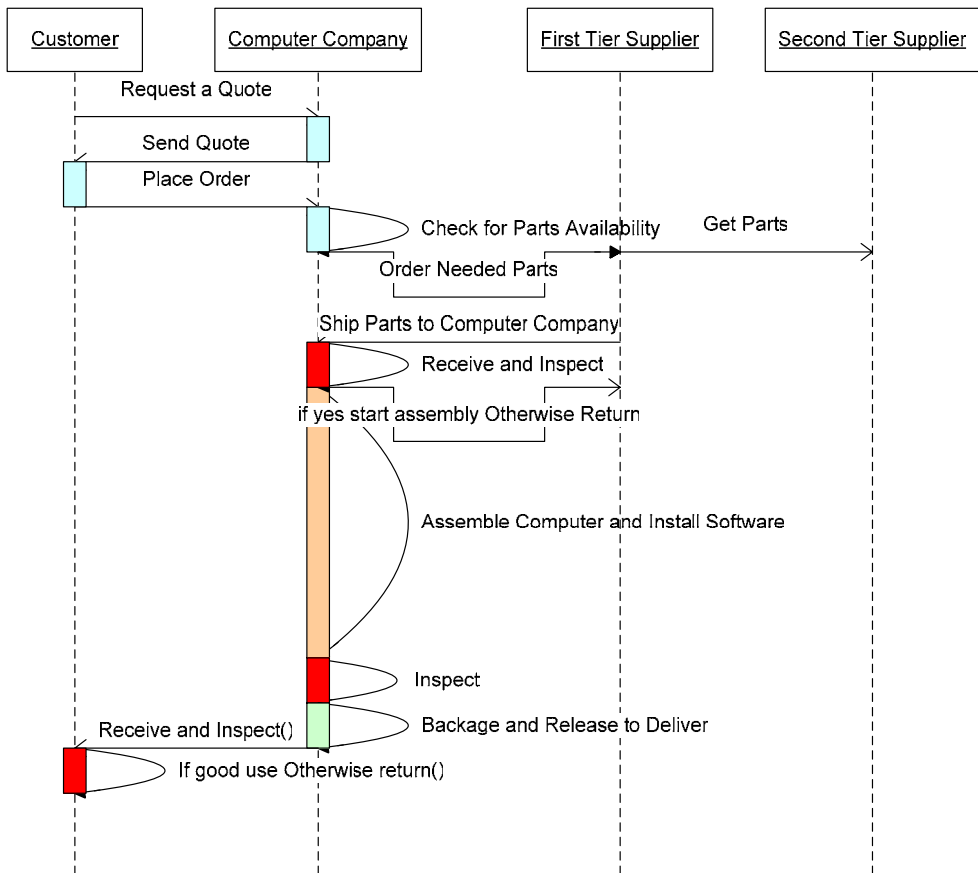


Figure 52: Sequence Diagram for Ordering a Product through the Chain

**4.2 ABC Implementation**

Activity Based Costing (ABC) can be defined by the following equation:

$$C/A = H(Ahr) + M + E + S \text{ ----- (1)}$$

Where C/A = Estimated cost per activity

H = Number of labor hours required to perform the activity one time

Ahr = Wages per labor hour

M = Material costs required to perform the activity one time

E = Equipment costs to perform the activity one time

S = Subcontracting costs to perform the activity one time

The number of labor hours required to perform the activity one time is considered a duration cost driver, which can be replaced by a frequency driver if needed. The labor cost can be calculated by multiplying the number of labor hours by the wages. If there is any material, equipment or subcontracting cost, it will be added to the labor cost to get the estimated cost per activity. The total cost for performing the activity will be based on the number of times the activity is performed during a specific time frame. The cost drivers were mapped using ontologies within Protégé 2000, each to the related activity as shown in the following figures.

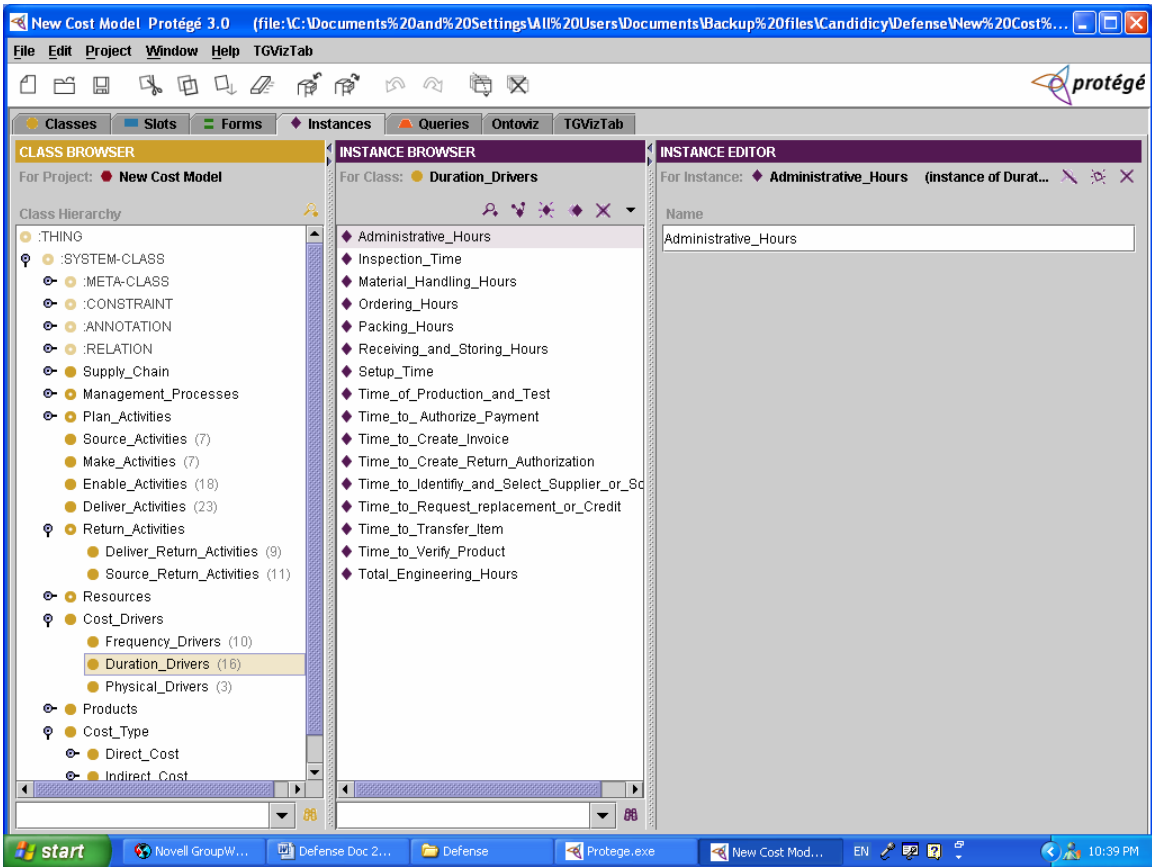


Figure 53: Duration Drivers Ontologies

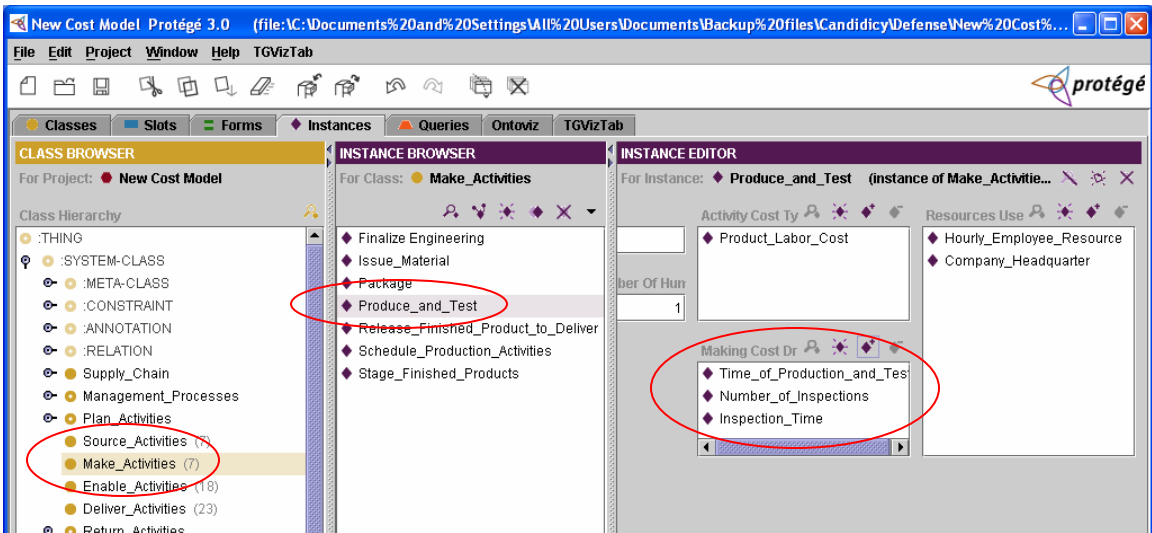


Figure 54: Mapping Cost Drivers to Activities

The frequency drivers are the number of times an activity is being performed. Duration drivers measure the time consumed performing the activity, and physical drivers measure product quantities. The following table shows the list of drivers that have been created based on the computer assembly company database.

Table 13: Frequency Drivers

<b>Frequency Drivers</b>
Number of orders
Number of inspections
Number of receiving
Number of returns
Number of scheduled deliveries
Number of machine setups
Number of shipments
Number of time material being handled

Table 14: Duration Drivers

<b>Duration Drivers</b>
Administrative hours
Inspection time
Material handling hours
Ordering hours
Receiving and storing hours
Setup time
Production and test hours
Time to authorize a payment
Time to create an invoice
Time to create return authorization
Time to identify and select supplier or source
Time to request Replacement or credit
Time to transfer an item
Time to verify a product
Total engineering hours

Table 15: Physical Drivers

<b>Physical Drivers</b>
Number of cubic feet
Number of pounds received
Number of pounds shipped

Identifying the cost drivers and mapping them to activities is very important in finding the cost per activity if using an ABC costing model. First the number of workers needed to accomplish the activity is identified. Then the average wages for workers will be calculated by equation number 1:

$$\text{AverageHourlyRate} = \frac{\sum \text{wages/hour for all workers involved in an activity}}{\sum \text{number of workers needed to accomplish this activity}} \quad (2)$$

The total cost per activity will be calculated by equation number 2:

$$\sum \text{cost / activity} = \text{Average Hourly Rate} * \text{Hours needed to accomplish the activity} + \text{Material Cost} + \text{Equipment Cost} + \text{Subcontracting Cost} \quad (3)$$

The previous cost parameters are involved directly in the production or the assembly process, and that is what is called direct cost. Direct cost is defined as cost that can be directly related to a product, process, and/or activity. A sample of the tables that have been created in Excel to calculate the direct cost to perform the activity one time is shown in the table below.

Table 16: Sample of Direct Labor

<b>Activities</b>		<b>Products</b>	
<b>Deliver Activities</b>		AMD	Celeron
<b>Receive Request for a Quote, Create and send Quote</b>	Number of Labor Hours Required to Perform the Activity one Time	0.3	0.4
	Average Wages Per Labor Hour	6.0	6.0
	<b>Total Cost Per Activity T1</b>	<b>\$1.8</b>	<b>\$2.4</b>
<b>Place Order to Production</b>	Number of Labor Hours Required to Perform the Activity one Time	0.2	0.3
	Average Wages Per Labor Hour	6.0	6.0
	<b>Total Cost Per Activity T2</b>	<b>\$1.2</b>	<b>\$1.8</b>
<b>Select Carrier and Shipment Type</b>	Number of Labor Hours Required to Perform the Activity one Time	0.2	0.3
	Average Wages Per Labor Hour	6.0	6.0
	<b>Total Cost Per Activity T3</b>	<b>\$1.2</b>	<b>\$1.8</b>
<b>Load Vehicle &amp; Generate Data</b>	Number of Labor Hours Required to Perform the Activity one Time	0.3	0.3
	Average Wages Per Labor Hour	6.0	6.0
	<b>Total Cost Per Activity T4</b>	<b>\$1.8</b>	<b>\$1.8</b>
<b>Deliver Product if Local</b>	Number of Labor Hours Required to Perform the Activity one Time	0.3	0.3
	Average Wages Per Labor Hour	7.0	7.0
	<b>Total Cost Per Activity T5</b>	<b>\$2.1</b>	<b>\$2.1</b>
<b>Invoice</b>	Number of Labor Hours Required to Perform the Activity one Time	0.2	0.2
	Average Wages Per Labor Hour	6.0	6.0
	<b>Total Cost Per Activity T6</b>	<b>\$1.2</b>	<b>\$1.2</b>

The administrative cost, the rent, the utilities, and other expense are considered indirect costs or overhead. The following table shows the overhead for the partners in this supply chain.

Table 17: Overhead Cost for Computek

<b>Labor Overhead</b>		<b>General Overhead</b>	
Employees Salary	\$ 274,000	Mortgage/ Rent	\$44,400
Employer's Contribution for FICA (social Security)	\$23,016	Utilities (Heat, AC, Water...etc.)	
Health Insurance	\$ 38,415	Office Supplies, Postage	\$1,500
Worker's Compensation	\$ 38,749	Insurance	\$ 10,800
Vacation Pay	\$54,479	Association Dues	\$900
Holiday Pay	\$11,814	Fed and State Taxes	\$ 33,000
Sick Pay	\$13,619	Owners Salary	\$ 70,000
Unlisted Expenses		Travel Expense	\$5,000
		Maintenance and Repairs	\$2,500
		Gas, Oil, Wash, Tag	\$3,800
		Advertising	\$10,000
		Donations	\$1,500
		Unlisted Expenses	
<b>Total Overhead Per Year</b>	\$637,492		
<b>Total Calculated working Hours</b>	25480		
<b>Total Labor Overhead Per Hour</b>	\$25.02		

From the above table total overhead per hour will be calculated to be added later on to each activity based on the number of labor hours the activity consumes. The equation to calculate the overhead is as follows:

$$\text{Total Overhead} = \sum \text{Labor Overhead} + \sum \text{General Overhead} + \sum \text{Material Overhead} \quad (4)$$



$$\text{Total Working hours} = \text{Total \# of workers} * 40 \text{ hours/week} * 49 \text{ weeks}^{22} \text{ ----- (5)}$$

Total overhead per hour is calculated by taking the total from equation (3) and dividing it by the total calculated working hours for the company during the whole year calculated in equation (4).

$$\text{Estimated Overhead per Hour} = \text{Total Overhead} / \text{Total Working Hours} \text{ ----- (6)}$$

$$\text{Estimated Overhead per Activity} = \text{Estimated Overhead per Hour} * \text{Number of Hours Required to Perform the Activity one Time} \text{ ----- (7)}$$

The calculated overhead per activity will be added to the direct labor and direct material to produce the estimated total cost per activity. Adding all the cost for the activities the product is involved in, we can estimate the unit cost of that product.

Table 18: Estimated Total Cost per Unit

<b>Product Type or Name</b>	<b>AMD</b>	<b>Celeron</b>
<b>Total Direct Labor Cost per unit</b>	\$54.75	\$42.75
<b>Total Direct Material Cost per unit</b>	\$424.00	\$296.00
<b>Total Overhead per activity per unit</b>	111.9937	88.19505
<b>Total Estimated Cost Per Unit</b>	\$590.74	\$426.95

---

<sup>22</sup> The annual working weeks are 52 taking two weeks vacation and 5 days of holiday 49 weeks will be left

### 4.3 Integration

The supply chain domain information was developed within the built ontologies which included all the partners. The partner's ontologies identify the management processes, the activities, the resources, and the drivers for each partner. Computek information can be found as an instance in the domain ontologies that has certain attributes. The figure below shows some of the information as described by the company.

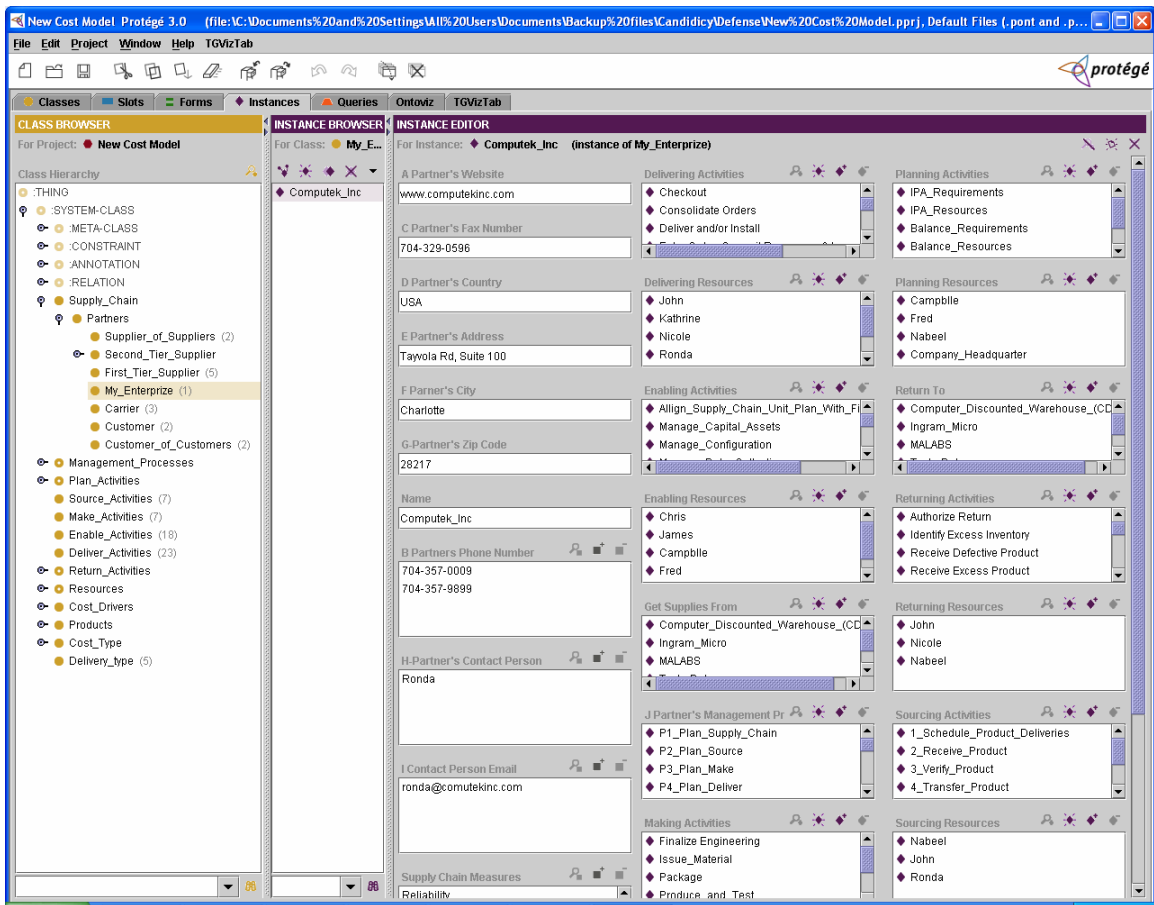


Figure 55: Computek Ontologies

The number of hours required to perform an activity, average labor wages, and other information needed to calculate the estimated cost per activity can be found within the ontologies. The Excel sheet with the Activity Based Costing model can be linked to the domain ontologies to automate the process of information sharing between the two applications. The information sharing can be available through LAN, MAN, or WAN networks. The estimated cost can be displayed for the partners within the chain. The dynamic changes that might happen can be tracked, and the link will reflect the change to the cost, which will make it more possible to track the cost through the supply chain.

To link the ontologies with Excel, a Visual Basic code was developed, which can read from an XML file created by the ontologies. A search for the tags and the attributes will lead to the required values and place it in the Excel sheet cells. The Excel sheet will include embedded calculation with all the previous equation for cost estimation. Most likely the users for such model will be computer illiterate or have limited computer literacy. To make it easier for the users, a friendly graphical user interface was developed. The interface is shown in the following two figures.

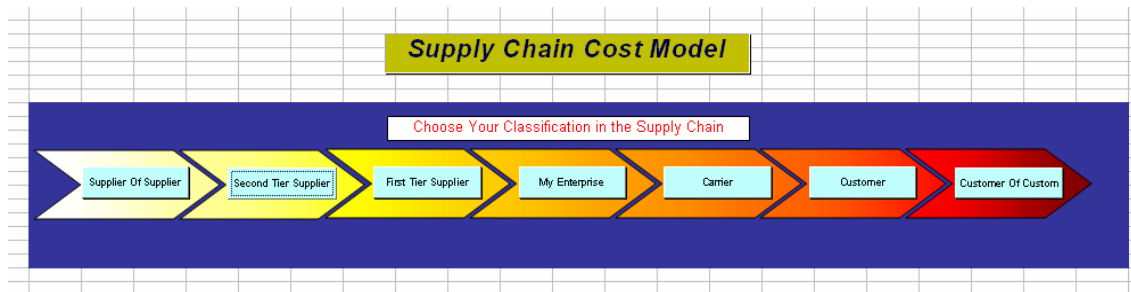


Figure 56: Supply Chain Cost Model Startup Page

The screenshot shows a software interface for data entry. At the top, there's a dropdown menu to 'Choose your organization from the list'. The 'Overhead Cost' section is split into two columns: 'Labor Overhead' (Total Employee Salary, Total FICA, Health Insurance, Compensation, Vacation Pay, Holiday Pay, Sick Pay, Unlisted Expenses) and 'General Overhead' (Mortgage/Rent, Utilities, Office Supplies, Insurance, Association Dues, Fed & state Tax, Owners Salary, Travel Expense, Maintenance/Repair, GAS, Oil, Wash, Tag, Advertising, Donations, Unlisted Expenses). Below this is a section to 'Enter Total Calculated Working Hours' with an input field and an 'Add to Data Base' button. The 'Direct Labor' section starts with a 'Product Name' field. It has three main activity groups: 'Deliver Activities' (Recieve Quote, Place Order, Select Carrier & Shipping Type, Load Vehicle & Generate Data, Deliver Product, Invoice), 'Source Activities' (Order from Supplier, Schedule Deliveries, Receive Product, Verify Product, Transfer Product, Authorize Supplier Payment), and 'Make Activities' (Schedule Production Activities, Issue Material, Produce and Test, Package, Stage Finished Products, Release Finished Product). There are also 'Deliver Return Activities' (Authorize Return, Request Return Replacement or Credit, Schedule Return, Receive Defective) and 'Source Return Activities' (Verify Defective, Disposition Defective, Authorize Replacement or Credit). Each activity has input fields for 'Labor Hours/Activity' and 'Average Wages'. An 'Add To Data Base' button is at the bottom of this section. The 'Direct Material' section at the bottom has a table with two rows: 'Material Name' and 'Material Cost', each with 10 columns for data entry.

Figure 57: Cost Model Data Form

The user can choose the organization from the list and that will pull all the information from the ontologies. Also, there is an option to enter the data manually if needed. The following is a sample from the Visual Basic code.

```

Private Sub cbxMyFirm_Change()
Sheets.Add
Application.ActiveSheet.Name = cbxMyFirm.Text
Application.Sheets("Cost Template").Select
Cells.Select
Selection.Copy
Sheets(cbxMyFirm.Text).Select
Range("A1").Select
ActiveSheet.Paste
Range("D4:I4").Select
  With Selection
    .HorizontalAlignment = xlCenter
    .VerticalAlignment = xlBottom
    .WrapText = False
    .Orientation = 0
    .AddIndent = False
    .IndentLevel = 0
    .ShrinkToFit = False
    .ReadingOrder = xlContext
    .MergeCells = False
  End With
Selection.Merge
  With Selection.Font
    .Name = "Arial"
    .Size = 24
    .Strikethrough = False
    .Superscript = False
    .Subscript = False
    .OutlineFont = False
    .Shadow = False
    .Underline = xlUnderlineStyleNone
    .ColorIndex = xlAutomatic
  End With
Range("d4") = cbxMyFirm.Text
Selection.Font.Bold = True
Selection.Font.ColorIndex = 5
Range("D4:I4").Select
  With Selection.Interior
    .ColorIndex = 45
    .Pattern = xlSolid
  End With
End Sub

```

The values will be inputted in the Excel sheet shown below to calculate the cost and display it back again on the same form. The calculation will happen in the background and there is no need for the user to enter the data in Excel.

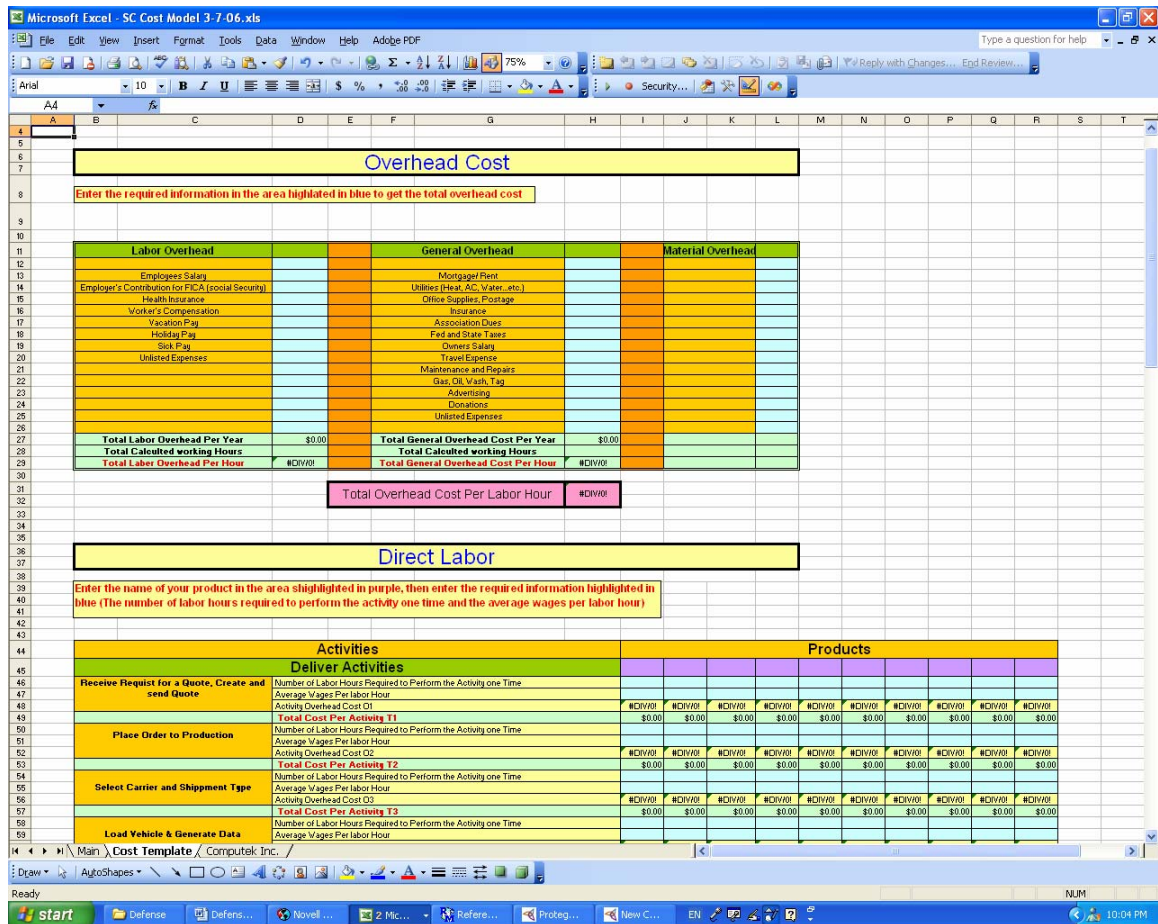


Figure 58: The Cost Model Excel Sheet

The information system that was developed from the framework will help as a decision support system for decision making and analysis.

The process of integration could be automated where the Excel sheet can read directly from the XML schema which will be shared through the web. The visual basic code will load the XML file and go through the code searching for the tags or child nodes. Each child node has attributes with scertain values. In this case the child node will be the activity and the attributes, such as number of hours needed to accomplish the activity etc. The following XML code contains an example for the source activities.

```
<?xml version="1.0"?>
  <NewCostModel>
    <SourceActivity SourceActivityName="Order Items From Supplier">
      <NumberOfLaborHours>0.75</NumberOfLaborHours>
      <AverageHourlyRate>7.0</AverageHourlyRate>
    </SourceActivity>
    <SourceActivityName="Schedule Product Deliveries">
      <NumberOfLaborHours>0.3</NumberOfLaborHours>
      <AverageHourlyRate>7.0</AverageHourlyRate>
    </SourceActivity>
    <SourceActivity SourceActivityName="Receive Product">
      <NumberOfLaborHours>0.5</NumberOfLaborHours>
      <AverageHourlyRate>6.0</AverageHourlyRate>
    </SourceActivity>
    <SourceActivity SourceActivityName="Verify Product">
      <NumberOfLaborHours>0.2</NumberOfLaborHours>
      <AverageHourlyRate>7.5</AverageHourlyRate>
    </SourceActivity>
    <SourceActivity SourceActivityName="Transfer Product">
      <NumberOfLaborHours>0.3</NumberOfLaborHours>
      <AverageHourlyRate>7.0</AverageHourlyRate>
    </SourceActivity>
    <SourceActivity SourceActivityName="Authorize Supplier Payment">
      <NumberOfLaborHours>0.2</NumberOfLaborHours>
      <AverageHourlyRate>6.0</AverageHourlyRate>
    </SourceActivity>
  </NewCostModel>
```

Once the values have been found, they will be recorded in the Excel sheet to calculate the cost per activity. A graph can be generated from the data to provide a visual tool to compare the cost of each activity. The table and the graph generated from the code above is shown below.

Table 19: Example of Recorded Values Read from Model Ontologies

<b>Source Activities</b>	<b>Estimated Cost/Activity</b>	<b>Number of Labor Hours</b>	<b>Average Hourly Rate</b>
Order Items From Supplier	5.25	0.75	7
Schedule Product Deliveries	2.1	0.3	7
Receive Product	3	0.5	6
Verify Product	1.5	0.2	7.5
Transfer Product	2.1	0.3	7
Authorize Supplier Payment	1.2	0.2	6



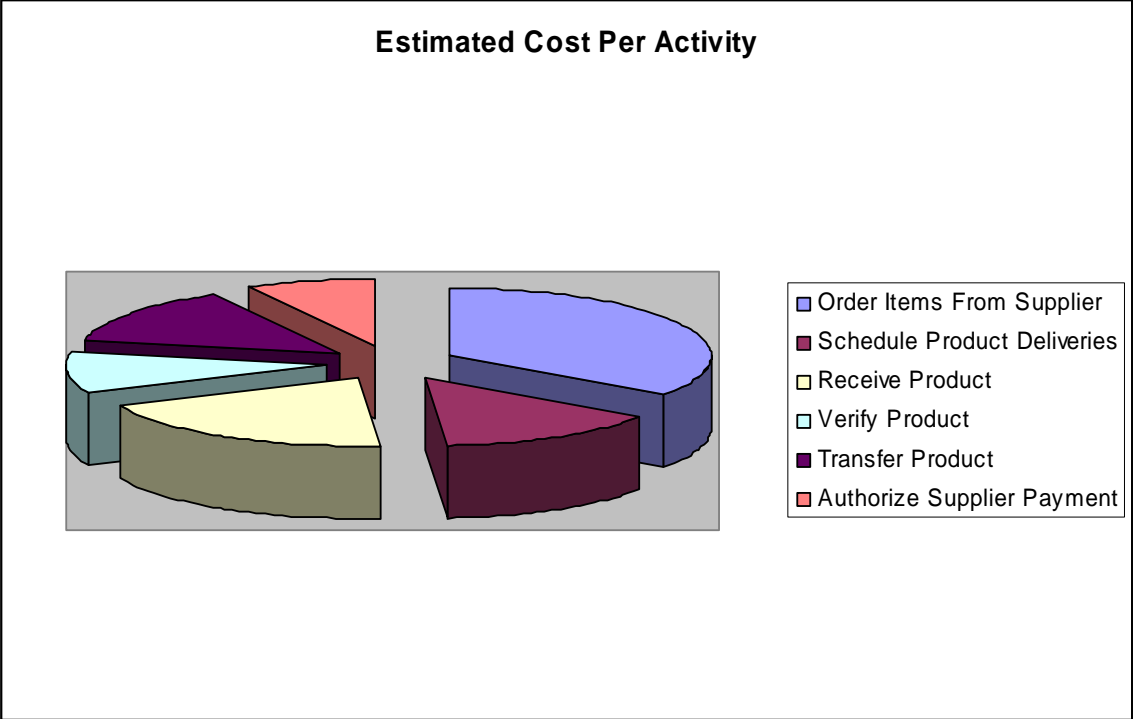


Figure 59: Example of Estimated Cost Per Activity

## **CHAPTER 5: CONCLUSION AND FUTURE RESEARCH**

### **5.1 Overview**

The framework could express the cost data for the partners of the supply chain in similar terms and connect the activities with resources to meet certain requirements. It was able to track the changes and their effects through the supply chain. Cost information will help in making decisions about pricing, outsourcing, capital expenditures, and operational efficiency. It should enable the organizations to compare directly the costs of certain activities. Monitoring the activities' durations will create new opportunities for improving supply chain responsiveness.

The framework will help in developing product strategy paradigms that encompass the dynamics of the market, in particular with respect to technology adoption lifecycle. It will be used for forecasting and decision making product related problems. From cost information, successful products and their driving performance measures can be detected.

## 5.2 Research Summary and Conclusion

The literature does not address the need for a standard template for supply chain cost information, a template that can translate cost data into similar terms that can be understood through different partners. There was no evidence in the literature of a cost model that can identify cost drivers mapped to activities.

The developed ontologies translated the supply chain concepts into a web based language that can be shared and used through the Internet. The OWL language converted the concepts into reusable objects which will make it easier to understand and track. A main class will represent each object through which many subclasses and instances could be developed. Each class has its own attributes that can be inherited to the child class (subclass). Other specific attributes could be added individually to the related instances. A relationship was developed between the classes and the subclasses in the supply chain to express cost information. The language has the ability to coordinate conflicting goals and objectives to improve performance. The framework is shown again in the following figure.

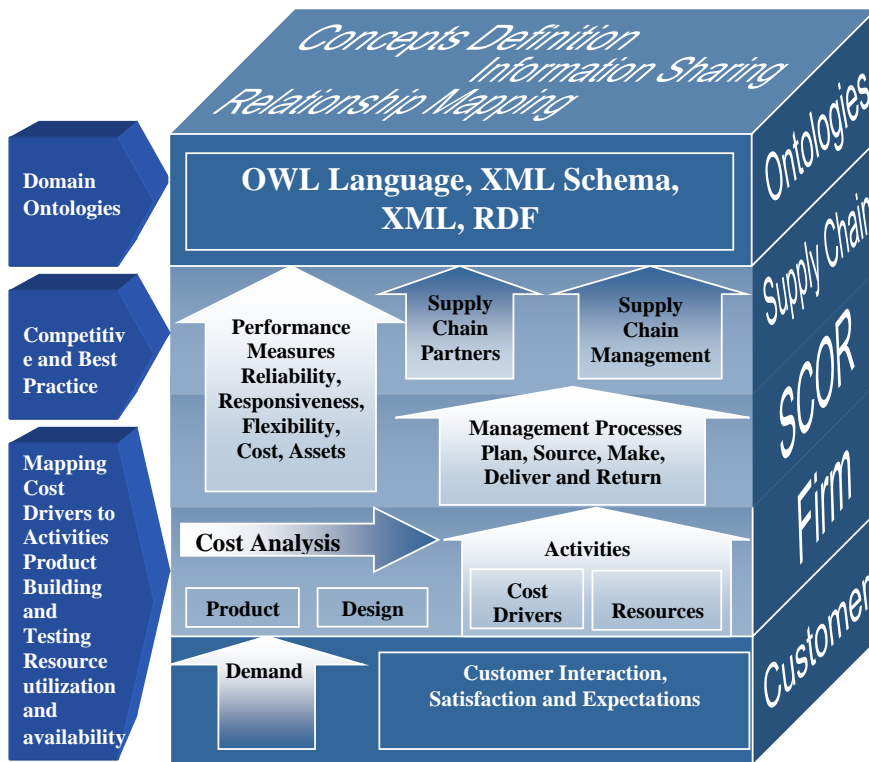


Figure 60: Framework for Supply Chain Cost Ontologies

The OWL language can be used to interface with other applications like Excel, Word, Access, etc, and it could be involved in other programming codes. The importance of that comes from the ability of OWL to be used by different operating systems and computer languages, which means less problems and more compatibility.

When it comes to information sharing, security will be a major issue to discuss. XML and its ability to interface with other software applications and programming languages will

make it easy to involve certain measures of security to control the levels of access to the system.

In the research, the developed OWL language could be interfaced with Excel sheets through Visual Basic for Applications to read from the ontologies and record into Excel. Equations were created to calculate the overhead cost and both direct labor and direct material costs. The Visual Basic for Applications could load the XML file and skim through to find certain attribute values and record them in Excel cells. For user convenience the model had a user interface to enter the data, and the calculation will be embedded within the Excel sheet. Once the calculations are done, they will be displayed in the user interface. Any changes that might occur in the ontology language will be reflected in the calculations and change the displayed figures.

Cost information will help in making decisions about pricing, outsourcing, capital expenditures, and operational efficiency. It should enable the organizations to compare directly the costs of certain activities. The standardization will help in:

- Improving comparability of cost data between firms.
- Identifying the weakest link in the chain and either replace it or improve it. The improvement will be through supporting the partner to understand the points of weaknesses and change them.
- Recognizing the right time to release a new product and the effect of that on the market.

- Creating a more flexible chain that will react fast and correctly to introduce the solution to the customer, especially with the short life items.
- Create communication between different management information systems no matter the type of cost analysis that has been used in that system, which will add to the value of development and standardization.
- Leverage the effectiveness of communication between different departments within the firm.
- Understand that as the firm seeks to minimize the cost and maximize its profit, the reduction of the cost should extend to the supply chain level.
- Restructuring the activities to be integrated with each other across the firms of the supply chain.
- Driving future profits by creating newer strategies.
- Recognizing the profitable products and services and eliminating the non profitable ones.

### **5.3 Research Contribution**

The cost understanding will minimize uncertainties in production planning and will develop new strategies.

The research contribution can be summarized as follows

- Created a framework for a cost model that can be used as a standard template in the supply chain cost management and optimization.

- The framework can track cost in dynamic environment.
- Research framework aids in information sharing through organization units.
- Through Ontologies this framework enabled easy access to information and minimized redundancy.
- The framework used OWL to define cost ontologies.

#### **5.4 Future Work**

- Comparing different tools for network integration such as RTI/HLA and FIPER
- Extending the research from the supply chain to the value chain to include the Design Chain (DCOR), Customer Chain (CCOR), and Market Chain Operation Reference (MCOR)
- Using cost information to develop an agent-base system to trigger alerts through design and production
- Using cost information to predict different phases of the product lifecycle

## **APPENDIX A: VBA CODE FOR ONTOLOGIES INTEGRATION**



```
Private Sub cbxMyFirm_Change()  
Sheets.Add  
Application.ActiveSheet.Name = cbxMyFirm.Text  
Application.Sheets("Cost Template").Select  
Cells.Select  
Selection.Copy  
Sheets(cbxMyFirm.Text).Select  
Range("A1").Select  
ActiveSheet.Paste
```

```
Range("D4:I4").Select  
With Selection  
    .HorizontalAlignment = xlCenter  
    .VerticalAlignment = xlBottom  
    .WrapText = False  
    .Orientation = 0  
    .AddIndent = False  
    .IndentLevel = 0  
    .ShrinkToFit = False  
    .ReadingOrder = xlContext  
    .MergeCells = False  
End With  
Selection.Merge  
With Selection.Font  
    .Name = "Arial"  
    .Size = 24  
    .Strikethrough = False  
    .Superscript = False  
    .Subscript = False  
    .OutlineFont = False  
    .Shadow = False  
    .Underline = xlUnderlineStyleNone  
    .ColorIndex = xlAutomatic
```

```
End With  
Range("d4") = cbxMyFirm.Text  
Selection.Font.Bold = True  
Selection.Font.ColorIndex = 5  
Range("D4:I4").Select  
With Selection.Interior  
    .ColorIndex = 45  
    .Pattern = xlSolid  
End With  
ActiveWindow.Zoom = 75
```

```
ActiveSheet.Move after:=Sheets(3)
```

```
End Sub
```

```
Private Sub cmdGraphs_Click()
```

```
UserForm9.Show
```

```
End Sub
```

```
Private Sub cmdload_Click()
```

```
Sheets(cbxMyFirm.Text).Select
```

```
Dim oDOC As MSXML.DOMDocument
```

```
Dim fSuccess As Boolean
```

```
Dim oRoot As MSXML.IXMLDOMNode
```

```
Dim oCountry As MSXML.IXMLDOMNode
```

```
Dim oAttributes As MSXML.IXMLDOMNamedNodeMap
```

```
Dim oCountryName As MSXML.IXMLDOMNode
```

```
Dim oChildren As MSXML.IXMLDOMNodeList
```

```
Dim oChild As MSXML.IXMLDOMNode
```

```
Dim intI As Integer
```

```
On Error GoTo HandleErr
```

```
Set oDOC = New MSXML.DOMDocument
```

```
' Load the XML from disk, without validating it. Wait
```

```
' for the load to finish before proceeding.
```

```
oDOC.async = False
```

```
oDOC.validateOnParse = False
```

```
fSuccess = oDOC.Load("E:\defense\costmodel.xml")
```

```
' If anything went wrong, quit now.
```

```
If Not fSuccess Then
```

```
GoTo ExitHere
```

```
End If
```

```
' Set up a row counter.
```

```
intI = 206
```

```
' Delete the previous information.
```

```
Range("C205:F230").Select
```

```
Selection.Clear
```

```
' Create column headers.
```

```
ActiveSheet.Cells(205, 3) = "Activities"
```

```

ActiveSheet.Cells(205, 4) = "Estimated Cost/Activity"
ActiveSheet.Cells(205, 5) = "Number of Labor Hours"
ActiveSheet.Cells(205, 6) = "Average Hourly Rate"
Range("D206").Select
ActiveCell.FormulaR1C1 = "=RC[1]*RC[2]"
Range("D206").Select
Selection.AutoFill Destination:=Range("D206:D230"), Type:=xlFillDefault
Range("D206:D230").Select
' Get the root of the XML tree.
Set oRoot = oDOC.documentElement
' Go through all children of the root.
For Each oCountry In oRoot.childNodes
' Collect the attributes for this country/region.
Set oAttributes = oCountry.Attributes
' Extract the country/region name and
' place it on the worksheet.
Set oCountryName = _
oAttributes.getNamedItem("CountryName")
ActiveSheet.Cells(intI, 3).Value = oCountryName.Text
' Go through all the children of the country/region node.
Set oChildren = oCountry.childNodes
For Each oChild In oChildren
' Get information from each child node to the sheet.
If oChild.nodeName = "TotalVisits" Then
ActiveSheet.Cells(intI, 5) = oChild.nodeTypeValue
End If
If oChild.nodeName = "LatestVisit" Then
ActiveSheet.Cells(intI, 6) = oChild.nodeTypeValue
End If
Next oChild
intI = intI + 1
Next oCountry
' Now for some eye candy; build a chart of the data.
Charts.Add
With ActiveChart
.ChartType = xl3DPieExploded
.SetSourceData Source:=Sheets(cbxMyFirm.Text). _
Range("C206:D211"), PlotBy:=xlColumns
'& CStr(intI - 1)
.Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
End With
ActiveChart.HasTitle = True
ActiveChart.ChartTitle.Characters.Text = "Estimated Direct Cost Per Activity for
Source Activities"

```

```
ActiveSheet.Shapes(2).Top = 500
ActiveSheet.Shapes(2).Left = 200
```

```
Charts.Add
With ActiveChart
    .ChartType = xl3DPieExploded
    .SetSourceData Source:=Sheets(cbxMyFirm.Text). _
        Range("C212:D217"), PlotBy:=xlColumns
        '& CStr(intI - 1)
    .Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
End With
ActiveChart.HasTitle = True
ActiveChart.ChartTitle.Characters.Text = "Estimated Direct Cost Per Activity for
Deliver Activities"
ActiveSheet.Shapes(2).Top = 500
ActiveSheet.Shapes(2).Left = 200
```

```
Charts.Add
With ActiveChart
    .ChartType = xl3DPieExploded
    .SetSourceData Source:=Sheets(cbxMyFirm.Text). _
        Range("C218:D223"), PlotBy:=xlColumns
        '& CStr(intI - 1)
    .Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
End With
ActiveChart.HasTitle = True
ActiveChart.ChartTitle.Characters.Text = "Estimated Direct Cost Per Activity for
Make Activities"
ActiveSheet.Shapes(2).Top = 500
ActiveSheet.Shapes(2).Left = 200
```

```
Charts.Add
With ActiveChart
    .ChartType = xl3DPieExploded
    .SetSourceData Source:=Sheets(cbxMyFirm.Text). _
        Range("C224:D227"), PlotBy:=xlColumns
        '& CStr(intI - 1)
    .Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
End With
ActiveChart.HasTitle = True
ActiveChart.ChartTitle.Characters.Text = "Estimated Direct Cost Per Activity for
Deliver Return Activities"
ActiveSheet.Shapes(2).Top = 500
ActiveSheet.Shapes(2).Left = 200
```

```

Charts.Add
With ActiveChart
    .ChartType = xl3DPieExploded
    .SetSourceData Source:=Sheets(cbxMyFirm.Text). _
        Range("C228:D230"), PlotBy:=xlColumns
        '& CStr(intI - 1)
    .Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
End With
ActiveChart.HasTitle = True
ActiveChart.ChartTitle.Characters.Text = "Estimated Direct Cost Per Activity for
Source Return Activities"
    ActiveSheet.Shapes(2).Top = 500
    ActiveSheet.Shapes(2).Left = 200

tbxOrderFromSupplier.Text = Range("E206")
tbxOrderFromSupplier2.Text = Range("F206")
tbxScheduleDeliveries.Text = Range("E207")
tbxScheduleDeliveries2.Text = Range("F207")
tbxReceiveProduct.Text = Range("E208")
tbxReceiveProduct2.Text = Range("F208")
tbxVerifyProduct.Text = Range("E209")
tbxVerifyProduct2.Text = Range("F209")
tbxTransferProduct.Text = Range("E210")
tbxTransferProduct2.Text = Range("F210")
tbxAuthorizeSupplierPayment.Text = Range("E211")
tbxAuthorizeSupplierPayment2.Text = Range("F211")
tbxRecieveQuote.Text = Range("E212")
tbxRecieveQuote2.Text = Range("F212")
tbxPlaceOrder.Text = Range("E213")
tbxPlaceOrder2.Text = Range("F213")
tbxCarrier.Text = Range("E214")
tbxCarrier2.Text = Range("F214")
tbxLoadVeh.Text = Range("E215")
tbxLoadVeh2.Text = Range("F215")
tbxDeliver.Text = Range("E216")
tbxDeliver2.Text = Range("F216")
tbxInvoice.Text = Range("E217")
tbxInvoice2.Text = Range("F217")
tbxScheduleProduction.Text = Range("E218")
tbxScheduleProduction2.Text = Range("F218")
tbxIssueMaterial.Text = Range("E219")
tbxIssueMaterial2.Text = Range("F219")
tbxProduceTest.Text = Range("E220")

```

```

tbxProduceTest2.Text = Range("F220")
tbxPackage.Text = Range("E221")
tbxPackage2.Text = Range("F221")
tbxStageFinished.Text = Range("E222")
tbxStageFinished2.Text = Range("F222")
tbxReleaseFinished.Text = Range("E223")
tbxReleaseFinished2.Text = Range("F223")
tbxAuthorizeReturn.Text = Range("E224")
tbxAuthorizeReturn2.Text = Range("F224")
tbxRequestReturnReplaceORCredit.Text = Range("E225")
tbxRequestReturnReplaceORCredit2.Text = Range("F225")
tbxScheduleReturn.Text = Range("E226")
tbxScheduleReturn2.Text = Range("F226")
tbxReceiveDefective.Text = Range("E227")
tbxReceiveDefective2.Text = Range("F227")
tbxVerifyDefective.Text = Range("E228")
tbxVerifyDefective2.Text = Range("F228")
tbxDispositionDefective.Text = Range("E229")
tbxDispositionDefective2.Text = Range("F229")
tbxAuthorizeReplaceOrCredit.Text = Range("E230")
tbxAuthorizeReplaceOrCredit2.Text = Range("F230")

```

ExitHere:

```
Exit Sub
```

HandleErr:

```

MsgBox "Error " & Err.Number & ": " & Err.Description
Resume ExitHere
Resume

```

End Sub

Private Sub cmdSubmitDirectLabor\_Click()

```

If Range("H45") = "" Then
Range("H45") = tbxProductName.Text
Range("H46") = tbxRecieveQuote.Text
Range("H47") = tbxRecieveQuote2.Text
Range("H50") = tbxPlaceOrder.Text
Range("H51") = tbxPlaceOrder2.Text
Range("H54") = tbxCarrier.Text
Range("H55") = tbxCarrier2.Text
Range("H58") = tbxLoadVeh.Text

```

Range("H59") = tbxLoadVeh2.Text  
 Range("H62") = tbxDeliver.Text  
 Range("H63") = tbxDeliver2.Text  
 Range("H66") = tbxInvoice.Text  
 Range("H67") = tbxInvoice2.Text  
 Range("H73") = tbxScheduleProduction.Text  
 Range("H74") = tbxScheduleProduction2.Text  
 Range("H77") = tbxIssueMaterial.Text  
 Range("H78") = tbxIssueMaterial2.Text  
 Range("H81") = tbxProduceTest.Text  
 Range("H82") = tbxProduceTest2.Text  
 Range("H85") = tbxPackage.Text  
 Range("H86") = tbxPackage2.Text  
 Range("H89") = tbxStageFinished.Text  
 Range("H90") = tbxStageFinished2.Text  
 Range("H93") = tbxReleaseFinished.Text  
 Range("H94") = tbxReleaseFinished2.Text  
 Range("H100") = tbxOrderFromSupplier.Text  
 Range("H101") = tbxOrderFromSupplier2.Text  
 Range("H104") = tbxScheduleDeliveries.Text  
 Range("H105") = tbxScheduleDeliveries2.Text  
 Range("H108") = tbxReceiveProduct.Text  
 Range("H109") = tbxReceiveProduct2.Text  
 Range("H112") = tbxVerifyProduct.Text  
 Range("H113") = tbxVerifyProduct2.Text  
 Range("H116") = tbxTransferProduct.Text  
 Range("H117") = tbxTransferProduct2.Text  
 Range("H120") = tbxAuthorizeSupplierPayment.Text  
 Range("H121") = tbxAuthorizeSupplierPayment2.Text  
 Range("H127") = tbxAuthorizeReturn.Text  
 Range("H128") = tbxAuthorizeReturn2.Text  
 Range("H131") = tbxRequestReturnReplaceORCredit.Text  
 Range("H132") = tbxRequestReturnReplaceORCredit2.Text  
 Range("H135") = tbxScheduleReturn.Text  
 Range("H136") = tbxScheduleReturn2.Text  
 Range("H139") = tbxReceiveDefective.Text  
 Range("H140") = tbxReceiveDefective2.Text  
 Range("H146") = tbxVerifyDefective.Text  
 Range("H147") = tbxVerifyDefective2.Text  
 Range("H150") = tbxDispositionDefective.Text  
 Range("H151") = tbxDispositionDefective2.Text  
 Range("H154") = tbxAuthorizeReplaceOrCredit.Text  
 Range("H155") = tbxAuthorizeReplaceOrCredit2.Text  
 Range("F166") = tbxMaterialName1.Text

```
Range("G166") = tbxMaterialName2.Text
Range("H166") = tbxMaterialName3.Text
Range("I166") = tbxMaterialName4.Text
Range("J166") = tbxMaterialName5.Text
Range("K166") = tbxMaterialName6.Text
Range("L166") = tbxMaterialName7.Text
Range("M166") = tbxMaterialName8.Text
Range("N166") = tbxMaterialName9.Text
Range("O166") = tbxMaterialName10.Text
Range("P166") = tbxMaterialName11.Text
Range("Q166") = tbxMaterialName12.Text
Range("R166") = tbxMaterialName13.Text
Range("S166") = tbxMaterialName14.Text
Range("F167") = tbxMaterialCost1.Text
Range("G167") = tbxMaterialCost2.Text
Range("H167") = tbxMaterialCost3.Text
Range("I167") = tbxMaterialCost4.Text
Range("J167") = tbxMaterialCost5.Text
Range("K167") = tbxMaterialCost6.Text
Range("L167") = tbxMaterialCost7.Text
Range("M167") = tbxMaterialCost8.Text
Range("N167") = tbxMaterialCost9.Text
Range("O167") = tbxMaterialCost10.Text
Range("P167") = tbxMaterialCost11.Text
Range("Q167") = tbxMaterialCost12.Text
Range("R167") = tbxMaterialCost13.Text
Range("S167") = tbxMaterialCost14.Text
```

```
GoTo 10
End If
```

```
If Range("i45") = "" Then
    Range("i45") = tbxProductName.Text
    Range("i46") = tbxRecieveQuote.Text
    Range("i47") = tbxRecieveQuote2.Text
    Range("i50") = tbxPlaceOrder.Text
    Range("i51") = tbxPlaceOrder2.Text
    Range("i54") = tbxCarrier.Text
    Range("i55") = tbxCarrier2.Text
    Range("i58") = tbxLoadVeh.Text
    Range("i59") = tbxLoadVeh2.Text
```



Range("i62") = tbxDeliver.Text  
 Range("i63") = tbxDeliver2.Text  
 Range("i66") = tbxInvoice.Text  
 Range("i67") = tbxInvoice2.Text  
 Range("i73") = tbxScheduleProduction.Text  
 Range("i74") = tbxScheduleProduction2.Text  
 Range("i77") = tbxIssueMaterial.Text  
 Range("i78") = tbxIssueMaterial2.Text  
 Range("i81") = tbxProduceTest.Text  
 Range("i82") = tbxProduceTest2.Text  
 Range("i85") = tbxPackage.Text  
 Range("i86") = tbxPackage2.Text  
 Range("i89") = tbxStageFinished.Text  
 Range("i90") = tbxStageFinished2.Text  
 Range("i93") = tbxReleaseFinished.Text  
 Range("i94") = tbxReleaseFinished2.Text  
 Range("i100") = tbxOrderFromSupplier.Text  
 Range("i101") = tbxOrderFromSupplier2.Text  
 Range("i104") = tbxScheduleDeliveries.Text  
 Range("i105") = tbxScheduleDeliveries2.Text  
 Range("i108") = tbxReceiveProduct.Text  
 Range("i109") = tbxReceiveProduct2.Text  
 Range("i112") = tbxVerifyProduct.Text  
 Range("i113") = tbxVerifyProduct2.Text  
 Range("i116") = tbxTransferProduct.Text  
 Range("i117") = tbxTransferProduct2.Text  
 Range("i120") = tbxAuthorizeSupplierPayment.Text  
 Range("i121") = tbxAuthorizeSupplierPayment2.Text  
 Range("i127") = tbxAuthorizeReturn.Text  
 Range("i128") = tbxAuthorizeReturn2.Text  
 Range("i131") = tbxRequestReturnReplaceORCredit.Text  
 Range("i132") = tbxRequestReturnReplaceORCredit2.Text  
 Range("i135") = tbxScheduleReturn.Text  
 Range("i136") = tbxScheduleReturn2.Text  
 Range("i139") = tbxReceiveDefective.Text  
 Range("i140") = tbxReceiveDefective2.Text  
 Range("i146") = tbxVerifyDefective.Text  
 Range("i147") = tbxVerifyDefective2.Text  
 Range("i150") = tbxDispositionDefective.Text  
 Range("i151") = tbxDispositionDefective2.Text  
 Range("i154") = tbxAuthorizeReplaceOrCredit.Text  
 Range("i155") = tbxAuthorizeReplaceOrCredit2.Text  
 Range("F168") = tbxMaterialName1.Text  
 Range("G168") = tbxMaterialName2.Text

```
Range("H168") = tbxMaterialName3.Text
Range("I168") = tbxMaterialName4.Text
Range("J168") = tbxMaterialName5.Text
Range("K168") = tbxMaterialName6.Text
Range("L168") = tbxMaterialName7.Text
Range("M168") = tbxMaterialName8.Text
Range("N168") = tbxMaterialName9.Text
Range("O168") = tbxMaterialName10.Text
Range("P168") = tbxMaterialName11.Text
Range("Q168") = tbxMaterialName12.Text
Range("R168") = tbxMaterialName13.Text
Range("S168") = tbxMaterialName14.Text
Range("F169") = tbxMaterialCost1.Text
Range("G169") = tbxMaterialCost2.Text
Range("H169") = tbxMaterialCost3.Text
Range("I169") = tbxMaterialCost4.Text
Range("J169") = tbxMaterialCost5.Text
Range("K169") = tbxMaterialCost6.Text
Range("L169") = tbxMaterialCost7.Text
Range("M169") = tbxMaterialCost8.Text
Range("N169") = tbxMaterialCost9.Text
Range("O169") = tbxMaterialCost10.Text
Range("P169") = tbxMaterialCost11.Text
Range("Q169") = tbxMaterialCost12.Text
Range("R169") = tbxMaterialCost13.Text
Range("S169") = tbxMaterialCost14.Text
```

```
GoTo 10
End If
```

```
If Range("j45") = "" Then
    Range("j45") = tbxProductName.Text
    Range("j46") = tbxRecieveQuote.Text
    Range("j47") = tbxRecieveQuote2.Text
    Range("j50") = tbxPlaceOrder.Text
    Range("j51") = tbxPlaceOrder2.Text
    Range("j54") = tbxCarrier.Text
    Range("j55") = tbxCarrier2.Text
    Range("j58") = tbxLoadVeh.Text
    Range("j59") = tbxLoadVeh2.Text
    Range("j62") = tbxDeliver.Text
```

Range("j63") = tbxDeliver2.Text  
Range("j66") = tbxInvoice.Text  
Range("j67") = tbxInvoice2.Text  
Range("j73") = tbxScheduleProduction.Text  
Range("j74") = tbxScheduleProduction2.Text  
Range("j77") = tbxIssueMaterial.Text  
Range("j78") = tbxIssueMaterial2.Text  
Range("j81") = tbxProduceTest.Text  
Range("j82") = tbxProduceTest2.Text  
Range("j85") = tbxPackage.Text  
Range("j86") = tbxPackage2.Text  
Range("j89") = tbxStageFinished.Text  
Range("j90") = tbxStageFinished2.Text  
Range("j93") = tbxReleaseFinished.Text  
Range("j94") = tbxReleaseFinished2.Text  
Range("j100") = tbxOrderFromSupplier.Text  
Range("j101") = tbxOrderFromSupplier2.Text  
Range("j104") = tbxScheduleDeliveries.Text  
Range("j105") = tbxScheduleDeliveries2.Text  
Range("j108") = tbxReceiveProduct.Text  
Range("j109") = tbxReceiveProduct2.Text  
Range("j112") = tbxVerifyProduct.Text  
Range("j113") = tbxVerifyProduct2.Text  
Range("j116") = tbxTransferProduct.Text  
Range("j117") = tbxTransferProduct2.Text  
Range("j120") = tbxAuthorizeSupplierPayment.Text  
Range("j121") = tbxAuthorizeSupplierPayment2.Text  
Range("j127") = tbxAuthorizeReturn.Text  
Range("j128") = tbxAuthorizeReturn2.Text  
Range("j131") = tbxRequestReturnReplaceORCredit.Text  
Range("j132") = tbxRequestReturnReplaceORCredit2.Text  
Range("j135") = tbxScheduleReturn.Text  
Range("j136") = tbxScheduleReturn2.Text  
Range("j139") = tbxReceiveDefective.Text  
Range("j140") = tbxReceiveDefective2.Text  
Range("j146") = tbxVerifyDefective.Text  
Range("j147") = tbxVerifyDefective2.Text  
Range("j150") = tbxDispositionDefective.Text  
Range("j151") = tbxDispositionDefective2.Text  
Range("j154") = tbxAuthorizeReplaceOrCredit.Text  
Range("j155") = tbxAuthorizeReplaceOrCredit2.Text  
Range("F170") = tbxMaterialName1.Text  
Range("G170") = tbxMaterialName2.Text  
Range("H170") = tbxMaterialName3.Text

```

Range("I170") = tbxMaterialName4.Text
Range("J170") = tbxMaterialName5.Text
Range("K170") = tbxMaterialName6.Text
Range("L170") = tbxMaterialName7.Text
Range("M170") = tbxMaterialName8.Text
Range("N170") = tbxMaterialName9.Text
Range("O170") = tbxMaterialName10.Text
Range("P170") = tbxMaterialName11.Text
Range("Q170") = tbxMaterialName12.Text
Range("R170") = tbxMaterialName13.Text
Range("S170") = tbxMaterialName14.Text
Range("F171") = tbxMaterialCost1.Text
Range("G171") = tbxMaterialCost2.Text
Range("H171") = tbxMaterialCost3.Text
Range("I171") = tbxMaterialCost4.Text
Range("J171") = tbxMaterialCost5.Text
Range("K171") = tbxMaterialCost6.Text
Range("L171") = tbxMaterialCost7.Text
Range("M171") = tbxMaterialCost8.Text
Range("N171") = tbxMaterialCost9.Text
Range("O171") = tbxMaterialCost10.Text
Range("P171") = tbxMaterialCost11.Text
Range("Q171") = tbxMaterialCost12.Text
Range("R171") = tbxMaterialCost13.Text
Range("S171") = tbxMaterialCost14.Text

```

```

GoTo 10
End If

```

```

10 Dim a$
a$ = MsgBox("Do you want add another product ?", vbYesNo, "More !")
If a$ = vbYes Then
    'clear boxes

    tbxProductName.Text = ""
    tbxRecieveQuote.Text = ""
    'tbxRecieveQuote2.Text = ""
    tbxPlaceOrder.Text = ""
    'tbxPlaceOrder2.Text = ""
    tbxCarrier.Text = ""
    'tbxCarrier2.Text = ""

```

tbxLoadVeh.Text = ""  
'tbxLoadVeh2.Text = ""  
tbxDeliver.Text = ""  
'tbxDeliver2.Text = ""  
tbxInvoice.Text = ""  
'tbxInvoice2.Text = ""  
tbxScheduleProduction.Text = ""  
'tbxScheduleProduction2.Text = ""  
tbxIssueMaterial.Text = ""  
'tbxIssueMaterial2.Text = ""  
tbxProduceTest.Text = ""  
'tbxProduceTest2.Text = ""  
tbxPackage.Text = ""  
'tbxPackage2.Text = ""  
tbxStageFinished.Text = ""  
'tbxStageFinished2.Text = ""  
tbxReleaseFinished.Text = ""  
'tbxReleaseFinished2.Text = ""  
tbxOrderFromSupplier.Text = ""  
'tbxOrderFromSupplier2.Text = ""  
tbxScheduleDeliveries.Text = ""  
'tbxScheduleDeliveries2.Text = ""  
tbxReceiveProduct.Text = ""  
'tbxReceiveProduct2.Text = ""  
tbxVerifyProduct.Text = ""  
'tbxVerifyProduct2.Text = ""  
tbxTransferProduct.Text = ""  
'tbxTransferProduct2.Text = ""  
tbxAuthorizeSupplierPayment.Text = ""  
'tbxAuthorizeSupplierPayment2.Text = ""  
tbxAuthorizeReturn.Text = ""  
'tbxAuthorizeReturn2.Text = ""  
tbxRequestReturnReplaceORCredit.Text = ""  
'tbxRequestReturnReplaceORCredit2.Text = ""  
tbxScheduleReturn.Text = ""  
'tbxScheduleReturn2.Text = ""  
tbxReceiveDefective.Text = ""  
'tbxReceiveDefective2.Text = ""  
tbxVerifyDefective.Text = ""  
'tbxVerifyDefective2.Text = ""  
tbxDispositionDefective.Text = ""  
'tbxDispositionDefective2.Text = ""  
tbxAuthorizeReplaceOrCredit.Text = ""  
'tbxAuthorizeReplaceOrCredit2.Text = ""

tbxMaterialName1.Text = ""  
tbxMaterialName2.Text = ""  
tbxMaterialName3.Text = ""  
tbxMaterialName4.Text = ""  
tbxMaterialName5.Text = ""  
tbxMaterialName6.Text = ""  
tbxMaterialName7.Text = ""  
tbxMaterialName8.Text = ""  
tbxMaterialName9.Text = ""  
tbxMaterialName10.Text = ""  
tbxMaterialName11.Text = ""  
tbxMaterialName12.Text = ""  
tbxMaterialName13.Text = ""  
tbxMaterialName14.Text = ""  
tbxMaterialCost1.Text = ""  
tbxMaterialCost2.Text = ""  
tbxMaterialCost3.Text = ""  
tbxMaterialCost4.Text = ""  
tbxMaterialCost5.Text = ""  
tbxMaterialCost6.Text = ""  
tbxMaterialCost7.Text = ""  
tbxMaterialCost8.Text = ""  
tbxMaterialCost9.Text = ""  
tbxMaterialCost10.Text = ""  
tbxMaterialCost11.Text = ""  
tbxMaterialCost12.Text = ""  
tbxMaterialCost13.Text = ""  
tbxMaterialCost14.Text = ""  
'tbxTotalSalary.Text = ""  
'tbxTotalFica.Text = ""  
'tbxHealthInsu.Text = ""  
'tbxComp.Text = ""  
'tbxVacatPay.Text = ""  
'tbxHolidayPay.Text = ""  
'tbxSickPay.Text = ""  
'tbxUnlistedLabor.Text = ""  
'tbxTotalWorkingHours.Text = ""  
'tbxMortRent.Text = ""  
'tbxUtilities.Text = ""  
'tbxOfficeSupplies.Text = ""  
'tbxInsurance.Text = ""  
'tbxAssociatDues.Text = ""  
'tbxtax.Text = ""  
'tbxOwnersSal.Text = ""

```
'tbxTravel.Text = ""
'tbxMaintRepair.Text = ""
'tbxGasOil.Text = ""
'tbxAd.Text = ""
'tbxDonation.Text = ""
'tbxUnlistedGeneral.Text = ""
'tbxTotalWorkingHours.Text = ""
UserForm4.LabelProduct1.Caption = Range("H174")
UserForm4.LabelProduct2.Caption = Range("I174")
UserForm4.LabelProduct3.Caption = Range("J174")
UserForm4.LabelProduct1Cost.Caption = Range("H178")
UserForm4.LabelProduct2Cost.Caption = Range("I178")
UserForm4.LabelProduct3Cost.Caption = Range("J178")
```

Else

```
tbxProductName.Text = ""
tbxRecieveQuote.Text = ""
'tbxRecieveQuote2.Text = ""
tbxPlaceOrder.Text = ""
'tbxPlaceOrder2.Text = ""
tbxCarrier.Text = ""
'tbxCarrier2.Text = ""
tbxLoadVeh.Text = ""
'tbxLoadVeh2.Text = ""
tbxDeliver.Text = ""
'tbxDeliver2.Text = ""
tbxInvoice.Text = ""
'tbxInvoice2.Text = ""
tbxScheduleProduction.Text = ""
'tbxScheduleProduction2.Text = ""
tbxIssueMaterial.Text = ""
'tbxIssueMaterial2.Text = ""
tbxProduceTest.Text = ""
'tbxProduceTest2.Text = ""
tbxPackage.Text = ""
'tbxPackage2.Text = ""
tbxStageFinished.Text = ""
'tbxStageFinished2.Text = ""
tbxReleaseFinished.Text = ""
'tbxReleaseFinished2.Text = ""
tbxOrderFromSupplier.Text = ""
'tbxOrderFromSupplier2.Text = ""
```

tbxScheduleDeliveries.Text = ""  
'tbxScheduleDeliveries2.Text = ""  
tbxReceiveProduct.Text = ""  
'tbxReceiveProduct2.Text = ""  
tbxVerifyProduct.Text = ""  
'tbxVerifyProduct2.Text = ""  
tbxTransferProduct.Text = ""  
'tbxTransferProduct2.Text = ""  
tbxAuthorizeSupplierPayment.Text = ""  
'tbxAuthorizeSupplierPayment2.Text = ""  
tbxAuthorizeReturn.Text = ""  
'tbxAuthorizeReturn2.Text = ""  
tbxRequestReturnReplaceORCredit.Text = ""  
'tbxRequestReturnReplaceORCredit2.Text = ""  
tbxScheduleReturn.Text = ""  
'tbxScheduleReturn2.Text = ""  
tbxReceiveDefective.Text = ""  
'tbxReceiveDefective2.Text = ""  
tbxVerifyDefective.Text = ""  
'tbxVerifyDefective2.Text = ""  
tbxDispositionDefective.Text = ""  
'tbxDispositionDefective2.Text = ""  
tbxAuthorizeReplaceOrCredit.Text = ""  
'tbxAuthorizeReplaceOrCredit2.Text = ""  
tbxMaterialName1.Text = ""  
tbxMaterialName2.Text = ""  
tbxMaterialName3.Text = ""  
tbxMaterialName4.Text = ""  
tbxMaterialName5.Text = ""  
tbxMaterialName6.Text = ""  
tbxMaterialName7.Text = ""  
tbxMaterialName8.Text = ""  
tbxMaterialName9.Text = ""  
tbxMaterialName10.Text = ""  
tbxMaterialName11.Text = ""  
tbxMaterialName12.Text = ""  
tbxMaterialName13.Text = ""  
tbxMaterialName14.Text = ""  
tbxMaterialCost1.Text = ""  
tbxMaterialCost2.Text = ""  
tbxMaterialCost3.Text = ""  
tbxMaterialCost4.Text = ""  
tbxMaterialCost5.Text = ""  
tbxMaterialCost6.Text = ""



```
tbxMaterialCost7.Text = ""
tbxMaterialCost8.Text = ""
tbxMaterialCost9.Text = ""
tbxMaterialCost10.Text = ""
tbxMaterialCost11.Text = ""
tbxMaterialCost12.Text = ""
tbxMaterialCost13.Text = ""
tbxMaterialCost14.Text = ""
'tbxTotalSalary.Text = ""
'tbxTotalFica.Text = ""
'tbxHealthInsu.Text = ""
'tbxComp.Text = ""
'tbxVacatPay.Text = ""
'tbxHolidayPay.Text = ""
'tbxSickPay.Text = ""
'tbxUnlistedLabor.Text = ""
'tbxTotalWorkingHours.Text = ""
'tbxMortRent.Text = ""
'tbxUtilities.Text = ""
'tbxOfficeSupplies.Text = ""
'tbxInsurance.Text = ""
'tbxAssociatDues.Text = ""
'tbxtax.Text = ""
'tbxOwnersSal.Text = ""
'tbxTravel.Text = ""
'tbxMaintRepair.Text = ""
'tbxGasOil.Text = ""
'tbxAd.Text = ""
'tbxDonation.Text = ""
'tbxUnlistedGeneral.Text = ""
'tbxTotalWorkingHours.Text = ""
UserForm4.LabelProduct1.Caption = Range("H174")
UserForm4.LabelProduct2.Caption = Range("I174")
UserForm4.LabelProduct3.Caption = Range("J174")
UserForm4.LabelProduct1Cost.Caption = Range("H178")
UserForm4.LabelProduct2Cost.Caption = Range("I178")
UserForm4.LabelProduct3Cost.Caption = Range("J178")
```

End If

End Sub

```
Private Sub cmdSubmitOverhead_Click()  
Sheets("Overhead Data").Select
```

```
'Labor Overhead
```

```
UserForm4.LabelEmployeeSalary.Caption = Range("D8")  
UserForm4.LabelFica.Caption = Range("D9")  
UserForm4.LabelHealthInsurance.Caption = Range("D10")  
UserForm4.LabelCompensation.Caption = Range("D11")  
UserForm4.LabelVacationPay.Caption = Range("D12")  
UserForm4.LabelHolidayPay.Caption = Range("D13")  
UserForm4.LabelSickPay.Caption = Range("D14")  
UserForm4.LabelUnlistedExpense.Caption = Range("D15")
```

```
'General overhead
```

```
UserForm4.LabelMortgageRent.Caption = Range("G8")  
UserForm4.LabelUtilities.Caption = Range("G9")  
UserForm4.LabelOfficeSupplies.Caption = Range("G10")  
UserForm4.LabelInsurance.Caption = Range("G11")  
UserForm4.LabelAssociationDues.Caption = Range("G12")  
UserForm4.LabelFedAndStateTax.Caption = Range("G13")  
UserForm4.LabelAdminSalary.Caption = Range("G14")  
UserForm4.LabelTravelExpense.Caption = Range("G15")  
UserForm4.LabelMaintenanceRepair.Caption = Range("G16")  
UserForm4.LabelGasOil.Caption = Range("G17")  
UserForm4.LabelAdvertising.Caption = Range("G18")  
UserForm4.LabelDonation.Caption = Range("G19")  
UserForm4.LabelCommunicationCost.Caption = Range("G20")  
UserForm4.LabelTotalCalculatedWorkingHours.Caption = Range("D22")
```

```
'Labor overhead
```

```
Sheets(cbxMyFirm.Text).Select
```

```
'ActiveSheet.Select
```

```
Range("d13") = LabelEmployeeSalary.Caption
```

```
Range("d14") = LabelFica.Caption
```

```
Range("d15") = LabelHealthInsurance.Caption
```

```
Range("d16") = LabelCompensation.Caption
```

```
Range("d17") = LabelVacationPay.Caption
```

```
Range("d18") = LabelHolidayPay.Caption
```

```
Range("d19") = LabelSickPay.Caption
```

```
Range("d20") = LabelUnlistedExpense.Caption
```

```
Range("d28") = LabelTotalCalculatedWorkingHours.Caption
```

```

'General overhead
Range("g13") = LabelMortgageRent.Caption
Range("g14") = LabelUtilities.Caption
Range("g15") = LabelOfficeSupplies.Caption
Range("g16") = LabelInsurance.Caption
Range("g17") = LabelAssociationDues.Caption
Range("g18") = LabelFedAndStateTax.Caption
Range("g19") = LabelAdminSalary.Caption
Range("g20") = LabelTravelExpense.Caption
Range("g21") = LabelMaintenanceRepair.Caption
Range("g22") = LabelGasOil.Caption
Range("g23") = LabelAdvertising.Caption
Range("g24") = LabelDonation.Caption
Range("g25") = LabelCommunicationCost.Caption
Range("g28") = LabelTotalCalculatedWorkingHours.Caption

```

```

Range("F13:G25").Select
Charts.Add
ActiveChart.ChartType = xl3DPieExploded
ActiveChart.SetSourceData Source:=Sheets(cbxMyFirm.Text).Range("F13:G25"), _
    PlotBy:=xlColumns
ActiveChart.Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
With ActiveChart
    .HasTitle = True
    .ChartTitle.Characters.Text = "General Overhead Cost"
End With
Range("C13:D20").Select
Charts.Add
ActiveChart.ChartType = xl3DPieExploded
ActiveChart.SetSourceData Source:=Sheets(cbxMyFirm.Text).Range("C13:D20"), _
    PlotBy:=xlColumns
ActiveChart.Location Where:=xlLocationAsObject, Name:=cbxMyFirm.Text
With ActiveChart
    .HasTitle = True
    .ChartTitle.Characters.Text = "Labor Overhead Cost"
End With

```

```
End Sub
```

```
Private Sub tbxProductName_Change()
```

```
    If tbxProductName.Text = "AMD" Then
```

```
Sheets("AMD").Select
UserForm4.tbxMaterialName1.Text = Range("D8")
UserForm4.tbxMaterialCost1.Text = Range("E8")
UserForm4.tbxMaterialName2.Text = Range("D9")
UserForm4.tbxMaterialCost2.Text = Range("E9")
UserForm4.tbxMaterialName3.Text = Range("D10")
UserForm4.tbxMaterialCost3.Text = Range("E10")
UserForm4.tbxMaterialName4.Text = Range("D11")
UserForm4.tbxMaterialCost4.Text = Range("E11")
UserForm4.tbxMaterialName5.Text = Range("D12")
UserForm4.tbxMaterialCost5.Text = Range("E12")
UserForm4.tbxMaterialName6.Text = Range("D13")
UserForm4.tbxMaterialCost6.Text = Range("E13")
UserForm4.tbxMaterialName7.Text = Range("D14")
UserForm4.tbxMaterialCost7.Text = Range("E14")
UserForm4.tbxMaterialName8.Text = Range("D15")
UserForm4.tbxMaterialCost8.Text = Range("E15")
UserForm4.tbxMaterialName9.Text = Range("D16")
UserForm4.tbxMaterialCost9.Text = Range("E16")
UserForm4.tbxMaterialName10.Text = Range("D17")
UserForm4.tbxMaterialCost10.Text = Range("E17")
UserForm4.tbxMaterialName11.Text = Range("D18")
UserForm4.tbxMaterialCost11.Text = Range("E18")
UserForm4.tbxMaterialName12.Text = Range("D19")
UserForm4.tbxMaterialCost12.Text = Range("E19")
UserForm4.tbxMaterialName13.Text = Range("D20")
UserForm4.tbxMaterialCost13.Text = Range("E20")
UserForm4.tbxMaterialName14.Text = Range("D21")
UserForm4.tbxMaterialCost14.Text = Range("E21")
```

```
Sheets(cbxFirm.Text).Select
```

```
Else
```

```
  If tbxProductName.Text = "Celeron" Then
    Sheets("Celeron").Select
    UserForm4.tbxMaterialName1.Text = Range("D8")
    UserForm4.tbxMaterialCost1.Text = Range("E8")
    UserForm4.tbxMaterialName2.Text = Range("D9")
    UserForm4.tbxMaterialCost2.Text = Range("E9")
    UserForm4.tbxMaterialName3.Text = Range("D10")
    UserForm4.tbxMaterialCost3.Text = Range("E10")
    UserForm4.tbxMaterialName4.Text = Range("D11")
    UserForm4.tbxMaterialCost4.Text = Range("E11")
```

```
UserForm4.tbxMaterialName5.Text = Range("D12")
UserForm4.tbxMaterialCost5.Text = Range("E12")
UserForm4.tbxMaterialName6.Text = Range("D13")
UserForm4.tbxMaterialCost6.Text = Range("E13")
UserForm4.tbxMaterialName7.Text = Range("D14")
UserForm4.tbxMaterialCost7.Text = Range("E14")
UserForm4.tbxMaterialName8.Text = Range("D15")
UserForm4.tbxMaterialCost8.Text = Range("E15")
UserForm4.tbxMaterialName9.Text = Range("D16")
UserForm4.tbxMaterialCost9.Text = Range("E16")
UserForm4.tbxMaterialName10.Text = Range("D17")
UserForm4.tbxMaterialCost10.Text = Range("E17")
UserForm4.tbxMaterialName11.Text = Range("D18")
UserForm4.tbxMaterialCost11.Text = Range("E18")
UserForm4.tbxMaterialName12.Text = Range("D19")
UserForm4.tbxMaterialCost12.Text = Range("E19")
UserForm4.tbxMaterialName13.Text = Range("D20")
UserForm4.tbxMaterialCost13.Text = Range("E20")
UserForm4.tbxMaterialName14.Text = Range("D21")
UserForm4.tbxMaterialCost14.Text = Range("E21")
```

```
Sheets(cbxMyFirm.Text).Select
```

```
Else
```

```
If tbxProductName.Text = "Pentium" Then
```

```
Sheets("Pentium").Select
```

```
UserForm4.tbxMaterialName1.Text = Range("D8")
```

```
UserForm4.tbxMaterialCost1.Text = Range("E8")
```

```
UserForm4.tbxMaterialName2.Text = Range("D9")
```

```
UserForm4.tbxMaterialCost2.Text = Range("E9")
```

```
UserForm4.tbxMaterialName3.Text = Range("D10")
```

```
UserForm4.tbxMaterialCost3.Text = Range("E10")
```

```
UserForm4.tbxMaterialName4.Text = Range("D11")
```

```
UserForm4.tbxMaterialCost4.Text = Range("E11")
```

```
UserForm4.tbxMaterialName5.Text = Range("D12")
```

```
UserForm4.tbxMaterialCost5.Text = Range("E12")
```

```
UserForm4.tbxMaterialName6.Text = Range("D13")
```

```
UserForm4.tbxMaterialCost6.Text = Range("E13")
```

```
UserForm4.tbxMaterialName7.Text = Range("D14")
```

```
UserForm4.tbxMaterialCost7.Text = Range("E14")
```

```
UserForm4.tbxMaterialName8.Text = Range("D15")
```

```
UserForm4.tbxMaterialCost8.Text = Range("E15")
```

```
UserForm4.tbxMaterialName9.Text = Range("D16")
```

```
UserForm4.tbxMaterialCost9.Text = Range("E16")
```

```
UserForm4.tbxMaterialName10.Text = Range("D17")
UserForm4.tbxMaterialCost10.Text = Range("E17")
UserForm4.tbxMaterialName11.Text = Range("D18")
UserForm4.tbxMaterialCost11.Text = Range("E18")
UserForm4.tbxMaterialName12.Text = Range("D19")
UserForm4.tbxMaterialCost12.Text = Range("E19")
UserForm4.tbxMaterialName13.Text = Range("D20")
UserForm4.tbxMaterialCost13.Text = Range("E20")
UserForm4.tbxMaterialName14.Text = Range("D21")
UserForm4.tbxMaterialCost14.Text = Range("E21")
Sheets(cbxMyFirm.Text).Select
```

```
Else
End If
End If
End If
```

```
End Sub
```

```
Private Sub UserForm_Activate()
cbxMyFirm.AddItem "Computek Inc."
```

```
End Sub
```

**APPENDIX B: COST MODEL ONTOLOGIES CODE (OWL  
LANGUAGE BUILT ON TOP OF XML SCHEMA)**

```

<?xml version="1.0"?>
<rdf:RDF
  xmlns:protege="http://protege.stanford.edu/plugins/owl/protege#"
  xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
  xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
  xmlns:owl="http://www.w3.org/2002/07/owl#"
  xmlns="http://www.owl-ontologies.com/unnamed.owl#"
  xml:base="http://www.owl-ontologies.com/unnamed.owl">
  <owl:Ontology rdf:about="">
    <owl:imports rdf:resource="http://protege.stanford.edu/plugins/owl/protege"/>
  </owl:Ontology>
  <owl:Class rdf:ID="Supplier_of_Suppliers_Management">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Management"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Return_Activities">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >The activities that is related to the returning process in the supply
chain</rdfs:comment>
    <protege:abstract>true</protege:abstract>
  </owl:Class>
  <owl:Class rdf:ID="Carrier_Salary_Employee">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Salary_Employee"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Customer_of_Customers">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Partners"/>
    </rdfs:subClassOf>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >A person, company, or other entity which buys goods and services produced by
another person, company, or other entity.</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Enable">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Management_Processes"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Make_to_Order_Products">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Physical_Products"/>
    </rdfs:subClassOf>
  </owl:Class>

```



```

    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="First_Tier_Supplier_Hourly_Employee">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Hourly_Employee"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Engineer_to_Order_Products">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Physical_Products"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Plan_Activities">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >The activities that is related to the planning process in the supply
chain</rdfs:comment>
    <protege:abstract>true</protege:abstract>
  </owl:Class>
  <owl:Class rdf:ID="My_Enterprize">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Partners"/>
    </rdfs:subClassOf>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >the transformation of raw materials into finished goods for sale, or intermediate
processes involving the production or finishing of semi-manufactures.</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:about="#Partners">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Supply_Chain"/>
    </rdfs:subClassOf>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Those are defined as the partners in the supply chain that will assest in the flow of a
product from the raw material to the end user</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Money">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Resources"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Plan">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >all processes that balance aggregate demand and supply to develop a course of action
which best meets sourcing, production and delivery requirements.</rdfs:comment>
    <rdfs:subClassOf>

```

```

    <owl:Class rdf:about="#Management_Processes"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Physical_Drivers">
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >The quantity of a resource processed by an activity</rdfs:comment>
  <rdfs:subClassOf>
    <owl:Class rdf:ID="Cost_Drivers"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Source">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Management_Processes"/>
  </rdfs:subClassOf>
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >all processes that procure goods and services to meet planned or actual
demand.</rdfs:comment>
</owl:Class>
<owl:Class rdf:ID="Supplier_of_Supplier_Hourly_Employee">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Hourly_Employee"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Deliver_Return_Activities">
  <rdfs:subClassOf rdf:resource="#Return_Activities"/>
</owl:Class>
<owl:Class rdf:ID="Motherboard_Suppliers">
  <rdfs:subClassOf>
    <owl:Class rdf:ID="Second_Tier_Supplier"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Cost_Type"/>
<owl:Class rdf:ID="Delivery_type"/>
<owl:Class rdf:ID="Direct_Variable_Cost">
  <rdfs:subClassOf>
    <owl:Class rdf:ID="Direct_Cost"/>
  </rdfs:subClassOf>
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Other costs that varies as the level of activity varies like cost of material, cost of labor
etc.</rdfs:comment>
</owl:Class>
<owl:Class rdf:ID="My_Enterprize_Hourly_Employee">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Hourly_Employee"/>

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    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="First_Tier_Supplier_Salary_Employee">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Salary_Employee"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Supplier_of_Suppliers">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >The last tier of suppliers for one supply chain (it might the first for another
chain)</rdfs:comment>
    <rdfs:subClassOf rdf:resource="#Partners"/>
  </owl:Class>
  <owl:Class rdf:ID="RAM_Suppliers">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Second_Tier_Supplier"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="My_Enterprize_Salary_Employee">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Salary_Employee"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Facilities">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Resources"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Network_Card_Suppliers">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Second_Tier_Supplier"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Source_Return">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Return"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Second_Tier_Supplier_Hourly_Employee">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Hourly_Employee"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="KB">

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    <rdfs:subClassOf rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
</owl:Class>
<owl:Class rdf:ID="Carrier_Hourly_Employee">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Hourly_Employee"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="#Salary_Employee">
  <rdfs:subClassOf>
    <owl:Class rdf:ID="People"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="#Physical_Products">
  <rdfs:subClassOf>
    <owl:Class rdf:ID="Products"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Monitors_Suppliers">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Second_Tier_Supplier"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Supplier_of_Suppliers_Salary_Employee">
  <rdfs:subClassOf rdf:resource="#Salary_Employee"/>
</owl:Class>
<owl:Class rdf:ID="Second_Tier_Supplier_Salary_Employee">
  <rdfs:subClassOf rdf:resource="#Salary_Employee"/>
</owl:Class>
<owl:Class rdf:ID="Deliver_Return">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Return"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Indirect_Cost">
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Costs that are not directly related to the product, process or activity like
administrative cost</rdfs:comment>
  <rdfs:subClassOf rdf:resource="#Cost_Type"/>
</owl:Class>
<owl:Class rdf:ID="Deliver">
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >all processes that provide finished goods and services to meet planned or actual
demand, typically including order management, transportation management, and
distribution management.</rdfs:comment>

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    <rdfs:subClassOf>
      <owl:Class rdf:about="#Management_Processes"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Make">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >all processes that transform product to a finished state to meet planned or actual
demand.</rdfs:comment>
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Management_Processes"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="First_Tier_Supplier">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >An organization that provides goods and/or services to a purchasing
organization</rdfs:comment>
    <rdfs:subClassOf rdf:resource="#Partners"/>
  </owl:Class>
  <owl:Class rdf:ID="Source_Return_Activities">
    <rdfs:subClassOf rdf:resource="#Return_Activities"/>
  </owl:Class>
  <owl:Class rdf:about="#Direct_Cost">
    <rdfs:subClassOf rdf:resource="#Cost_Type"/>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Costs that can be directly related to product, process and/or activity</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="HD_Suppliers">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Second_Tier_Supplier"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="CD_Floppy_And_Other_Drives_Suppliers">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Second_Tier_Supplier"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Stationary_Equipment">
    <rdfs:subClassOf>
      <owl:Class rdf:ID="Equipment"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="First_Tier_Supplier_Management">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Management"/>

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    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Customer">
    <rdfs:subClassOf rdf:resource="#Partners"/>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >A person, company, or other entity which buys goods and services produced by
another person, company, or other entity.</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Customer_Management">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Management"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Moving_Equipment">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Equipment"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Source_Activities">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >The activities that is related to the sourcing process in the supply
chain</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Chases_Supplier">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Second_Tier_Supplier"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Indirect_Variable_Cost">
    <rdfs:subClassOf rdf:resource="#Indirect_Cost"/>
  </owl:Class>
  <owl:Class rdf:about="#Management_Processes">
    <rdfs:subClassOf>
      <owl:Restriction>
        <owl:hasValue rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
          >Reliability</owl:hasValue>
        <owl:onProperty>
          <owl:DatatypeProperty rdf:ID="Performance_Attributes"/>
        </owl:onProperty>
      </owl:Restriction>
    </rdfs:subClassOf>
    <rdfs:subClassOf>
      <owl:Restriction>
        <owl:hasValue rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >Flexibility</owl:hasValue>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="#Performance_Attributes"/>
    </owl:onProperty>
  </owl:Restriction>
</rdfs:subClassOf>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:hasValue rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</owl:hasValue>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="#Performance_Attributes"/>
    </owl:onProperty>
  </owl:Restriction>
</rdfs:subClassOf>
<protege:abstract>true</protege:abstract>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:hasValue rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</owl:hasValue>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="#Performance_Attributes"/>
    </owl:onProperty>
  </owl:Restriction>
</rdfs:subClassOf>
<rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>The main Management process that mange the flow of material through the supply
chain</rdfs:comment>
<rdfs:subClassOf>
  <owl:Restriction>
    <owl:hasValue rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</owl:hasValue>
    <owl:onProperty>
      <owl:DatatypeProperty rdf:about="#Performance_Attributes"/>
    </owl:onProperty>
  </owl:Restriction>
</rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Keyboard_and_Mouse_Suppliers">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#Second_Tier_Supplier"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Second_Tier_Supplier_Management">

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    <rdfs:subClassOf>
      <owl:Class rdf:about="#Management"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Frequency_Drivers">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >The number of times an activity is performed</rdfs:comment>
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Cost_Drivers"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Sound_Card_Suppliers">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Second_Tier_Supplier"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="#Second_Tier_Supplier">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >An organization that provides goods and/or services to a purchasing
organization</rdfs:comment>
    <rdfs:subClassOf rdf:resource="#Partners"/>
  </owl:Class>
  <owl:Class rdf:about="#Resources">
    <protege:abstract>true</protege:abstract>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets available and anticipated for operations. They include people, equipment,
facilities, land, money, raw material and other things used to plan, implement, and
evaluate public programs whether or not paid for directly by public
funds.</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:about="#Products">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Goods or services produced in the production process</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Land">
    <rdfs:subClassOf rdf:resource="#Resources"/>
  </owl:Class>
  <owl:Class rdf:ID="Graphic_Card_Suppliers">
    <rdfs:subClassOf rdf:resource="#Second_Tier_Supplier"/>
  </owl:Class>
  <owl:Class rdf:ID="Direct_Fixed_Cost">
    <rdfs:subClassOf rdf:resource="#Direct_Cost"/>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >Include all costs that do not vary with activity for an accounting period. The fixed
    cost must be paid regardless of the level of output and of the resources
    used</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Enable_Activities">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >The activities that is related to the enabling process in the supply
    chain</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:about="#Return">
    <rdfs:subClassOf rdf:resource="#Management_Processes"/>
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >all processes associated with returning or receiving returned
    products.</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Carrier_Management">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Management"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:about="#Equipment">
    <rdfs:subClassOf rdf:resource="#Resources"/>
  </owl:Class>
  <owl:Class rdf:ID="Indirect_Fixed_Cost">
    <rdfs:subClassOf rdf:resource="#Indirect_Cost"/>
  </owl:Class>
  <owl:Class rdf:about="#Cost_Drivers">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Measure of the quantity of resources consumed by an activity.
    Factors responsible for variation in the cost of an activity.</rdfs:comment>
  </owl:Class>
  <owl:Class rdf:ID="Customer_Hourly_Employee">
    <rdfs:subClassOf>
      <owl:Class rdf:about="#Hourly_Employee"/>
    </rdfs:subClassOf>
  </owl:Class>
  <owl:Class rdf:ID="Carrier">
    <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >the person or company that physically moves the package between
    locations</rdfs:comment>
    <rdfs:subClassOf rdf:resource="#Partners"/>
  </owl:Class>
  <owl:Class rdf:ID="Balance_Resources_and_Requirements">
    <rdfs:subClassOf rdf:resource="#Plan_Activities"/>

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</owl:Class>
<owl:Class rdf:ID="Services">
  <rdfs:subClassOf rdf:resource="#Products"/>
</owl:Class>
<owl:Class rdf:ID="Raw_Material">
  <rdfs:subClassOf rdf:resource="#Resources"/>
</owl:Class>
<owl:Class rdf:ID="Establish_and_Communicate_Plans">
  <rdfs:subClassOf rdf:resource="#Plan_Activities"/>
</owl:Class>
<owl:Class rdf:ID="Stocked_Products">
  <rdfs:subClassOf rdf:resource="#Physical_Products"/>
</owl:Class>
<owl:Class rdf:ID="Customer_Salary_Employee">
  <rdfs:subClassOf rdf:resource="#Salary_Employee"/>
</owl:Class>
<owl:Class rdf:about="#Management">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#People"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:about="#Hourly_Employee">
  <rdfs:subClassOf>
    <owl:Class rdf:about="#People"/>
  </rdfs:subClassOf>
</owl:Class>
<owl:Class rdf:ID="Duration_Drivers">
  <rdfs:subClassOf rdf:resource="#Cost_Drivers"/>
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >The time Consumed Performing the activity</rdfs:comment>
</owl:Class>
<owl:Class rdf:ID="Deliver_Activities">
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >The activities that is related to the delivery process in the supply
chain</rdfs:comment>
</owl:Class>
<owl:Class rdf:ID="My_Enterprize_Management">
  <rdfs:subClassOf rdf:resource="#Management"/>
</owl:Class>
<owl:Class rdf:ID="CPU_Suppliers">
  <rdfs:subClassOf rdf:resource="#Second_Tier_Supplier"/>
</owl:Class>
<owl:Class rdf:ID="Make_Activities">
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >The activities that is related to the Making process in the supply
chain</rdfs:comment>
</owl:Class>
<owl:Class rdf:about="#Supply_Chain">
  <rdfs:comment rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >flow of production from raw material to the finish product including disposal
process</rdfs:comment>
</owl:Class>
<owl:Class rdf:about="#People">
  <rdfs:subClassOf rdf:resource="#Resources"/>
</owl:Class>
<owl:Class rdf:ID="Identify_Prioritize-Aggregate">
  <rdfs:subClassOf rdf:resource="#Plan_Activities"/>
</owl:Class>
<owl:ObjectProperty rdf:ID="Return_to">
  <rdfs:range rdf:resource="#First_Tier_Supplier"/>
  <rdfs:domain rdf:resource="#My_Enterprize"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Activity_Cost_Type">
  <rdfs:range rdf:resource="#Cost_Type"/>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Plan_Activities"/>
        <owl:Class rdf:about="#Source_Activities"/>
        <owl:Class rdf:about="#Make_Activities"/>
        <owl:Class rdf:about="#Enable_Activities"/>
        <owl:Class rdf:about="#Deliver_Activities"/>
        <owl:Class rdf:about="#Return_Activities"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Sourcing_Resources">
  <rdfs:range rdf:resource="#Resources"/>
  <rdfs:domain rdf:resource="#Partners"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Get_Supplies_From">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="#First_Tier_Supplier"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Returning_Resources">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range>

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    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Resources"/>
        <owl:Class rdf:about="#First_Tier_Supplier"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:range>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Deliver_Products_Through">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="#Carrier"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Planning_Resources">
  <rdfs:range rdf:resource="#Resources"/>
  <rdfs:domain rdf:resource="#My_Enterprize"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Enabling_Activities">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="#Enable_Activities"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Resources_Used">
  <rdfs:range rdf:resource="#Resources"/>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Plan_Activities"/>
        <owl:Class rdf:about="#Source_Activities"/>
        <owl:Class rdf:about="#Make_Activities"/>
        <owl:Class rdf:about="#Enable_Activities"/>
        <owl:Class rdf:about="#Deliver_Activities"/>
        <owl:Class rdf:about="#Return_Activities"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Get_Delivery_Through">
  <rdfs:range rdf:resource="#Carrier"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Sourcing_Cost_Drivers">
  <rdfs:range rdf:resource="#Cost_Drivers"/>
  <rdfs:domain rdf:resource="#Source_Activities"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Enabling_Resources">
  <rdfs:domain rdf:resource="#Partners"/>

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    <rdfs:range rdf:resource="#Resources"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="Making_Activities">
    <rdfs:range rdf:resource="#Make_Activities"/>
    <rdfs:domain rdf:resource="#My_Enterprize"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="Sell_to">
    <rdfs:range rdf:resource="#Partners"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="Making_Cost_Drivers">
    <rdfs:range rdf:resource="#Cost_Drivers"/>
    <rdfs:domain rdf:resource="#Make_Activities"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="J_Partner_s_Management_Process">
    <rdfs:label>J_Partner's_Management_Process</rdfs:label>
    <rdfs:range rdf:resource="#Management_Processes"/>
    <rdfs:domain rdf:resource="#Partners"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="Delivering_Resources">
    <rdfs:domain rdf:resource="#Partners"/>
    <rdfs:range>
      <owl:Class>
        <owl:unionOf rdf:parseType="Collection">
          <owl:Class rdf:about="#Resources"/>
          <owl:Class rdf:about="#Carrier"/>
          <rdf:Description rdf:about="http://www.w3.org/2002/07/owl#Thing"/>
        </owl:unionOf>
      </owl:Class>
    </rdfs:range>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="Deliver_from">
    <rdfs:range rdf:resource="#My_Enterprize"/>
    <rdfs:domain>
      <owl:Class>
        <owl:unionOf rdf:parseType="Collection">
          <owl:Class rdf:about="#Carrier"/>
          <owl:Class rdf:about="#Delivery_type"/>
        </owl:unionOf>
      </owl:Class>
    </rdfs:domain>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  </owl:ObjectProperty>
  <owl:ObjectProperty rdf:ID="Products_Provided">
    <rdfs:range rdf:resource="#Products"/>

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```

</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Get_Product_from">
  <rdfs:range>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#My_Enterprize"/>
        <owl:Class rdf:about="#Customer"/>
        <owl:Class rdf:about="#Partners"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:range>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Planning_Activities">
  <rdfs:domain rdf:resource="#My_Enterprize"/>
  <rdfs:range rdf:resource="#Plan_Activities"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Returning_Cost_Drivers">
  <rdfs:range rdf:resource="#Cost_Drivers"/>
  <rdfs:domain rdf:resource="#Return_Activities"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Making_Resources">
  <rdfs:domain rdf:resource="#My_Enterprize"/>
  <rdfs:range rdf:resource="#Resources"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Supply_to">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="#Partners"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Delivering_Activities">
  <rdfs:range rdf:resource="#Deliver_Activities"/>
  <rdfs:domain rdf:resource="#Partners"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Activity">
  <rdfs:range>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Identify_Prioritize-Aggregate"/>
        <owl:Class rdf:about="#Balance_Resources_and_Requirements"/>
        <owl:Class rdf:about="#Establish_and_Communicate_Plans"/>
        <owl:Class rdf:about="#Source_Activities"/>
        <owl:Class rdf:about="#Make_Activities"/>
        <owl:Class rdf:about="#Enable_Activities"/>
        <owl:Class rdf:about="#Deliver_Activities"/>
        <owl:Class rdf:about="#Return_Activities"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:range>

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    </owl:unionOf>
  </owl:Class>
</rdfs:range>
<rdfs:domain rdf:resource="#Management_Processes"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Enabling_Cost_Drivers">
  <rdfs:domain rdf:resource="#Enable_Activities"/>
  <rdfs:range rdf:resource="#Cost_Drivers"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Delivery_Type">
  <rdfs:range rdf:resource="#Delivery_type"/>
  <rdfs:domain rdf:resource="#Carrier"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Sourcing_Activities">
  <rdfs:range rdf:resource="#Source_Activities"/>
  <rdfs:domain rdf:resource="#Partners"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Delivery_Cost_Drivers">
  <rdfs:range rdf:resource="#Cost_Drivers"/>
  <rdfs:domain rdf:resource="#Deliver_Activities"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Partner_s_Products">
  <rdfs:label>Partner's_Products</rdfs:label>
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="#Products"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Name">
  <rdfs:domain rdf:resource="#Raw_Material"/>
  <rdfs:range rdf:resource="#Products"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Deliver_to">
  <rdfs:range>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Customer"/>
        <owl:Class rdf:about="#Customer_of_Customers"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:range>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Carrier"/>
        <owl:Class rdf:about="#Delivery_type"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>

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    </owl:unionOf>
  </owl:Class>
</rdfs:domain>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Returning_Activities">
  <rdfs:range rdf:resource="#Return_Activities"/>
  <rdfs:domain rdf:resource="#Partners"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Planning_Cost_Drivers">
  <rdfs:range rdf:resource="#Cost_Drivers"/>
  <rdfs:domain rdf:resource="#Plan_Activities"/>
</owl:ObjectProperty>
<owl:ObjectProperty rdf:ID="Provided_by">
  <rdfs:domain rdf:resource="#Raw_Material"/>
  <rdfs:range rdf:resource="#Partners"/>
</owl:ObjectProperty>
<owl:DatatypeProperty rdf:about="#Performance_Attributes">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Management_Processes"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Date_Hired">
  <rdfs:domain rdf:resource="#People"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="F_Partner_s_City">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:label>F_Partner's_City</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="broader">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#KB"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Machine_Setup_Time">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:domain rdf:resource="#Equipment"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="B_Partners_Phone_Number">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Partners"/>
</owl:DatatypeProperty>

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<owl:DatatypeProperty rdf:ID="New_Cost_Model_Slot_43">
  <rdfs:label>New Cost Model_Slot_43</rdfs:label>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="related_slot">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#KB"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Financial_Institution">
  <rdfs:label>Financial Institution</rdfs:label>
  <rdfs:domain rdf:resource="#Money"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="I_Contact_Person_Email">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Cash_Available">
  <rdfs:domain rdf:resource="#Money"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:label>Cash Available</rdfs:label>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Credit__Available">
  <rdfs:domain rdf:resource="#Money"/>
  <rdfs:label>Credit Available</rdfs:label>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Percentage_from_Sale">
  <rdfs:domain rdf:resource="#People"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="E_Partner_s_Address">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:label>E_Partner's_Address</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="synonym">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#KB"/>

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</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Water_Consumption">
  <rdfs:domain rdf:resource="#Facilities"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Monthly_Payment">
  <rdfs:domain rdf:resource="#Equipment"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Hourly_Wages">
  <rdfs:domain rdf:resource="#Hourly_Employee"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Duration_of_Scheduled_Maintenance">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Equipment"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Tracking_Number">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Delivery_type"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="G-Partner_s_Zip_Code">
  <rdfs:label>G-Partner's_Zip_Code</rdfs:label>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Partners"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Features">
  <rdfs:domain rdf:resource="#Management_Processes"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="New_Cost_Model_Slot_10071">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:label>New Cost Model_Slot_10071</rdfs:label>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Best_Practices">
  <rdfs:domain rdf:resource="#Management_Processes"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>

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</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Metric">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Management_Processes"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="H-Partner_s_Contact_Person">
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:label>H-Partner's_Contact_Person</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Supply_Chain_Measures">
  <rdfs:domain rdf:resource="#Supply_Chain"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Interes_Rate">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Money"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:label>Interes Rate</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="semantic_type">
  <rdfs:domain rdf:resource="#KB"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Department">
  <rdfs:domain rdf:resource="#People"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Service_Type">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:domain rdf:resource="#Services"/>
  <rdfs:label>Service Type</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Facility_Size">
  <rdfs:domain rdf:resource="#Facilities"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="A_Partner_s_Website">
  <rdfs:label>A_Partner's_Website</rdfs:label>
  <rdfs:domain rdf:resource="#Partners"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>

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    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Phone_Number_Extension">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#People"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Service_Duration">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:domain rdf:resource="#Services"/>
  <rdfs:label>Service Duration</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Average_Hourly_Rate">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Plan_Activities"/>
        <owl:Class rdf:about="#Source_Activities"/>
        <owl:Class rdf:about="#Make_Activities"/>
        <owl:Class rdf:about="#Enable_Activities"/>
        <owl:Class rdf:about="#Deliver_Activities"/>
        <owl:Class rdf:about="#Return_Activities"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#float"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="Parts_Needed_for_Maintenace">
  <rdfs:domain rdf:resource="#Equipment"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="New_Cost_Model_Slot_39">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#FunctionalProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:label>New Cost Model_Slot_39</rdfs:label>
</owl:DatatypeProperty>
<owl:DatatypeProperty rdf:ID="narrower">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#KB"/>
</owl:DatatypeProperty>
<owl:FunctionalProperty rdf:ID="C_Partner_s_Fax_Number">

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<rdfs:domain rdf:resource="#Partners"/>
<rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
<rdfs:label>C_Partner's_Fax_Number</rdfs:label>
<rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Hours_to_Accomplish_Activity">
  <rdfs:range>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Frequency_Drivers"/>
        <owl:Class rdf:about="#Duration_Drivers"/>
        <owl:Class rdf:about="#Physical_Drivers"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:range>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#ObjectProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Power_Consumption">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Facilities"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Communications_Bill_Amount">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Facilities"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Suupply_Chain_Cost">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="documentation">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Process_Number">
  <rdfs:domain rdf:resource="#Management_Processes"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Bonus">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Management"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>

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</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Land_Size">
  <rdfs:domain rdf:resource="#Land"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Order_or_Invoice_Number">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Delivery_type"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="D_Partner_s_Country">
  <rdfs:label>D_Partner's_Country</rdfs:label>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Partners"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Facility_Location">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Facilities"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="New_Cost_Model_Slot_10066">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:label>New Cost Model_Slot_10066</rdfs:label>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Number_of_Hours_if_Rented">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Equipment"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Job_Title">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#People"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Taxes_Amount">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Facilities"/>

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    <owl:Class rdf:about="#Land"/>
  </owl:unionOf>
</owl:Class>
</rdfs:domain>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Absence_Hours">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Hourly_Employee"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Category_Definition">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Management_Processes"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Marital_Status">
  <rdfs:domain rdf:resource="#People"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Number_of_Setups_per_Week">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Equipment"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Job_Discription">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#People"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Rental_or_Mortgage_Amount">
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Facilities"/>
        <owl:Class rdf:about="#Land"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Product_Dimension">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>

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    <rdfs:domain rdf:resource="#Physical_Products"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Units">
    <rdfs:domain rdf:resource="#Physical_Products"/>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="cui">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
    <rdfs:domain rdf:resource="#KB"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Land_Location">
    <rdfs:domain rdf:resource="#Land"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="New_Cost_Model_Slot_45">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
    <rdfs:label>New Cost Model_Slot_45</rdfs:label>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Overtime_Hours">
    <rdfs:domain rdf:resource="#Hourly_Employee"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Email">
    <rdfs:domain rdf:resource="#People"/>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Power_or_Fuel_Consumption">
    <rdfs:domain rdf:resource="#Equipment"/>
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty
rdf:ID="Number_of_Human_Resources_to_Accomplish_Activity">
    <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#int"/>
    <rdfs:domain>
    <owl:Class>
    <owl:unionOf rdf:parseType="Collection">

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    <owl:Class rdf:about="#Plan_Activities"/>
    <owl:Class rdf:about="#Source_Activities"/>
    <owl:Class rdf:about="#Make_Activities"/>
    <owl:Class rdf:about="#Enable_Activities"/>
    <owl:Class rdf:about="#Deliver_Activities"/>
    <owl:Class rdf:about="#Return_Activities"/>
  </owl:unionOf>
</owl:Class>
</rdfs:domain>
<rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Amount">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Raw_Material"/>
        <owl:Class rdf:about="#Physical_Products"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Hourly_Rate">
  <rdfs:label>Hourly Rate</rdfs:label>
  <rdfs:domain rdf:resource="#Services"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Number_of_Hours_to_Accomplish_Activity">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain>
    <owl:Class>
      <owl:unionOf rdf:parseType="Collection">
        <owl:Class rdf:about="#Plan_Activities"/>
        <owl:Class rdf:about="#Source_Activities"/>
        <owl:Class rdf:about="#Make_Activities"/>
        <owl:Class rdf:about="#Enable_Activities"/>
        <owl:Class rdf:about="#Deliver_Activities"/>
        <owl:Class rdf:about="#Return_Activities"/>
      </owl:unionOf>
    </owl:Class>
  </rdfs:domain>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#int"/>

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</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Hourly_Rate_if_Rented">
  <rdfs:domain rdf:resource="#Equipment"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Product_Weight">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdfs:domain rdf:resource="#Physical_Products"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Shipping_Cost">
  <rdfs:domain rdf:resource="#Delivery_type"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#float"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Machine_Type">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Equipment"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Weight">
  <rdfs:domain rdf:resource="#Raw_Material"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Size">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Raw_Material"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Sex">
  <rdfs:domain rdf:resource="#People"/>
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
</owl:FunctionalProperty>
<owl:FunctionalProperty rdf:ID="Salary">
  <rdfs:range rdf:resource="http://www.w3.org/2001/XMLSchema#string"/>
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#DatatypeProperty"/>
  <rdfs:domain rdf:resource="#Salary_Employee"/>
</owl:FunctionalProperty>
<HD_Suppliers rdf:ID="Maxtor">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.maxtor.com</A_Partner_s_Website>

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</HD_Suppliers>
<Raw_Material rdf:ID="Chases">
  <Provided_by>
    <Chases_Supplier rdf:ID="Acer">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.acer.com</A_Partner_s_Website>
    </Chases_Supplier>
  </Provided_by>
  <Provided_by>
    <Chases_Supplier rdf:ID="MSI">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.msi.com</A_Partner_s_Website>
    </Chases_Supplier>
  </Provided_by>
  <Name>
    <Make_to_Order_Products rdf:ID="Make_to_Order_Chases"/>
  </Name>
</Raw_Material>
<Source_Return_Activities rdf:ID="Recover___Disposition_Excess_Product">
  <Activity_Cost_Type>
    <Direct_Variable_Cost rdf:ID="Product_Labor_Cost"/>
  </Activity_Cost_Type>
  <rdfs:label>Recover & Disposition Excess Product</rdfs:label>
  <Returning_Cost_Drivers>
    <Frequency_Drivers rdf:ID="Number_of_Returns"/>
  </Returning_Cost_Drivers>
</Source_Return_Activities>
<Raw_Material rdf:ID="Keyboard_and_mouse">
  <Provided_by>
    <Keyboard_and_Mouse_Suppliers rdf:ID="logitech">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.logitech.com</A_Partner_s_Website>
    </Keyboard_and_Mouse_Suppliers>
  </Provided_by>
  <Name>
    <Make_to_Order_Products rdf:ID="Make_to_Order_Keyboard_Mouse"/>
  </Name>
</Raw_Material>
<Monitors_Suppliers rdf:ID="View_Sonic">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.viewsonic.com</A_Partner_s_Website>

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</Monitors_Suppliers>
<Delivery_type rdf:ID="Standard_Three_Days_Delivery"/>
<Enable_Activities rdf:ID="Manage_Supplier_Network">
  <Resources_Used>
    <Management rdf:ID="Management_Employee"/>
  </Resources_Used>
  <Resources_Used>
    <Facilities rdf:ID="Company_Headquarter">
      <Facility_Location rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Charlotte, North Carolina</Facility_Location>
      <Rental_or_Mortgage_Amount
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >$7500.00</Rental_or_Mortgage_Amount>
      <Power_Consumption rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >$1700.00</Power_Consumption>
      <Water_Consumption rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >$200.00</Water_Consumption>
      <Facility_Size rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >10000 SqFt</Facility_Size>
    </Facilities>
  </Resources_Used>
  <Activity_Cost_Type>
    <Indirect_Variable_Cost rdf:ID="Administrative_Cost"/>
  </Activity_Cost_Type>
  <Enabling_Cost_Drivers>
    <Duration_Drivers rdf:ID="Administrative_Hours"/>
  </Enabling_Cost_Drivers>
</Enable_Activities>
<Raw_Material rdf:ID="RAM">
  <Provided_by>
    <RAM_Suppliers rdf:ID="Kingstone">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.kingstone.com</A_Partner_s_Website>
    </RAM_Suppliers>
  </Provided_by>
  <Provided_by>
    <RAM_Suppliers rdf:ID="Simple_Tech">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.simpletech.com</A_Partner_s_Website>
    </RAM_Suppliers>
  </Provided_by>
</Provided_by>

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    <RAM_Suppliers rdf:ID="Edge">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.edgetechnology.com</A_Partner_s_Website>
    </RAM_Suppliers>
  </Provided_by>
  <Name>
    <Make_to_Order_Products rdf:ID="Make_to_Order_RAM"/>
  </Name>
</Raw_Material>
<Make_to_Order_Products rdf:ID="Make_to_Order_CPU"/>
<Deliver_Activities rdf:ID="Select_Carriers__Rate_Shipments">
  <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
  <Delivery_Cost_Drivers>
    <Duration_Drivers rdf:ID="Time_to_Identify_and_Select_Supplier_or_Source"/>
  </Delivery_Cost_Drivers>
  <rdfs:label>Select Carriers & Rate Shipments</rdfs:label>
</Deliver_Activities>
<Raw_Material rdf:ID="CPU">
  <Provided_by>
    <CPU_Suppliers rdf:ID="Intel">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.intel.com</A_Partner_s_Website>
    </CPU_Suppliers>
  </Provided_by>
  <Provided_by>
    <CPU_Suppliers rdf:ID="AMD">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.amd.com</A_Partner_s_Website>
    </CPU_Suppliers>
  </Provided_by>
  <Name rdf:resource="#Make_to_Order_CPU"/>
</Raw_Material>
<Deliver_Activities rdf:ID="Stock_Shelf">
  <rdfs:label>Stock Shelf</rdfs:label>
  <Delivery_Cost_Drivers>
    <Duration_Drivers rdf:ID="Material_Handling_Hours"/>
  </Delivery_Cost_Drivers>
  <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
</Deliver_Activities>
<My_Enterprize_Hourly_Employee rdf:ID="Jim">
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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>Computer Technician Inspector</Job_Title>
<Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Married</Marital_Status>
<Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Assembly</Department>
<Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Male</Sex>
</My_Enterprize_Hourly_Employee>
<Network_Card_Suppliers rdf:ID="_3Com">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.3com.com</A_Partner_s_Website>
  <rdfs:label>3Com</rdfs:label>
</Network_Card_Suppliers>
<Enable rdf:ID="Enable_Plan">
  <Activity>
    <Enable_Activities rdf:ID="Manage_Capital_Assets">
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    </Enable_Activities>
  </Activity>
  <Activity>
    <Enable_Activities rdf:ID="Manage_Product_Inventory">
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    </Enable_Activities>
  </Activity>
  <Activity>
    <Enable_Activities rdf:ID="Manage_Regulatory_Requirements_and_Compliance">
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    </Enable_Activities>
  </Activity>
  <Activity>
    <Enable_Activities
rdf:ID="Allign_Supply_Chain_Unit_Plan_With_Financial_Plan">
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Average_Hourly_Rate rdf:datatype="http://www.w3.org/2001/XMLSchema#float"
      >75.0</Average_Hourly_Rate>

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    <Number_of_Human_Resources_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Human_Resources_to_Acc
omplish_Activity>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Act
ivity>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Resources_Used rdf:resource="#Management_Employee"/>
    </Enable_Activities>
</Activity>
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>Cost</Performance_Attributes>
<Performance_Attributes rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Reliability</Performance_Attributes>
<Activity>
    <Enable_Activities rdf:ID="Manage_Data_Collection">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    </Enable_Activities>
</Activity>
<Performance_Attributes rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Responsivness</Performance_Attributes>
<Activity>
    <Enable_Activities rdf:ID="Manage_Performance">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    </Enable_Activities>
</Activity>
<Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>EP</Process_Number>
<Activity>
    <Enable_Activities rdf:ID="Manage_Rules">
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    </Enable_Activities>

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</Activity>
<Activity>
  <Enable_Activities rdf:ID="Manage_Configuration">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
  </Enable_Activities>
</Activity>
<Performance_Attributes rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Flexibility</Performance_Attributes>
<Performance_Attributes rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Assets</Performance_Attributes>
<Activity>
  <Enable_Activities rdf:ID="Manage_Transportation">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
  </Enable_Activities>
</Activity>
</Enable>
<Graphic_Card_Suppliers rdf:ID="ATI_Technologies_Inc">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.ati.com</A_Partner_s_Website>
</Graphic_Card_Suppliers>
<Duration_Drivers rdf:ID="Time_to_Create_Return_Authorization"/>
<Duration_Drivers rdf:ID="Inspection_Time"/>
<Supplier_of_Suppliers rdf:ID="System_General_Corporation">
  <J_Partner_s_Management_Process>
    <Enable rdf:ID="Enable_Source">
      <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Responsivness</Performance_Attributes>
      <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Assets</Performance_Attributes>
      <Activity rdf:resource="#Manage_Product_Inventory"/>
    </Activity>
    <Enable_Activities rdf:ID="Manage_Supplier_Agreements">
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    </Enable_Activities>
  </J_Partner_s_Management_Process>
</Supplier_of_Suppliers>
</Duration_Drivers>
</Duration_Drivers>
</Graphic_Card_Suppliers>
</Enable>
</Performance_Attributes>
</Performance_Attributes>
</Supplier_of_Suppliers>
</Activity>
</Activity>

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    </Enable_Activities>
  </Activity>
  <Activity rdf:resource="#Manage_Rules"/>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Flexibility</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Cost</Performance_Attributes>
  <Activity>
    <Enable_Activities rdf:ID="Manage_Incoming_Products">
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
    </Enable_Activities>
  </Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Reliability</Performance_Attributes>
  <Activity>
    <Enable_Activities rdf:ID="Manage_Import_Export_Requirements">
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    </Enable_Activities>
  </Activity>
  <Activity rdf:resource="#Manage_Performance"/>
  <Activity rdf:resource="#Manage_Supplier_Network"/>
  <Activity rdf:resource="#Manage_Capital_Assets"/>
  <Activity rdf:resource="#Manage_Data_Collection"/>
</Enable>
</J_Partner_s_Management_Process>
<C_Partner_s_Fax_Number
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >886-2-29111283</C_Partner_s_Fax_Number>
<B_Partners_Phone_Number
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >886-2-29173005</B_Partners_Phone_Number>
<J_Partner_s_Management_Process>
  <Deliver_Return rdf:ID="DR_Excess_Product">
    <Activity>
      <Deliver_Return_Activities rdf:ID="Identify_Excess_Inventory">

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    <Activity_Cost_Type>
      <Direct_Variable_Cost rdf:ID="Delivery_Cost"/>
    </Activity_Cost_Type>
    <Returning_Cost_Drivers>
      <Frequency_Drivers rdf:ID="Number_of_Inspections"/>
    </Returning_Cost_Drivers>
    <Activity_Cost_Type>
      <Direct_Variable_Cost rdf:ID="Warranty_Cost"/>
    </Activity_Cost_Type>
    <rdfs:label>Identify Excess Inventory</rdfs:label>
    <Returning_Cost_Drivers rdf:resource="#Inspection_Time"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
  </Deliver_Return_Activities>
</Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Reliability</Performance_Attributes>
<Activity>
  <Deliver_Return_Activities rdf:ID="Receive_Excess_Product">
    <Returning_Cost_Drivers>
      <Frequency_Drivers rdf:ID="Number_of_Receivings"/>
    </Returning_Cost_Drivers>
    <rdfs:label>Receive Excess Product</rdfs:label>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
  </Deliver_Return_Activities>
</Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Cost</Performance_Attributes>
<Activity>
  <Deliver_Return_Activities rdf:ID="Schedule_Product_Shipment">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Schedule Product Shipment</rdfs:label>
    <Returning_Cost_Drivers>
      <Frequency_Drivers rdf:ID="Number_of_Shipments"/>
    </Returning_Cost_Drivers>
  </Deliver_Return_Activities>
</Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Assets</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Flexibility</Performance_Attributes>

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    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >DR3</Process_Number>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity>
    <Deliver_Return_Activities rdf:ID="Request_Return_Replacement_or_Credit">
    <Returning_Cost_Drivers>
    <Duration_Drivers rdf:ID="Time_to_Request_replacement_or_Credit"/>
    </Returning_Cost_Drivers>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Request Return Replacement or Credit</rdfs:label>
    </Deliver_Return_Activities>
    </Activity>
    </Deliver_Return>
    </J_Partner_s_Management_Process>
    <J_Partner_s_Management_Process>
    <Deliver rdf:ID="D1_Deliver_Stocked_Product">
    <Activity>
    <Deliver_Activities rdf:ID="Plan__Build_Loads">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <rdfs:label>Plan & Build Loads</rdfs:label>
    <Resources_Used>
    <Hourly_Employee rdf:ID="Hourly_Employee_Resource"/>
    </Resources_Used>
    <Delivery_Cost_Drivers>
    <Frequency_Drivers rdf:ID="Number_of_Customer_Orders"/>
    </Delivery_Cost_Drivers>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    </Deliver_Activities>
    </Activity>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#Select_Carriers__Rate_Shipments"/>
    <Activity>
    <Deliver_Activities rdf:ID="Receive_Enter__Validate_Order">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Receive Enter & Validate Order</rdfs:label>
    <Delivery_Cost_Drivers>
    <Duration_Drivers rdf:ID="Ordering_Hours"/>
    </Delivery_Cost_Drivers>

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    </Deliver_Activities>
  </Activity>
  <Activity>
    <Deliver_Activities rdf:ID="Route_Shipments">
      <rdfs:label>Route Shipments</rdfs:label>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Delivery_Cost_Drivers>
        <Duration_Drivers rdf:ID="Time_to_Transfer_Item"/>
      </Delivery_Cost_Drivers>
    </Deliver_Activities>
  </Activity>
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  >D1</Process_Number>
  <Activity>
    <Deliver_Activities rdf:ID="Test__Install_Product">
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Delivery_Cost_Drivers rdf:resource="#Number_of_Inspections"/>
      <Delivery_Cost_Drivers rdf:resource="#Inspection_Time"/>
      <rdfs:label>Test & amp; Install Product</rdfs:label>
    </Deliver_Activities>
  </Activity>
  <Activity>
    <Deliver_Activities rdf:ID="Reserve_Inventory__Determine_Delivery_Date">
      <rdfs:label>Reserve Inventory & amp; Determine Delivery Date</rdfs:label>
      <Delivery_Cost_Drivers rdf:resource="#Material_Handling_Hours"/>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    </Deliver_Activities>
  </Activity>
  <Activity>
    <Deliver_Activities rdf:ID="Invoice">
      <Delivery_Cost_Drivers>
        <Duration_Drivers rdf:ID="Time_to_Create_Invoice"/>
      </Delivery_Cost_Drivers>
      <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
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  >Flexibility</Performance_Attributes>

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  <Deliver_Activities rdf:ID="Process_Inquiry__Quote">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
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    <Delivery_Cost_Drivers rdf:resource="#Number_of_Customer_Orders"/>
  </Deliver_Activities>
</Activity>
<Activity>
  <Deliver_Activities rdf:ID="Consolidate_Orders">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Delivery_Cost_Drivers>
      <Frequency_Drivers rdf:ID="Number_of_Purchase_Orders"/>
    </Delivery_Cost_Drivers>
    <rdfs:label>Consolidate Orders</rdfs:label>
    <Delivery_Cost_Drivers rdf:resource="#Ordering_Hours"/>
  </Deliver_Activities>
</Activity>
<Activity>
  <Deliver_Activities
rdf:ID="Load_Vehicle__Generate_Ship_Docs__Verify_Credit__Ship_Product">
    <Delivery_Cost_Drivers rdf:resource="#Number_of_Shipments"/>
    <rdfs:label>Load Vehicle, Generate Ship Docs, Verify Credit & Ship
Product</rdfs:label>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
  </Deliver_Activities>
</Activity>
<Activity>
  <Deliver_Activities rdf:ID="Receive_Product_at_Warehouse">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Receive Product at Warehouse</rdfs:label>
    <Delivery_Cost_Drivers rdf:resource="#Number_of_Receivings"/>
  </Deliver_Activities>
</Activity>
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<Activity>
  <Deliver_Activities rdf:ID="Receive__Verify_Product_at_Customer_Site">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Delivery_Cost_Drivers rdf:resource="#Number_of_Receivings"/>

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    <Delivery_Cost_Drivers>
      <Duration_Drivers rdf:ID="Time_to_Verify_Product"/>
    </Delivery_Cost_Drivers>
    <rdfs:label>Receive & Verify Product at Customer Site</rdfs:label>
  </Deliver_Activities>
</Activity>
<Activity>
  <Deliver_Activities rdf:ID="Pick_Stage_Product">
    <rdfs:label>Pick Stage Product</rdfs:label>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Delivery_Cost_Drivers>
      <Duration_Drivers rdf:ID="Receiving_and_Storing_Hours"/>
    </Delivery_Cost_Drivers>
  </Deliver_Activities>
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  >SR3</Process_Number>
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  >Responsivness</Performance_Attributes>
  <Activity>
    <Source_Return_Activities rdf:ID="Receive_Excess_Product_Return">
      <Returning_Cost_Drivers rdf:resource="#Number_of_Receivings"/>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <rdfs:label>Receive Excess Product Return</rdfs:label>
    </Source_Return_Activities>
  </Activity>
</Activity>
  <Source_Return_Activities rdf:ID="Approve_Request_Authorization">
    <Activity_Cost_Type rdf:resource="#Warranty_Cost"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Returning_Cost_Drivers rdf:resource="#Number_of_Returns"/>

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        <rdfs:label>Approve Request Authorization</rdfs:label>
    </Source_Return_Activities>
</Activity>
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    >Assets</Performance_Attributes>
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            <Returning_Cost_Drivers rdf:resource="#Time_to_Verify_Product"/>
            <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
            <rdfs:label>Verify Excess Product</rdfs:label>
        </Source_Return_Activities>
    </Activity>
    <Activity>
        <Source_Return_Activities rdf:ID="Authorize_Replacement_or_Credit">
            <Returning_Cost_Drivers
rdf:resource="#Time_to_Request_replacement_or_Credit"/>
            <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
            <rdfs:label>Authorize Replacement or Credit</rdfs:label>
        </Source_Return_Activities>
    </Activity>
        <Activity rdf:resource="#Recover___Disposition_Excess_Product"/>
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</J_Partner_s_Management_Process>
<E_Partner_s_Address rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>8F, No. 205-3, Sec. 3, Beishin Road</E_Partner_s_Address>
<J_Partner_s_Management_Process>
    <Enable rdf:ID="Enable_Make">
        <Activity>
            <Enable_Activities rdf:ID="Manage_Information">
                <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
                <Resources_Used rdf:resource="#Management_Employee"/>
                <Resources_Used rdf:resource="#Company_Headquarter"/>
                <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
            </Enable_Activities>
        </Activity>
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>Responsivness</Performance_Attributes>
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  <Enable_Activities rdf:ID="Manage_In_Process_Products__WIP_">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <rdfs:label>Manage_In_Process_Products_(WIP)</rdfs:label>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
  </Enable_Activities>
</Activity>
<Activity rdf:resource="#Manage_Regulatory_Requirements_and_Compliance"/>
<Activity>
  <Enable_Activities rdf:ID="Mange_Equipment_and_Facilities">
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
  </Enable_Activities>
</Activity>
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rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Cost</Performance_Attributes>
  <Activity rdf:resource="#Manage_Rules"/>
  <Activity rdf:resource="#Manage_Performance"/>
  <Activity rdf:resource="#Manage_Transportation"/>
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rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assets</Performance_Attributes>
  <Activity>
    <Enable_Activities rdf:ID="Manage_production_Network">
      <Resources_Used rdf:resource="#Management_Employee"/>
      <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    </Enable_Activities>
  </Activity>
</Enable>
</J_Partner_s_Management_Process>

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<J_Partner_s_Management_Process>
  <Deliver rdf:ID="D2_Deliver_Make_to_Order_Products">
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    <Activity rdf:resource="#Plan__Build_Loads"/>
    <Activity rdf:resource="#Receive_Enter__Validate_Order"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#Route_Shipments"/>
    <Activity rdf:resource="#Select_Carriers__Rate_Shipments"/>
    <Activity rdf:resource="#Process_Inquiry__Quote"/>
    <Activity rdf:resource="#Receive__Verify_Product_at_Customer_Site"/>
    <Activity rdf:resource="#Reserve_Inventory__Determine_Delivery_Date"/>
    <Activity rdf:resource="#Pick_Stage_Product"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity
rdf:resource="#Load_Vehicle__Generate_Ship_Docs__Verify_Credit__Ship_Product"/
    >
    <Activity rdf:resource="#Consolidate_Orders"/>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >D2</Process_Number>
    <Activity rdf:resource="#Invoice"/>
    <Activity rdf:resource="#Test__Install_Product"/>
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    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
  </Deliver>
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  <Deliver rdf:ID="D4_Deliver_Retail_Product">
    <Activity>
    <Deliver_Activities rdf:ID="Fill_Shopping_Cart">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Fill Shopping Cart</rdfs:label>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Delivery_Cost_Drivers rdf:resource="#Ordering_Hours"/>
  </Activity>
  </Deliver>
</J_Partner_s_Management_Process>

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    <Delivery_Cost_Drivers rdf:resource="#Number_of_Purchase_Orders"/>
  </Deliver_Activities>
</Activity>
<Activity rdf:resource="#Stock_Shelf"/>
<Activity>
  <Deliver_Activities rdf:ID="Checkout">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Delivery_Cost_Drivers rdf:resource="#Number_of_Shipments"/>
  </Deliver_Activities>
</Activity>
<Activity>
  <Deliver_Activities rdf:ID="Deliver_and_or_Install">
    <Activity_Cost_Type>
      <Direct_Variable_Cost rdf:ID="Installation_and_Setup_Cost"/>
    </Activity_Cost_Type>
    <Delivery_Cost_Drivers>
      <Duration_Drivers rdf:ID="Setup_Time"/>
    </Delivery_Cost_Drivers>
    <Activity_Cost_Type rdf:resource="#Delivery_Cost"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <rdfs:label>Deliver and/or Install</rdfs:label>
    <Resources_Used>
      <Moving_Equipment rdf:ID="Delivery_Van">
        <Power_or_Fuel_Consumption
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
          >17 gallons per week</Power_or_Fuel_Consumption>
        <Machine_Type rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
          >Van</Machine_Type>
        <Machine_Setup_Time
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
          >0</Machine_Setup_Time>
        </Moving_Equipment>
      </Resources_Used>
      <Delivery_Cost_Drivers rdf:resource="#Time_to_Transfer_Item"/>
    </Deliver_Activities>
  </Activity>
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rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Pick_Stage_Product"/>
    <Activity>
    <Deliver_Activities rdf:ID="Receive_Product_at_Store">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Receive Product at Store</rdfs:label>
    <Delivery_Cost_Drivers rdf:resource="#Number_of_Receivings"/>
    </Deliver_Activities>
    </Activity>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >D4</Process_Number>
    <Activity>
    <Deliver_Activities rdf:ID="Generate_Stocking_Schedule">
    <Delivery_Cost_Drivers rdf:resource="#Receiving_and_Storing_Hours"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Generate Stocking Schedule</rdfs:label>
    <Delivery_Cost_Drivers rdf:resource="#Material_Handling_Hours"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    </Deliver_Activities>
    </Activity>
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    <Performance_Attributes
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    >Cost</Performance_Attributes>
    </Deliver>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Deliver_Return rdf:ID="DR_Defective_Product">
    <Activity>
    <Deliver_Return_Activities rdf:ID="Receive_Defective_Product">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Returning_Cost_Drivers rdf:resource="#Number_of_Receivings"/>
    <rdfs:label>Receive Defective Product</rdfs:label>
    </Deliver_Return_Activities>
    </Activity>

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    <Performance_Attributes
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    <Deliver_Return_Activities rdf:ID="Schedule_Product_Return">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <rdfs:label>Schedule Product Return</rdfs:label>
    <Returning_Cost_Drivers rdf:resource="#Number_of_Returns"/>
    </Deliver_Return_Activities>
    </Activity>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Request_Return_Replacement_or_Credit"/>
    <Activity>
    <Deliver_Return_Activities rdf:ID="Authorize_Return">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Returning_Cost_Drivers
rdf:resource="#Time_to_Create_Return_Authorization"/>
    <Returning_Cost_Drivers rdf:resource="#Number_of_Returns"/>
    <rdfs:label>Authorize Return</rdfs:label>
    <Activity_Cost_Type rdf:resource="#Warranty_Cost"/>
    <Activity_Cost_Type rdf:resource="#Delivery_Cost"/>
    </Deliver_Return_Activities>
    </Activity>
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    >DR1</Process_Number>
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    >Assets</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    </Deliver_Return>
    </J_Partner_s_Management_Process>
    <J_Partner_s_Management_Process>
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    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >P3</Process_Number>
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    >Flexibility</Performance_Attributes>
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    >Assets</Performance_Attributes>
    <Activity>
    <Identify_Prioritize-Aggregate rdf:ID="IPA_Resources">
    <Activity_Cost_Type>
    <Indirect_Variable_Cost rdf:ID="Employee_Travel_Cost"/>
    </Activity_Cost_Type>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">7</Number_of_Hours_to_Accomplish_Activity>
    <Resources_Used>
    <Money rdf:ID="Aux_Account"/>
    </Resources_Used>
    <Resources_Used>
    <Money rdf:ID="Loan_Account"/>
    </Resources_Used>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Activity_Cost_Type>
    <Indirect_Variable_Cost rdf:ID="Utilities_Cost"/>
    </Activity_Cost_Type>
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >3</Number_of_Human_Resources_to_Accomplish_Activity>
    <Planning_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Activity_Cost_Type>
    <Indirect_Variable_Cost rdf:ID="Supplies_Cost"/>
    </Activity_Cost_Type>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used>
    <Money rdf:ID="Expense_Account"/>
    </Resources_Used>
    <Average_Hourly_Rate
rdf:datatype="http://www.w3.org/2001/XMLSchema#float"
    >75.0</Average_Hourly_Rate>
    <Resources_Used>
    <Money rdf:ID="Purchasing_Account"/>
    </Resources_Used>

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<Resources_Used>
  <Money rdf:ID="Salary_Account"/>
</Resources_Used>
<Activity_Cost_Type>
  <Indirect_Variable_Cost rdf:ID="Communication_Cost"/>
</Activity_Cost_Type>
<Activity_Cost_Type>
  <Indirect_Variable_Cost rdf:ID="Employee_Benefits_Cost"/>
</Activity_Cost_Type>
</Identify_Prioritize-Aggregate>
</Activity>

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<Activity>
  <Balance_Resources_and_Requirements rdf:ID="Balance_Requirements">
    <Resources_Used rdf:resource="#Purchasing_Account"/>
    <Resources_Used rdf:resource="#Aux_Account"/>
    <Planning_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Activity_Cost_Type rdf:resource="#Supplies_Cost"/>
    <Activity_Cost_Type rdf:resource="#Employee_Benefits_Cost"/>
    <Activity_Cost_Type rdf:resource="#Communication_Cost"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Expense_Account"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
      rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >3</Number_of_Human_Resources_to_Accomplish_Activity>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=

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"http://www.w3.org/2001/XMLSchema#int">8</Number_of_Hours_to_Accomplish_Activity>

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  <Resources_Used rdf:resource="#Salary_Account"/>
  <Activity_Cost_Type rdf:resource="#Employee_Travel_Cost"/>
  <Resources_Used rdf:resource="#Loan_Account"/>
  <Activity_Cost_Type rdf:resource="#Utilities_Cost"/>
</Balance_Resources_and_Requirements>

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</Activity>
<Activity>
  <Establish_and_Communicate_Plans rdf:ID="Communicate_Plans">
    <Activity_Cost_Type rdf:resource="#Communication_Cost"/>
    <Resources_Used rdf:resource="#Salary_Account"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Resources_Used rdf:resource="#Purchasing_Account"/>
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"http://www.w3.org/2001/XMLSchema#int">5</Number_of_Hours_to_Accomplish_Activity>
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  <Resources_Used rdf:resource="#Expense_Account"/>
  <Planning_Cost_Drivers rdf:resource="#Administrative_Hours"/>
  <Number_of_Human_Resources_to_Accomplish_Activity
    rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
  >3</Number_of_Human_Resources_to_Accomplish_Activity>
  <Resources_Used rdf:resource="#Aux_Account"/>
  <Resources_Used rdf:resource="#Management_Employee"/>
  <Resources_Used rdf:resource="#Loan_Account"/>
</Establish_and_Communicate_Plans>
</Activity>
<Activity>
  <Balance_Resources_and_Requirements rdf:ID="Balance_Resources">
    <Resources_Used rdf:resource="#Aux_Account"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Activity_Cost_Type rdf:resource="#Communication_Cost"/>
    <Activity_Cost_Type rdf:resource="#Employee_Travel_Cost"/>
    <Activity_Cost_Type rdf:resource="#Employee_Benefits_Cost"/>
    <Resources_Used rdf:resource="#Expense_Account"/>
    <Planning_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Resources_Used rdf:resource="#Loan_Account"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
      rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
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    <Number_of_Hours_to_Accomplish_Activity rdf:datatype="
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  <Activity_Cost_Type rdf:resource="#Utilities_Cost"/>
  <Resources_Used rdf:resource="#Company_Headquarter"/>
  <Resources_Used rdf:resource="#Purchasing_Account"/>
  <Activity_Cost_Type rdf:resource="#Supplies_Cost"/>
  <Resources_Used rdf:resource="#Salary_Account"/>
  <Resources_Used rdf:resource="#Management_Employee"/>
</Balance_Resources_and_Requirements>
</Activity>
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<Activity>
  <Establish_and_Communicate_Plans rdf:ID="Establish_Plans">

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    <Resources_Used rdf:resource="#Purchasing_Account"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">5</Number_of_Hours_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Expense_Account"/>
    <Resources_Used rdf:resource="#Aux_Account"/>
    <Activity_Cost_Type rdf:resource="#Communication_Cost"/>
    <Resources_Used rdf:resource="#Salary_Account"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
>3</Number_of_Human_Resources_to_Accomplish_Activity>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Planning_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Resources_Used rdf:resource="#Loan_Account"/>
  </Establish_and_Communicate_Plans>
</Activity>
<Activity>
  <Identify_Prioritize-Aggregate rdf:ID="IPA_Requirements">
    <Average_Hourly_Rate
rdf:datatype="http://www.w3.org/2001/XMLSchema#float"
>75.0</Average_Hourly_Rate>
    <Resources_Used rdf:resource="#Loan_Account"/>
    <Planning_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Activity_Cost_Type rdf:resource="#Communication_Cost"/>
    <Resources_Used rdf:resource="#Aux_Account"/>
    <Activity_Cost_Type rdf:resource="#Supplies_Cost"/>
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Purchasing_Account"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">8</Number_of_Hours_to_Accomplish_Activity>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    <Activity_Cost_Type rdf:resource="#Employee_Benefits_Cost"/>
    <Activity_Cost_Type rdf:resource="#Employee_Travel_Cost"/>
    <Resources_Used rdf:resource="#Expense_Account"/>
    <Resources_Used rdf:resource="#Salary_Account"/>
    <Activity_Cost_Type rdf:resource="#Utilities_Cost"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"

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    >3</Number_of_Human_Resources_to_Accomplish_Activity>
  </Identify_Prioritize-Aggregate>
</Activity>
  <Category_Definition rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >The development and establishment of courses of action over specified time
periods that represent a projected appropriation of production resources to meet
production requirements</Category_Definition>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Responsivness</Performance_Attributes>
</Plan>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
  <Plan rdf:ID="P4_Plan_Deliver">
    <Category_Definition rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >The development and establishment of courses of action over specified time
periods that represent a projected appropriation of delivery resources to meet delivery
requirements</Category_Definition>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#Balance_Requirements"/>
    <Activity rdf:resource="#Establish_Plans"/>
    <Activity rdf:resource="#Communicate_Plans"/>
    <Activity rdf:resource="#IPA_Resources"/>
    <Activity rdf:resource="#IPA_Requirements"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#Balance_Resources"/>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >P4</Process_Number>
  </Plan>
</J_Partner_s_Management_Process>

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    <H-Partner_s_Contact_Person
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Mr. Tom Yang</H-Partner_s_Contact_Person>
    <J_Partner_s_Management_Process>
    <Make rdf:ID="Make_Engineer_to_Order">
    <Activity>
    <Make_Activities rdf:ID="Finalize_Engineering">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">5</Number_of_Hours_to_Accomplish_Act
ivity>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Making_Cost_Drivers>
    <Duration_Drivers rdf:ID="Total_Engineering_Hours"/>
    </Making_Cost_Drivers>
    <rdfs:label>Finalize Engineering</rdfs:label>
    </Make_Activities>
    </Activity>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity>
    <Make_Activities rdf:ID="Release_Finished_Product_to_Deliver">
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Making_Cost_Drivers>
    <Frequency_Drivers rdf:ID="Number_of_Scheduled_Deliveries"/>
    </Making_Cost_Drivers>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Act
ivity>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    </Make_Activities>
    </Activity>
    <Activity>

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    <Make_Activities rdf:ID="Schedule_Production_Activities">
      <Number_of_Human_Resources_to_Accomplish_Activity
        rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
      >1</Number_of_Human_Resources_to_Accomplish_Activity>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Making_Cost_Drivers rdf:resource="#Number_of_Customer_Orders"/>
      <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
      <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
    </Make_Activities>
  </Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Responsivness</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assets</Performance_Attributes>
  <Activity>
    <Make_Activities rdf:ID="Stage_Finished_Products">
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Number_of_Human_Resources_to_Accomplish_Activity
        rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
      >1</Number_of_Human_Resources_to_Accomplish_Activity>
      <Making_Cost_Drivers rdf:resource="#Material_Handling_Hours"/>
      <Making_Cost_Drivers>
        <Frequency_Drivers rdf:ID="Number_of_Times_Handled"/>
      </Making_Cost_Drivers>
      <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    </Make_Activities>
  </Activity>
  <Activity>
    <Make_Activities rdf:ID="Package">
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Making_Cost_Drivers>
        <Duration_Drivers rdf:ID="Packing_Hours"/>

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    </Making_Cost_Drivers>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
    <Number_of_Human_Resources_to_Accomplish_Activity
    rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
  </Make_Activities>
</Activity>
<Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>M3</Process_Number>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Flexibility</Performance_Attributes>
<Activity>
  <Make_Activities rdf:ID="Issue_Material">
    <Making_Cost_Drivers rdf:resource="#Material_Handling_Hours"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
    rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
  </Make_Activities>
</Activity>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Cost</Performance_Attributes>
<Activity>
  <Make_Activities rdf:ID="Produce_and_Test">
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Making_Cost_Drivers>
      <Duration_Drivers rdf:ID="Time_of_Production_and_Test"/>
    </Making_Cost_Drivers>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
    rdf:datatype="http://www.w3.org/2001/XMLSchema#int"

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    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Making_Cost_Drivers rdf:resource="#Number_of_Inspections"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
    </Make_Activities>
    </Activity>
  </Make>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
  <Source_Return rdf:ID="SR_Defective_Product">
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assets</Performance_Attributes>
    <Activity>
      <Source_Return_Activities rdf:ID="Disposition_Product">
        <rdfs:label>Disposition Product</rdfs:label>
        <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
        <Returning_Cost_Drivers rdf:resource="#Number_of_Returns"/>
      </Source_Return_Activities>
    </Activity>
      <Activity rdf:resource="#Authorize_Replacement_or_Credit"/>
      <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Reliability</Performance_Attributes>
      <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Responsivness</Performance_Attributes>
    </Activity>
      <Source_Return_Activities rdf:ID="Verify_Defective_Product">
        <Returning_Cost_Drivers rdf:resource="#Time_to_Verify_Product"/>
        <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
        <rdfs:label>Verify Defective Product</rdfs:label>
      </Source_Return_Activities>
    </Activity>
      <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >Cost</Performance_Attributes>
      <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >SR1</Process_Number>

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</Source_Return>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
  <Source rdf:ID="S1_Source_Stocked_Product">
    <Activity>
      <Source_Activities rdf:ID="_1_Schedule_Product_Deliveries">
        <rdfs:label>1_Schedule_Product_Deliveries</rdfs:label>
        <Activity_Cost_Type rdf:resource="#Delivery_Cost"/>
        <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
        <Sourcing_Cost_Drivers rdf:resource="#Number_of_Scheduled_Deliveries"/>
        <Number_of_Human_Resources_to_Accomplish_Activity
          rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
        >1</Number_of_Human_Resources_to_Accomplish_Activity>
        <Average_Hourly_Rate
          rdf:datatype="http://www.w3.org/2001/XMLSchema#float"
        >7.5</Average_Hourly_Rate>
        <Number_of_Hours_to_Accomplish_Activity rdf:datatype="
          http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
        <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
        <Resources_Used rdf:resource="#Company_Headquarter"/>
      </Source_Activities>
    </Activity>
    <Activity>
      <Source_Activities rdf:ID="_5_Authorize_Supplier_Payment">
        <Number_of_Human_Resources_to_Accomplish_Activity
          rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
        >1</Number_of_Human_Resources_to_Accomplish_Activity>
        <rdfs:label>5_Authorize_Supplier_Payment</rdfs:label>
        <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
        <Sourcing_Cost_Drivers>
          <Duration_Drivers rdf:ID="Time_to_Authorize_Payment">
            <rdfs:label>Time_to_Authorize_Payment</rdfs:label>
          </Duration_Drivers>
        </Sourcing_Cost_Drivers>
        <Resources_Used rdf:resource="#Company_Headquarter"/>
        <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
        <Number_of_Hours_to_Accomplish_Activity rdf:datatype="
          http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
      </Source_Activities>
    </Activity>
  </Source_Activities>
</Activity>

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    <Performance_Attributes
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    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
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    <Source_Activities rdf:ID="_2_Receive_Product">
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Sourcing_Cost_Drivers>
    <Frequency_Drivers rdf:ID="Number_of_Products_Received"/>
    </Sourcing_Cost_Drivers>
    <Activity_Cost_Type>
    <Direct_Variable_Cost rdf:ID="Cost_of_Raw_Material"/>
    </Activity_Cost_Type>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <rdfs:label>2_Receive_Product</rdfs:label>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
    </Source_Activities>
    </Activity>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >S1</Process_Number>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity>
    <Source_Activities rdf:ID="_4_Transfer_Product">
    <Sourcing_Cost_Drivers rdf:resource="#Time_to_Transfer_Item"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=

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"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
  <Activity_Cost_Type rdf:resource="#Cost_of_Raw_Material"/>
  <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
  <rdfs:label>4_Transfer_Product</rdfs:label>
</Source_Activities>
</Activity>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Cost</Performance_Attributes>
<Activity>
  <Source_Activities rdf:ID="_3_Verify_Product">
    <Number_of_Human_Resources_to_Accomplish_Activity
      rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype=

"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
  <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
  <rdfs:label>3_Verify_Product</rdfs:label>
  <Resources_Used rdf:resource="#Company_Headquarter"/>
  <Sourcing_Cost_Drivers rdf:resource="#Time_to_Verify_Product"/>
  <Activity_Cost_Type rdf:resource="#Cost_of_Raw_Material"/>
</Source_Activities>
</Activity>
</Source>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
  <Source rdf:ID="S3_Source_Engineer_to_Order_Product">
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Assets</Performance_Attributes>
  <Activity>
    <Source_Activities rdf:ID="Select_Final_Supplier">
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Resources_Used rdf:resource="#Company_Headquarter"/>
      <Sourcing_Cost_Drivers
rdf:resource="#Time_to_Identify_and_Select_Supplier_or_Source"/>
      <Number_of_Hours_to_Accomplish_Activity rdf:datatype=

"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>

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    <Number_of_Human_Resources_to_Accomplish_Activity
      rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
  </Source_Activities>
</Activity>
<Activity rdf:resource="#_2_Receive_Product"/>
<Activity rdf:resource="#_3_Verify_Product"/>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Cost</Performance_Attributes>
<Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>S3</Process_Number>
<Activity rdf:resource="#_5_Authorize_Supplier_Payment"/>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Responsivness</Performance_Attributes>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Flexibility</Performance_Attributes>
<Activity rdf:resource="#_1_Schedule_Product_Deliveries"/>
<Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Reliability</Performance_Attributes>
<Activity>
  <Source_Activities rdf:ID="Identify_Sources">
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Sourcing_Cost_Drivers
rdf:resource="#Time_to_Identify_and_Select_Supplier_or_Source"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Number_of_Hours_to_Accomplish_Activity rdf:datatype="
"http://www.w3.org/2001/XMLSchema#int">1</Number_of_Hours_to_Accomplish_Activity>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Number_of_Human_Resources_to_Accomplish_Activity
      rdf:datatype="http://www.w3.org/2001/XMLSchema#int"
    >1</Number_of_Human_Resources_to_Accomplish_Activity>
  </Source_Activities>
</Activity>
<Activity rdf:resource="#_4_Transfer_Product"/>
</Source>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>

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<Source_Return rdf:ID="SR_MRO_Product">
  <Activity>
    <Source_Return_Activities rdf:ID="Schedule_MRO_Shipment">
      <Returning_Cost_Drivers rdf:resource="#Number_of_Shipments"/>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <rdfs:label>Schedule MRO Shipment</rdfs:label>
    </Source_Return_Activities>
  </Activity>
  <Activity>
    <Source_Return_Activities rdf:ID="Request_MRO_Return_Authorization">
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Activity_Cost_Type rdf:resource="#Warranty_Cost"/>
      <Returning_Cost_Drivers rdf:resource="#Number_of>Returns"/>
      <rdfs:label>Request MRO Return Authorization</rdfs:label>
    </Source_Return_Activities>
  </Activity>
  <Activity rdf:resource="#Disposition_Product"/>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Reliability</Performance_Attributes>
  <Activity>
    <Source_Return_Activities rdf:ID="Return_MRO_Product">
      <Returning_Cost_Drivers rdf:resource="#Number_of>Returns"/>
      <Activity_Cost_Type rdf:resource="#Delivery_Cost"/>
      <rdfs:label>Return MRO Product</rdfs:label>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    </Source_Return_Activities>
  </Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Flexibility</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Responsivness</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assets</Performance_Attributes>
  <Activity>
    <Source_Return_Activities rdf:ID="Identify_MRO_Product_Condition">
      <rdfs:label>Identify MRO Product Condition</rdfs:label>
      <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
      <Returning_Cost_Drivers rdf:resource="#Inspection_Time"/>
      <Returning_Cost_Drivers rdf:resource="#Number_of_Inspections"/>
    </Source_Return_Activities>

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    </Activity>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >SR2</Process_Number>
    <Performance_Attributes
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    >Cost</Performance_Attributes>
    </Source_Return>
    </J_Partner_s_Management_Process>
    <J_Partner_s_Management_Process>
    <Make rdf:ID="Make_to_Stock">
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >M1</Process_Number>
    <Activity rdf:resource="#Package"/>
    <Activity rdf:resource="#Release_Finished_Product_to_Deliver"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Issue_Material"/>
    <Activity rdf:resource="#Stage_Finished_Products"/>
    <Activity rdf:resource="#Produce_and_Test"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Activity rdf:resource="#Schedule_Production_Activities"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    </Make>
    </J_Partner_s_Management_Process>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Plan"/>
    <J_Partner_s_Management_Process>
    <Enable rdf:ID="Enable_Return">
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Activity rdf:resource="#Manage_Capital_Assets"/>
    <Activity rdf:resource="#Manage_Performance"/>
    <Activity rdf:resource="#Manage_Rules"/>

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    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Activity rdf:resource="#Manage_Data_Collection"/>
    <Activity rdf:resource="#Manage_Product_Inventory"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Manage_Transportation"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#Manage_Regulatory_Requirements_and_Compliance"/>
    <Activity rdf:resource="#Manage_Configuration"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    </Enable>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Deliver rdf:ID="D3_Deliver_Engineer_to_Order_Product">
    <Activity>
        <Deliver_Activities rdf:ID="Schedule_Installation">
            <rdfs:label>Schedule Installation</rdfs:label>
            <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
            <Delivery_Cost_Drivers rdf:resource="#Number_of_Scheduled_Deliveries"/>
        </Deliver_Activities>
    </Activity>
    <Activity rdf:resource="#Plan_Build_Loads"/>
    <Activity rdf:resource="#Invoice"/>
    <Activity>
        <Deliver_Activities rdf:ID="Obtain___Respond_to_RFP_RFQ">
            <Resources_Used rdf:resource="#Company_Headquarter"/>
            <Delivery_Cost_Drivers
rdf:resource="#Time_to_Identify_and_Select_Supplier_or_Source"/>
            <rdfs:label>Obtain & Respond to RFP/RFQ</rdfs:label>
            <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
            <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
        </Deliver_Activities>
    </Activity>
    <Activity>
        <Deliver_Activities rdf:ID="Negotiate___Receive_Contract">
            <rdfs:label>Negotiate & Receive Contract</rdfs:label>
            <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>

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    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Delivery_Cost_Drivers
rdf:resource="#Time_to_Identify_and_Select_Supplier_or_Source"/>
    </Deliver_Activities>
  </Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Flexibility</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Responsivness</Performance_Attributes>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Reliability</Performance_Attributes>
  <Activity rdf:resource="#Route_Shipments"/>
  <Activity
rdf:resource="#Load_Vehicle__Generate_Ship_Docs__Verify_Credit__Ship_Product"/
>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assets</Performance_Attributes>
  <Activity rdf:resource="#Test__Install_Product"/>
  <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >D3</Process_Number>
  <Activity>
  <Deliver_Activities
rdf:ID="Enter_Order__Commit_Resources__Launch_Program">
    <rdfs:label>Enter Order, Commit Resources & Launch Program</rdfs:label>
    <Delivery_Cost_Drivers rdf:resource="#Ordering_Hours"/>
    <Resources_Used rdf:resource="#Hourly_Employee_Resource"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
  </Deliver_Activities>
</Activity>
  <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Cost</Performance_Attributes>
  <Activity rdf:resource="#Receive__Verify_Product_at_Customer_Site"/>
  <Activity rdf:resource="#Pick_Stage_Product"/>
</Deliver>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
  <Enable rdf:ID="Enable_Deliver">

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    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Activity rdf:resource="#Manage_Information"/>
    <Activity rdf:resource="#Manage_Import_Export_Requirements"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#Manage_Product_Inventory"/>
    <Activity rdf:resource="#Manage_Transportation"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Manage_Performance"/>
    <Activity>
    <Enable_Activities rdf:ID="Manage_Product_Life_Cycle">
    <Enabling_Cost_Drivers rdf:resource="#Administrative_Hours"/>
    <Resources_Used rdf:resource="#Management_Employee"/>
    <Resources_Used rdf:resource="#Company_Headquarter"/>
    <Activity_Cost_Type rdf:resource="#Administrative_Cost"/>
    </Enable_Activities>
    </Activity>
    <Activity rdf:resource="#Manage_Rules"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Activity rdf:resource="#Manage_Capital_Assets"/>
    </Enable>
    </J_Partner_s_Management_Process>
    <D_Partner_s_Country rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >China</D_Partner_s_Country>
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >http://www.sg.com.tw/</A_Partner_s_Website>
    <F_Parner_s_City rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Shindian</F_Parner_s_City>
    <G-Partner_s_Zip_Code rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >231</G-Partner_s_Zip_Code>
    <J_Partner_s_Management_Process>
    <Plan rdf:ID="P5_Plan_Return">
    <Activity rdf:resource="#Communicate_Plans"/>
    <Activity rdf:resource="#Balance_Requirements"/>

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    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#Establish_Plans"/>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >P5</Process_Number>
    <Category_Definition rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >A strategic or tactical process to establish and adjust courses of action over
specified time periods that represent a projected appropriation of return resources to meet
return requirements</Category_Definition>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsiveness</Performance_Attributes>
    <Activity rdf:resource="#IPA_Requirements"/>
    <Activity rdf:resource="#IPA_Resources"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#Balance_Resources"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
</Plan>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Plan rdf:ID="P2_Plan_Source">
    <Activity rdf:resource="#IPA_Resources"/>
    <Activity rdf:resource="#Balance_Requirements"/>
    <Category_Definition rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >The development and establishment of courses of action over specified time
periods that represent a projected appropriation of material resources to meet supply
chain requirements</Category_Definition>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >P2</Process_Number>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Activity rdf:resource="#Communicate_Plans"/>

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    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Balance_Resources"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#IPA_Requirements"/>
    <Activity rdf:resource="#Establish_Plans"/>
</Plan>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Source rdf:ID="S2_Source_Make_to_Order_Product">
    <Activity rdf:resource="#_4_Transfer_Product"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#_2_Receive_Product"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#_1_Schedule_Product_Deliveries"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >S2</Process_Number>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Activity rdf:resource="#_5_Authorize_Supplier_Payment"/>
    <Activity rdf:resource="#_3_Verify_Product"/>
</Source>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Plan rdf:ID="P1_Plan_Supply_Chain">
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >Assets</Performance_Attributes>
    <Activity rdf:resource="#Balance_Requirements"/>
    <Activity rdf:resource="#Communicate_Plans"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#IPA_Resources"/>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >P1</Process_Number>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#Establish_Plans"/>
    <Activity rdf:resource="#Balance_Resources"/>
    <Category_Definition rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >The development and establishment of courses of action over specified time
periods that represent a projected appropriation of supply chain
requirements</Category_Definition>
    <Activity rdf:resource="#IPA_Requirements"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    </Plan>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Deliver_Return rdf:ID="DR_MRO_Product">
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Activity>
    <Deliver_Return_Activities rdf:ID="Transfer_MRO_Product">
    <rdfs:label>Transfer MRO Product</rdfs:label>
    <Activity_Cost_Type rdf:resource="#Delivery_Cost"/>
    <Returning_Cost_Drivers rdf:resource="#Time_to_Transfer_Item"/>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    </Deliver_Return_Activities>
    </Activity>
    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >DR2</Process_Number>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#Schedule_Product_Return"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity>
    <Deliver_Return_Activities rdf:ID="Receive_MRO_Product_Includes_Verify_">
    <rdfs:label>Receive MRO Product (Includes Verify)</rdfs:label>
    <Activity_Cost_Type rdf:resource="#Product_Labor_Cost"/>
    <Returning_Cost_Drivers rdf:resource="#Number_of_Receivings"/>
    </Deliver_Return_Activities>
    </Activity>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Authorize_Return"/>
    </Deliver_Return>
</J_Partner_s_Management_Process>
<J_Partner_s_Management_Process>
    <Make rdf:ID="Make_to_Order">
    <Activity rdf:resource="#Produce_and_Test"/>
    <Activity rdf:resource="#Package"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Reliability</Performance_Attributes>
    <Activity rdf:resource="#Schedule_Production_Activities"/>
    <Activity rdf:resource="#Issue_Material"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Responsivness</Performance_Attributes>
    <Activity rdf:resource="#Stage_Finished_Products"/>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assets</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Flexibility</Performance_Attributes>
    <Performance_Attributes
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Cost</Performance_Attributes>
    <Activity rdf:resource="#Release_Finished_Product_to_Deliver"/>

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    <Process_Number rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >M2</Process_Number>
  </Make>
</J_Partner_s_Management_Process>
</Supplier_of_Suppliers>
<My_Enterprize_Hourly_Employee rdf:ID="Micheal">
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Male</Sex>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assembly</Department>
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Single</Marital_Status>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Computer Technician</Job_Title>
</My_Enterprize_Hourly_Employee>
<My_Enterprize_Salary_Employee rdf:ID="Ray">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Married</Marital_Status>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Human Resource</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Male</Sex>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assistant Director of HR</Job_Title>
</My_Enterprize_Salary_Employee>
<Carrier rdf:ID="UPS">
  <Delivery_Type>
    <Delivery_type rdf:ID="Ground_Delivery"/>
  </Delivery_Type>
  <Delivery_Type>
    <Delivery_type rdf:ID="Next_Day_Delivery"/>
  </Delivery_Type>
  <Delivery_Type>
    <Delivery_type rdf:ID="Two_Days_Delivery"/>
  </Delivery_Type>
  <Delivery_Type>
    <Delivery_type rdf:ID="Overnight_Delivery"/>
  </Delivery_Type>
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.ups.com</A_Partner_s_Website>
  <Delivery_Type rdf:resource="#Standard_Three_Days_Delivery"/>
</Carrier>
<Motherboard_Suppliers rdf:ID="Gigabyte">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >www.giga-byte.com</A_Partner_s_Website>
  </Motherboard_Suppliers>
  <My_Enterprize_Hourly_Employee rdf:ID="Sam">
    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales</Department>
    <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Married</Marital_Status>
    <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales Person</Job_Title>
    <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Male</Sex>
  </My_Enterprize_Hourly_Employee>
  <Motherboard_Suppliers rdf:ID="Asus">
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.asus.com</A_Partner_s_Website>
  </Motherboard_Suppliers>
  <Raw_Material rdf:ID="Monitor">
    <Provided_by rdf:resource="#View_Sonic"/>
    <Provided_by>
      <Monitors_Suppliers rdf:ID="Philips">
        <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
        >www.philips.com</A_Partner_s_Website>
      </Monitors_Suppliers>
    </Provided_by>
    <Name>
      <Make_to_Order_Products rdf:ID="Make_to_Order_Monitor"/>
    </Name>
    <Provided_by>
      <Monitors_Suppliers rdf:ID="Samsung">
        <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
        >www.samsung.com</A_Partner_s_Website>
      </Monitors_Suppliers>
    </Provided_by>
  </Raw_Material>
  <Customer_of_Customers rdf:ID="A_Person"/>
  <Raw_Material rdf:ID="Vedio_Card">
    <Provided_by rdf:resource="#ATI_Technologies_Inc"/>
    <Name>
      <Make_to_Order_Products rdf:ID="Make_to_Order_Vedio_Card"/>
    </Name>
    <Provided_by>
      <Graphic_Card_Suppliers rdf:ID="NVidia">

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    <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.nvidia.com</A_Partner_s_Website>
    </Graphic_Card_Suppliers>
    </Provided_by>
    </Raw_Material>
    <CD_Floppy_And_Other_Drives_Suppliers rdf:ID="Panasonic">
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.panasonic.com</A_Partner_s_Website>
    </CD_Floppy_And_Other_Drives_Suppliers>
    <My_Enterprize_Hourly_Employee rdf:ID="Nicole">
    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales</Department>
    <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales Manager</Job_Title>
    <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Female</Sex>
    <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Married</Marital_Status>
    </My_Enterprize_Hourly_Employee>
    <Indirect_Fixed_Cost rdf:ID="Property_Tax"/>
    <My_Enterprize_Hourly_Employee rdf:ID="Steve">
    <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Single</Marital_Status>
    <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Computer Technician</Job_Title>
    <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Male</Sex>
    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Assembly</Department>
    </My_Enterprize_Hourly_Employee>
    <Direct_Variable_Cost rdf:ID="Operating_Expenses"/>
    <Salary_Employee rdf:ID="Salary_Employee_Resource"/>
    <Make_to_Order_Products rdf:ID="Make_to_Order_NIC_Card"/>
    <My_Enterprize_Management rdf:ID="Fred">
    <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Male</Sex>
    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Human Resource</Department>
    <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Married</Marital_Status>
    <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Director of Human Resource</Job_Title>
    </My_Enterprize_Management>

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<My_Enterprize_Hourly_Employee rdf:ID="Jason">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >single</Marital_Status>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Computer Technician</Job_Title>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assembly</Department>
</My_Enterprize_Hourly_Employee>
<Motherboard_Suppliers rdf:ID="Intel_Motherboards"/>
<Sound_Card_Suppliers rdf:ID="Creative">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.creative.com</A_Partner_s_Website>
</Sound_Card_Suppliers>
<My_Enterprize_Hourly_Employee rdf:ID="Kathrine">
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Sales</Department>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Sales Person</Job_Title>
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Single</Marital_Status>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Female</Sex>
</My_Enterprize_Hourly_Employee>
<My_Enterprize_Hourly_Employee rdf:ID="Victor">
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Assembly</Department>
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Married</Marital_Status>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Computer Technician Inspector</Job_Title>
</My_Enterprize_Hourly_Employee>
<Raw_Material rdf:ID="Motherboard">
  <Provided_by rdf:resource="#Gigabyte"/>
  <Provided_by>
    <Motherboard_Suppliers rdf:ID="Abit">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.abit.com</A_Partner_s_Website>
    </Motherboard_Suppliers>
  </Provided_by>

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<Provided_by rdf:resource="#Asus"/>
<Name>
  <Make_to_Order_Products rdf:ID="Make_to_Order_Motherboard"/>
</Name>
<Provided_by rdf:resource="#Intel_Motherboards"/>
</Raw_Material>
<CD_Floppy_And_Other_Drives_Suppliers rdf:ID="NEC">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.nec.com</A_Partner_s_Website>
</CD_Floppy_And_Other_Drives_Suppliers>
<My_Enterprize_Management rdf:ID="Nabeel">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Married</Marital_Status>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Service and Assembly</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Programmer/Analyst</Job_Title>
</My_Enterprize_Management>
<Frequency_Drivers rdf:ID="Number_of_Setups"/>
<Raw_Material rdf:ID="Network_Card">
  <Name rdf:resource="#Make_to_Order_NIC_Card"/>
  <Provided_by>
    <Network_Card_Suppliers rdf:ID="Brodcom">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.brodcom.com</A_Partner_s_Website>
    </Network_Card_Suppliers>
  </Provided_by>
  <Provided_by>
    <Network_Card_Suppliers rdf:ID="Realteck">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.realteck.com</A_Partner_s_Website>
    </Network_Card_Suppliers>
  </Provided_by>
  <Provided_by rdf:resource="#_3Com"/>
  <Provided_by>
    <Network_Card_Suppliers rdf:ID="Intel_Network">
      <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
      >www.intel.com</A_Partner_s_Website>
    </Network_Card_Suppliers>

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    </Provided_by>
  </Raw_Material>
  <First_Tier_Supplier rdf:ID="Tiger_Direct">
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.tigerdirect.com</A_Partner_s_Website>
    <D_Partner_s_Country rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >USA</D_Partner_s_Country>
  </First_Tier_Supplier>
  <rdf:Description
rdf:about="http://protege.stanford.edu/plugins/owl/protege#subclassesDisjoint">
    <rdfs:domain rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
  </rdf:Description>
  <Customer rdf:ID="Sam_s_Club">
    <rdfs:label>Sam's_Club</rdfs:label>
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.samsclub.com</A_Partner_s_Website>
  </Customer>
  <Physical_Drivers rdf:ID="Number_of_Cubic_Feet"/>
  <Raw_Material rdf:ID="Hard_Drive">
    <Provided_by rdf:resource="#Maxtor"/>
    <Name>
      <Make_to_Order_Products rdf:ID="Make_to_Order_HD"/>
    </Name>
    <Provided_by>
      <HD_Suppliers rdf:ID="Western_Digital">
        <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
        >www.Westerndigital.com</A_Partner_s_Website>
      </HD_Suppliers>
    </Provided_by>
    <Provided_by>
      <HD_Suppliers rdf:ID="Seagate">
        <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
        >www.Seagate.com</A_Partner_s_Website>
      </HD_Suppliers>
    </Provided_by>
  </Raw_Material>
  <Stocked_Products rdf:ID="Stocked_Celeron"/>
  <First_Tier_Supplier rdf:ID="MALABS">
    <D_Partner_s_Country rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >USA</D_Partner_s_Country>
  </First_Tier_Supplier>
  <Make_to_Order_Products rdf:ID="Make_to_Order_Pentium"/>

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<CD_Floppy_And_Other_Drives_Suppliers rdf:ID="Toshiba">
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >www.toshiba.com</A_Partner_s_Website>
</CD_Floppy_And_Other_Drives_Suppliers>
<My_Enterprize_Salary_Employee rdf:ID="James">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Married</Marital_Status>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Accountant</Job_Title>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Accounting</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
</My_Enterprize_Salary_Employee>
<Physical_Drivers rdf:ID="Number_of_Pounds_Shipped"/>
<Make_to_Order_Products rdf:ID="Make_to_Order_AMD"/>
<Make_to_Order_Products rdf:ID="Make_to_Order_Speakers"/>
<My_Enterprize_Hourly_Employee rdf:ID="Brian">
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Technician</Job_Title>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Service</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Single</Marital_Status>
</My_Enterprize_Hourly_Employee>
<Raw_Material rdf:ID="Speakers">
  <Name rdf:resource="#Make_to_Order_Speakers"/>
  <Provided_by rdf:resource="#Creative"/>
</Raw_Material>
<Stocked_Products rdf:ID="Stocked_Pentium"/>
<My_Enterprize_Hourly_Employee rdf:ID="Adam">
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Computer Technician</Job_Title>
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Single</Marital_Status>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Service</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
</My_Enterprize_Hourly_Employee>
<First_Tier_Supplier rdf:ID="Tech_Data">
  <D_Partner_s_Country rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >USA</D_Partner_s_Country>
    <H-Partner_s_Contact_Person
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales Department</H-Partner_s_Contact_Person>
</First_Tier_Supplier>
<Supplier_of_Suppliers rdf:ID="Aid_Electronics_Corporation">
    <Enabling_Activities rdf:resource="#Manage_Supplier_Agreements"/>
    <Delivering_Activities rdf:resource="#Invoice"/>
    <Delivering_Activities rdf:resource="#Generate_Stocking_Schedule"/>
    <Enabling_Activities rdf:resource="#Mange_Equipment_and_Facilities"/>
    <Supply_to rdf:resource="#Seagate"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Return"/>
    <J_Partner_s_Management_Process
rdf:resource="#S2_Source_Make_to_Order_Product"/>
    <Returning_Activities rdf:resource="#Return_MRO_Product"/>
    <Supply_to rdf:resource="#Intel_Motherboards"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_Defective_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_MRO_Product"/>
    <Sourcing_Activities rdf:resource="#_2_Receive_Product"/>
    <Returning_Activities rdf:resource="#Disposotion_Product"/>
    <Returning_Activities rdf:resource="#Receive_Excess_Product"/>
    <Enabling_Activities rdf:resource="#Manage_Transportation"/>
    <Supply_to rdf:resource="#Abit"/>
    <Returning_Activities rdf:resource="#Receive_Defective_Product"/>
    <Returning_Activities rdf:resource="#Receive_MRO_Product__Includes_Verify_"/>
    <Delivering_Activities rdf:resource="#Pick_Stage_Product"/>
    <Returning_Activities rdf:resource="#Identify_Excess_Inventory"/>
    <Sourcing_Activities rdf:resource="#_5_Authorize_Supplier_Payment"/>
    <Returning_Activities rdf:resource="#Transfer_MRO_Product"/>
    <Returning_Activities rdf:resource="#Identify_MRO_Product_Condition"/>
    <Sourcing_Activities rdf:resource="#Select_Final_Supplier"/>
    <Delivering_Activities
rdf:resource="#Reserve_Inventory__Determine_Delivery_Date"/>
    <Returning_Activities rdf:resource="#Request_Return_Replacement_or_Credit"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Deliver"/>
    <Sourcing_Activities rdf:resource="#_3_Verify_Product"/>
    <Delivering_Activities rdf:resource="#Deliver_and_or_Install"/>
    <Delivering_Activities rdf:resource="#Schedule_Installation"/>
    <Enabling_Activities rdf:resource="#Manage_Performance"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_to_Order"/>
    <Delivering_Activities rdf:resource="#Negotiate__Receive_Contract"/>
    <Supply_to rdf:resource="#Creative"/>
    <Enabling_Activities rdf:resource="#Manage_Incoming_Products"/>
    <F_Parner_s_City rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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>Seng Kung Hsiang</F_Partner_s_City>
<Enabling_Activities rdf:resource="#Manage_Information"/>
<Returning_Activities rdf:resource="#Authorize_Replacement_or_Credit"/>
<E_Partner_s_Address rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>No. 65, Lane 667, Chung San Road</E_Partner_s_Address>
<Sourcing_Activities rdf:resource="#_1_Schedule_Product_Deliveries"/>
<J_Partner_s_Management_Process
rdf:resource="#D2_Deliver_Make_to_Order_Products"/>
  <C_Partner_s_Fax_Number
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >886-4-25629657</C_Partner_s_Fax_Number>
  <Supply_to rdf:resource="#Realteck"/>
  <J_Partner_s_Management_Process rdf:resource="#SR_MRO_Product"/>
  <J_Partner_s_Management_Process rdf:resource="#D4_Deliver_Retail_Product"/>
  <Enabling_Activities rdf:resource="#Manage_production_Network"/>
  <J_Partner_s_Management_Process rdf:resource="#P1_Plan_Supply_Chain"/>
  <J_Partner_s_Management_Process rdf:resource="#P4_Plan_Deliver"/>
  <Delivering_Activities rdf:resource="#Consolidate_Orders"/>
  <Enabling_Activities
rdf:resource="#Manage_Regulatory_Requirements_and_Compliance"/>
  <Sourcing_Activities rdf:resource="#_4_Transfer_Product"/>
  <Delivering_Activities rdf:resource="#Receive_Product_at_Warehouse"/>
  <Enabling_Activities rdf:resource="#Manage_Configuration"/>
  <J_Partner_s_Management_Process rdf:resource="#P2_Plan_Source"/>
  <Returning_Activities rdf:resource="#Schedule_MRO_Shipment"/>
  <J_Partner_s_Management_Process rdf:resource="#DR_Excess_Product"/>
  <B_Partners_Phone_Number
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >886-4-25620100</B_Partners_Phone_Number>
  <Enabling_Activities rdf:resource="#Manage_In_Process_Products_WIP_"/>
  <J_Partner_s_Management_Process rdf:resource="#Enable_Make"/>
  <Deliver_Products_Through>
    <Carrier rdf:ID="FedEx">
      <Delivery_Type rdf:resource="#Overnight_Delivery"/>
      <Delivery_Type rdf:resource="#Next_Day_Delivery"/>
      <Delivery_Type rdf:resource="#Ground_Delivery"/>
      <Delivery_Type rdf:resource="#Standard_Three_Days_Delivery"/>
      <Delivery_Type rdf:resource="#Two_Days_Delivery"/>
    <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.fedex.com</A_Partner_s_Website>
  </Carrier>
</Deliver_Products_Through>
  <Returning_Activities rdf:resource="#Verify_Excess_Product"/>

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<Supply_to rdf:resource="#ATI_Technologies_Inc"/>
<J_Partner_s_Management_Process rdf:resource="#D1_Deliver_Stocked_Product"/>
<Supply_to rdf:resource="#Asus"/>
<J_Partner_s_Management_Process rdf:resource="#P3_Plan_Make"/>
<Returning_Activities rdf:resource="#Recover__Disposition_Excess_Product"/>
<Returning_Activities rdf:resource="#Request_MRO_Return_Authorization"/>
<Delivering_Activities rdf:resource="#Obtain__Respond_to_RFP_RFQ"/>
<Enabling_Activities rdf:resource="#Manage_Supplier_Network"/>
<J_Partner_s_Management_Process rdf:resource="#SR_Excess_Product"/>
<J_Partner_s_Management_Process rdf:resource="#Enable_Source"/>
<Supply_to rdf:resource="#Brodcom"/>
<Enabling_Activities rdf:resource="#Manage_Product_Inventory"/>
<Enabling_Activities rdf:resource="#Manage_Import_Export_Requirements"/>
<Sourcing_Activities rdf:resource="#Identify_Sources"/>
<Supply_to rdf:resource="#Western_Digital"/>
<Deliver_Products_Through>
  <Carrier rdf:ID="DHL">
    <Delivery_Type rdf:resource="#Standard_Three_Days_Delivery"/>
    <Delivery_Type rdf:resource="#Next_Day_Delivery"/>
    <A_Partner_s_Website
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.dhl.com</A_Partner_s_Website>
    <Delivery_Type rdf:resource="#Two_Days_Delivery"/>
    <Delivery_Type rdf:resource="#Ground_Delivery"/>
    <Delivery_Type rdf:resource="#Overnight_Delivery"/>
  </Carrier>
</Deliver_Products_Through>
<Returning_Activities rdf:resource="#Schedule_Product_Shipment"/>
<Delivering_Activities rdf:resource="#Fill_Shopping_Cart"/>
<Returning_Activities rdf:resource="#Schedule_Product_Return"/>
<H-Partner_s_Contact_Person
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Ms. Rosa Weng</H-Partner_s_Contact_Person>
  <Supply_to rdf:resource="#Intel_Network"/>
  <D_Partner_s_Country rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >China</D_Partner_s_Country>
  <G-Partner_s_Zip_Code rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >429</G-Partner_s_Zip_Code>
  <Delivering_Activities rdf:resource="#Plan__Build_Loads"/>
  <Delivering_Activities rdf:resource="#Process_Inquiry__Quote"/>
  <H-Partner_s_Contact_Person
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Customer Service</H-Partner_s_Contact_Person>
  <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >http://www.aid.com.tw/</A_Partner_s_Website>
    <Delivering_Activities
rdf:resource="#Receive__Verify_Product_at_Customer_Site"/>
    <Supply_to rdf:resource="#_3Com"/>
    <J_Partner_s_Management_Process
rdf:resource="#S3_Source_Engineer_to_Order_Product"/>
    <Delivering_Activities rdf:resource="#Receive_Product_at_Store"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_Engineer_to_Order"/>
    <Returning_Activities rdf:resource="#Receive_Excess_Product_Return"/>
    <Delivering_Activities rdf:resource="#Route_Shipments"/>
    <Enabling_Activities rdf:resource="#Manage_Product_Life_Cycle"/>
    <Delivering_Activities
rdf:resource="#Enter_Order__Commit_Resources__Launch_Program"/>
    <Delivering_Activities rdf:resource="#Receive_Enter__Validate_Order"/>
    <Supply_to rdf:resource="#NVidia"/>
    <J_Partner_s_Management_Process rdf:resource="#P5_Plan_Return"/>
    <Supply_to rdf:resource="#Gigabyte"/>
    <Delivering_Activities rdf:resource="#Checkout"/>
    <Returning_Activities rdf:resource="#Approve_Request_Authorization"/>
    <Deliver_Products_Through rdf:resource="#UPS"/>
    <Returning_Activities rdf:resource="#Verify_Defective_Product"/>
    <Delivering_Activities
rdf:resource="#Load_Vehicle__Generate_Ship_Docs__Verify_Credit__Ship_Product"/
>
    <Enabling_Activities rdf:resource="#Manage_Data_Collection"/>
    <J_Partner_s_Management_Process
rdf:resource="#D3_Deliver_Engineer_to_Order_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_Defective_Product"/>
    <Delivering_Activities rdf:resource="#Select_Carriers__Rate_Shipments"/>
    <J_Partner_s_Management_Process rdf:resource="#S1_Source_Stocked_Product"/>
    <Delivering_Activities rdf:resource="#Stock_Shelf"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Plan"/>
    <Enabling_Activities rdf:resource="#Manage_Capital_Assets"/>
    <Returning_Activities rdf:resource="#Authorize_Return"/>
    <Enabling_Activities rdf:resource="#Manage_Rules"/>
    <Enabling_Activities
rdf:resource="#Allign_Supply_Chain_Unit_Plan_With_Financial_Plan"/>
    <Supply_to rdf:resource="#Maxtor"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_to_Stock"/>
    <Delivering_Activities rdf:resource="#Test__Install_Product"/>
    <H-Partner_s_Contact_Person
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales Department</H-Partner_s_Contact_Person>
</Supplier_of_Suppliers>

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<My_Enterprize_Hourly_Employee rdf:ID="Chen">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Married</Marital_Status>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Service</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Computer Technician</Job_Title>
</My_Enterprize_Hourly_Employee>
<Indirect_Fixed_Cost rdf:ID="Insurnace_Cost"/>
<My_Enterprize_Management rdf:ID="Campblle">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Married</Marital_Status>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Management</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Company President</Job_Title>
</My_Enterprize_Management>
<Services rdf:ID="Computer_Repair_Service"/>
<Make_to_Order_Products rdf:ID="Make_to_Order_Sound_Card"/>
<rdf:Description rdf:about="http://protege.stanford.edu/plugins/owl/protege#abstract">
  <rdfs:domain rdf:resource="http://www.w3.org/2000/01/rdf-schema#Class"/>
</rdf:Description>
<My_Enterprize_Salary_Employee rdf:ID="Chris">
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Married</Marital_Status>
  <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Marketing</Department>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Male</Sex>
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Market Analyst</Job_Title>
</My_Enterprize_Salary_Employee>
<Stocked_Products rdf:ID="Stocked_AMD"/>
<Physical_Drivers rdf:ID="Number_of_Pounds_Received"/>
<My_Enterprize_Hourly_Employee rdf:ID="John">
  <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Custodian</Job_Title>
  <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
  >Divorced</Marital_Status>
  <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"

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    >Male</Sex>
    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Inventory, Return, shipping</Department>
</My_Enterprize_Hourly_Employee>
<My_Enterprize_Hourly_Employee rdf:ID="Ronda">
    <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Married</Marital_Status>
    <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Female</Sex>
    <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Clerck</Job_Title>
    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Accounting</Department>
</My_Enterprize_Hourly_Employee>
<Indirect_Fixed_Cost rdf:ID="Rent_or_Mortgage_Cost"/>
<First_Tier_Supplier rdf:ID="Ingram_Micro">
    <J_Partner_s_Management_Process rdf:resource="#Enable_Source"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Make"/>
    <J_Partner_s_Management_Process
rdf:resource="#D2_Deliver_Make_to_Order_Products"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_Engineer_to_Order"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_to_Order"/>
    <J_Partner_s_Management_Process rdf:resource="#P3_Plan_Make"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Return"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Plan"/>
    <J_Partner_s_Management_Process rdf:resource="#D1_Deliver_Stocked_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_Defective_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_Excess_Product"/>
    <D_Partner_s_Country rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >USA</D_Partner_s_Country>
    <J_Partner_s_Management_Process
rdf:resource="#S3_Source_Engineer_to_Order_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#S1_Source_Stocked_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#P2_Plan_Source"/>
    <J_Partner_s_Management_Process rdf:resource="#P5_Plan_Return"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_Excess_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Deliver"/>
    <J_Partner_s_Management_Process rdf:resource="#D4_Deliver_Retail_Product"/>
    <H-Partner_s_Contact_Person
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >Sales Department</H-Partner_s_Contact_Person>
    <J_Partner_s_Management_Process rdf:resource="#P1_Plan_Supply_Chain"/>
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
    >www.ingrammicro.com</A_Partner_s_Website>

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    <J_Partner_s_Management_Process rdf:resource="#DR_MRO_Product"/>
    <J_Partner_s_Management_Process
rdf:resource="#S2_Source_Make_to_Order_Product"/>
    <J_Partner_s_Management_Process
rdf:resource="#D3_Deliver_Engineer_to_Order_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_MRO_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_Defective_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#P4_Plan_Deliver"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_to_Stock"/>
</First_Tier_Supplier>
<My_Enterprize_Salary_Employee rdf:ID="David">
    <Sex rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Male</Sex>
    <Marital_Status rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
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    <Department rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Networking and Support</Department>
    <Job_Title rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>Computer Administrator</Job_Title>
</My_Enterprize_Salary_Employee>
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    <Delivering_Activities rdf:resource="#Consolidate_Orders"/>
    <Partner_s_Products rdf:resource="#Stocked_Pentium"/>
    <Partner_s_Products rdf:resource="#Stocked_AMD"/>
    <Delivering_Resources rdf:resource="#Sam"/>
    <Enabling_Activities rdf:resource="#Manage_Rules"/>
    <Delivering_Activities rdf:resource="#Receive_Product_at_Warehouse"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Deliver"/>
    <Planning_Resources rdf:resource="#Campblle"/>
    <Enabling_Activities rdf:resource="#Manage_Product_Inventory"/>
    <Returning_Activities rdf:resource="#Approve_Request_Authorization"/>
    <B_Partners_Phone_Number
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    <Supply_to rdf:resource="#A_Person"/>
    <Delivering_Activities rdf:resource="#Checkout"/>
    <Sourcing_Resources rdf:resource="#Nabeel"/>
    <A_Partner_s_Website rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>www.computekinc.com</A_Partner_s_Website>
    <Sourcing_Activities rdf:resource="#_2_Receive_Product"/>
    <Returning_Resources rdf:resource="#Nabeel"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Make"/>
    <Delivering_Activities rdf:resource="#Obtain___Respond_to_RFP_RFQ"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_to_Stock"/>

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<Partner_s_Products rdf:resource="#Make_to_Order_Pentium"/>
<Supply_to rdf:resource="#Sam_s_Club"/>
<Making_Resources rdf:resource="#Nabeel"/>
<J_Partner_s_Management_Process rdf:resource="#SR_MRO_Product"/>
<Making_Activities rdf:resource="#Schedule_Production_Activities"/>
<Supply_Chain_Measures
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
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<Making_Activities rdf:resource="#Release_Finished_Product_to_Deliver"/>
<Sourcing_Activities rdf:resource="#_5_Authorize_Supplier_Payment"/>
<Returning_Activities rdf:resource="#Authorize_Return"/>
<Making_Activities rdf:resource="#Produce_and_Test"/>
<J_Partner_s_Management_Process rdf:resource="#D1_Deliver_Stocked_Product"/>
<Delivering_Activities rdf:resource="#Fill_Shopping_Cart"/>
<Returning_Activities rdf:resource="#Verify_Excess_Product"/>
<Planning_Resources rdf:resource="#Company_Headquarter"/>
<Returning_Activities rdf:resource="#Request_Return_Replacement_or_Credit"/>
<Enabling_Activities rdf:resource="#Manage_In_Process_Products__WIP__"/>
<Making_Resources rdf:resource="#Brian"/>
<Delivering_Resources rdf:resource="#Ronda"/>
<Delivering_Resources rdf:resource="#Nicole"/>
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<J_Partner_s_Management_Process rdf:resource="#D4_Deliver_Retail_Product"/>
<Partner_s_Products rdf:resource="#Make_to_Order_HD"/>
<Partner_s_Products rdf:resource="#Make_to_Order_CPU"/>
<J_Partner_s_Management_Process rdf:resource="#Enable_Plan"/>
<Partner_s_Products rdf:resource="#Make_to_Order_NIC_Card"/>
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<J_Partner_s_Management_Process rdf:resource="#Make_to_Stock"/>
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    <J_Partner_s_Management_Process rdf:resource="#SR_Excess_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_MRO_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Deliver"/>
    <Partner_s_Products rdf:resource="#Make_to_Order_RAM"/>
    <B_Partners_Phone_Number
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    >866-339-5850</B_Partners_Phone_Number>
    <A_Partner_s_Website
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    <J_Partner_s_Management_Process rdf:resource="#Enable_Source"/>
    <J_Partner_s_Management_Process
rdf:resource="#D1_Deliver_Stocked_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_Defective_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#P5_Plan_Return"/>
    <J_Partner_s_Management_Process
rdf:resource="#D2_Deliver_Make_to_Order_Products"/>
    <Partner_s_Products rdf:resource="#Make_to_Order_Speakers"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_MRO_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#P1_Plan_Supply_Chain"/>
    <rdfs:label>Computer_Discounted_Warehouse_(CDW)</rdfs:label>
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    <J_Partner_s_Management_Process rdf:resource="#P2_Plan_Source"/>
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    <J_Partner_s_Management_Process
rdf:resource="#S3_Source_Engineer_to_Order_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Make"/>
    <J_Partner_s_Management_Process rdf:resource="#P4_Plan_Deliver"/>
    <J_Partner_s_Management_Process rdf:resource="#P3_Plan_Make"/>
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    <J_Partner_s_Management_Process rdf:resource="#Make_Engineer_to_Order"/>
    <Supply_to rdf:resource="#Computek_Inc"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_Defective_Product"/>
    <Partner_s_Products rdf:resource="#Make_to_Order_Keyboard_Mouse"/>
    </First_Tier_Supplier>
    </Get_Supplies_From>
    <Making_Resources rdf:resource="#Nicole"/>
    <Supply_to>
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    </Supply_to>

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<Delivering_Activities rdf:resource="#Route_Shipments"/>
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<Enabling_Resources rdf:resource="#Fred"/>
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<G-Partner_s_Zip_Code rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
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<Return_to rdf:resource="#MALABS"/>
<Making_Resources rdf:resource="#Company_Headquarter"/>
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rdf:resource="#Enter_Order_Commit_Resources_Launch_Program"/>
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<Making_Resources rdf:resource="#John"/>
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<Delivering_Activities rdf:resource="#Select_Carriers_Rate_Shipments"/>
<Enabling_Resources rdf:resource="#James"/>
<I_Contact_Person_Email
rdf:datatype="http://www.w3.org/2001/XMLSchema#string"
>ronda@comutekinc.com</I_Contact_Person_Email>
<Returning_Activities rdf:resource="#Receive_Excess_Product"/>
<J_Partner_s_Management_Process rdf:resource="#DR_Excess_Product"/>
<J_Partner_s_Management_Process rdf:resource="#Enable_Plan"/>
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<Deliver_Products_Through rdf:resource="#DHL"/>
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<Making_Resources rdf:resource="#Jason"/>
<Enabling_Activities rdf:resource="#Manage_Capital_Assets"/>
<Returning_Activities rdf:resource="#Authorize_Replacement_or_Credit"/>
<Making_Resources rdf:resource="#Victor"/>
<Planning_Activities rdf:resource="#Establish_Plans"/>
<Delivering_Activities
rdf:resource="#Receive__Verify_Product_at_Customer_Site"/>
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  <Enabling_Activities rdf:resource="#Manage_Transportation"/>
  <Enabling_Activities rdf:resource="#Manage_Supplier_Agreements"/>
  <Delivering_Activities rdf:resource="#Generate_Stocking_Schedule"/>
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  <J_Partner_s_Management_Process rdf:resource="#SR_Defective_Product"/>
  <Enabling_Activities rdf:resource="#Manage_Import_Export_Requirements"/>
  <Return_to rdf:resource="#Ingram_Micro"/>
  <Delivering_Resources rdf:resource="#Nabeel"/>
  <Making_Activities rdf:resource="#Issue_Material"/>
  <Making_Activities rdf:resource="#Stage_Finished_Products"/>
  <Deliver_Products_Through rdf:resource="#UPS"/>
  <Return_to rdf:resource="#Tech_Data"/>
  <Making_Resources rdf:resource="#Steve"/>
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  >Reliability</Supply_Chain_Measures>
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  <J_Partner_s_Management_Process rdf:resource="#P4_Plan_Deliver"/>
  <Enabling_Activities rdf:resource="#Manage_production_Network"/>

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    <J_Partner_s_Management_Process
rdf:resource="#D3_Deliver_Engineer_to_Order_Product"/>
    <Delivering_Activities rdf:resource="#Invoice"/>
    <Returning_Activities rdf:resource="#Receive_MRO_Product__Includes_Verify_"/>
    <Get_Supplies_From rdf:resource="#Tiger_Direct"/>
    <J_Partner_s_Management_Process
rdf:resource="#S2_Source_Make_to_Order_Product"/>
    <Enabling_Activities
rdf:resource="#Manage_Regulatory_Requirements_and_Compliance"/>
    <Delivering_Activities rdf:resource="#Receive_Product_at_Store"/>
    <Enabling_Activities rdf:resource="#Manage_Performance"/>
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    <Making_Resources rdf:resource="#Adam"/>
    <Returning_Activities rdf:resource="#Recover___Disposition_Excess_Product"/>
    <Sourcing_Activities rdf:resource="#_1_Schedule_Product_Deliveries"/>
    <Making_Activities rdf:resource="#Finalize_Engineering"/>
    <Returning_Activities rdf:resource="#Receive_Defective_Product"/>
    <Delivering_Resources rdf:resource="#Kathrine"/>
    <Returning_Resources rdf:resource="#Nicole"/>
    <J_Partner_s_Management_Process rdf:resource="#S1_Source_Stocked_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#DR_MRO_Product"/>
    <Delivering_Activities rdf:resource="#Test___Install_Product"/>
    <J_Partner_s_Management_Process
rdf:resource="#D2_Deliver_Make_to_Order_Products"/>
    <Returning_Activities rdf:resource="#Schedule_Product_Return"/>
    <Delivering_Activities rdf:resource="#Deliver_and_or_Install"/>
    <Returning_Resources rdf:resource="#John"/>
    <J_Partner_s_Management_Process rdf:resource="#SR_Excess_Product"/>
    <Get_Supplies_From rdf:resource="#Ingram_Micro"/>
    <Enabling_Activities rdf:resource="#Manage_Product_Life_Cycle"/>
    <Delivering_Activities rdf:resource="#Pick_Stage_Product"/>
    <Delivering_Activities rdf:resource="#Process_Inquiry___Quote"/>
    <Returning_Activities rdf:resource="#Receive_Excess_Product_Return"/>
    <Planning_Resources rdf:resource="#Fred"/>
    <Delivering_Activities rdf:resource="#Negotiate___Receive_Contract"/>
    <Enabling_Activities rdf:resource="#Manage_Configuration"/>
    <Enabling_Activities rdf:resource="#Mange_Equipment_and_Facilities"/>
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    <Returning_Activities rdf:resource="#Identify_Excess_Inventory"/>
    <Enabling_Resources rdf:resource="#Chris"/>
    <Returning_Activities rdf:resource="#Identify_MRO_Product_Condition"/>

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    <Deliver_Products_Through rdf:resource="#FedEx"/>
    <J_Partner_s_Management_Process rdf:resource="#P5_Plan_Return"/>
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    <Delivering_Activities rdf:resource="#Schedule_Installation"/>
    <J_Partner_s_Management_Process
rdf:resource="#S3_Source_Engineer_to_Order_Product"/>
    <Delivering_Activities
rdf:resource="#Reserve_Inventory__Determine_Delivery_Date"/>
    <Sourcing_Activities rdf:resource="#_3_Verify_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#Enable_Source"/>
    <Returning_Activities rdf:resource="#Schedule_MRO_Shipment"/>
    <Partner_s_Products>
    <Make_to_Order_Products rdf:ID="Make_to_Order_Celeron"/>
    </Partner_s_Products>
    <Sourcing_Activities rdf:resource="#_4_Transfer_Product"/>
    <J_Partner_s_Management_Process rdf:resource="#D4_Deliver_Retail_Product"/>
    <Planning_Activities rdf:resource="#Balance_Requirements"/>
    <Returning_Activities rdf:resource="#Request_MRO_Return_Authorization"/>
    <Sourcing_Activities rdf:resource="#Identify_Sources"/>
    <Making_Resources rdf:resource="#Jim"/>
    <Partner_s_Products rdf:resource="#Make_to_Order_AMD"/>
    <Delivering_Activities
rdf:resource="#Load_Vehicle__Generate_Ship_Docs__Verify_Credit__Ship_Product"/
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    <Enabling_Activities
rdf:resource="#Align_Supply_Chain_Unit_Plan_With_Financial_Plan"/>
    <Get_Supplies_From rdf:resource="#MALABS"/>
    <Enabling_Resources rdf:resource="#Campblle"/>
    <Delivering_Activities rdf:resource="#Plan__Build_Loads"/>
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>Tayvola Rd, Suite 100</E_Partner_s_Address>
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    <Making_Resources rdf:resource="#Chen"/>
    <J_Partner_s_Management_Process rdf:resource="#Make_to_Order"/>
    <Get_Supplies_From rdf:resource="#Tech_Data"/>
    <Returning_Activities rdf:resource="#Verify_Defective_Product"/>
    <Enabling_Activities rdf:resource="#Manage_Incoming_Products"/>
    <Sourcing_Activities rdf:resource="#Select_Final_Supplier"/>
    <C_Partner_s_Fax_Number
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>704-329-0596</C_Partner_s_Fax_Number>
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    <Sourcing_Resources rdf:resource="#John"/>
    <J_Partner_s_Management_Process rdf:resource="#P3_Plan_Make"/>

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<Enabling_Resources rdf:resource="#Nabeel"/>
</My_Enterprize>
<Raw_Material rdf:ID="CD_Floppy_Other_Drives">
  <Provided_by rdf:resource="#Panasonic"/>
  <Provided_by rdf:resource="#NEC"/>
  <Provided_by rdf:resource="#Toshiba"/>
  <Name rdf:resource="#Make_to_Order_CD"/>
</Raw_Material>
<Raw_Material rdf:ID="Sound_Card">
  <Name rdf:resource="#Make_to_Order_Sound_Card"/>
  <Provided_by rdf:resource="#Creative"/>
</Raw_Material>
</rdf:RDF>
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http://protege.stanford.edu -->
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## REFERENCES

- Abdel-Aty-Zohdy, H.S. and Ewing, R.L. (1999). "Multidisciplinary Collaboration Methodology for System of Systems."  
<http://www.scs.org/scsarchive/getDoc.cfm?id=2076>
- Agrawal, Vipul, Xiuli Chao, and Sridhar Seshadri. (2004) "Dynamic balancing of inventory in supply chains." *European Journal of Operational Research*. 159.2, 296-317.
- Ahmad, Ali. (2003) " Ontologies for Supply Chain Management"; Master Thesis, University of Central Florida, Spring 2003.
- Armstrong, Peter. "The Costs of Activity-Based Management." *Accounting, Organizations and Society* 27.1-2 (2002): 99-120.
- Berners-Lee, T. (1999) *Weaving the Web*, HyperSanFrancisco – Harper Collins Publisher. Inc.
- Bhattacharjee, Sudip and R. Ramesh. (2000) "A multi-period Profit Maximizing Model for Retail Supply Chain Management: An Integration of Demand and Supply-Side Mechanisms." *European Journal of Operational Research* 122.3 (2000): 584-601.



Bolstorff, Peter and Rosenbaum, Robert. (2003) "Supply Chain Excellence". American Management Association.

Chan, F. T. S., and Chan, H. K. (2004) "A New Model for Manufacturing Supply Chain Networks: a Multiagent Approach." Proceedings of the Institution of Mechanical Engineers Part B: Journal of Engineering Manufacture, 218(4), 443-454

Cho, Richard K. and Gerchak, Yigal. "Supply Chain Coordination with Downstream Operating Costs: Coordination and Investment to Improve Downstream Operating Efficiency." *European Journal of Operational Research*, In Press, Corrected Proof.

Christopher, M., and Lee H-L (2001) *Supply Chain Confidence: The Key to Effective Supply Chains Through Improved Visibility and Reliability*. Vastera, Inc.

Chynoweth, George H.. (2004) "Actionable Information from Soft Data." i Six Sigma LLC <http://www.iSixSigma.com>.

Claribel Castillo. (1998) "Cost Modeling System for the IC Packing Industry." Diss. Texas A&M University.

Cokins, Gary.(1999) "Understanding Activity Based Costing and Supply Chain Management." [www.ascet.com](http://www.ascet.com).

- Cooper, Martha C.; Ellram, Lisa M.; Gardner, John T., and Hanks, Albert M. (1997)  
"Meshing Multiple Alliances." *Journal of Business Logistics*, Vol. 18, No. 1, pp.  
67-89.
- Cooper, Martha C.; Lambert, Douglas M., and Pagh, Janus D. (1997) "Supply Chain  
Management: More Than a New Name for Logistics." *The International Journal  
of Logistics Management*, Vol. 8, No. 1, pp. 1-14.
- Cooper, Richard; Richtermayer, Sandra; and Frigo, Mark. (2003) "2003 Survey of  
Management Accounting." Ernst and Young LLP and Institute of Management  
Accountants. Ref Type: Report.
- Copacino, William C. (1997) *Supply Chain Management: The Basics and Beyond*. St.  
Lucie Press, N.W. Boca Raton, FL.
- Cui, Z., and O'Brien, P. (2000) "Domain Ontology Management Environment",  
Proceedings of the 33rd Annual Hawaii International Conference on System  
Sciences, , pp. 2964 – 2972.
- Dekker, Henri C.; Van Goor, AD R. (2000) "Supply Chain Management And  
Management Accounting: A case Study of Activity-Based Costing." *International  
Journal of Logistics* 3.1: 41-52.
- Dekker, Henri C. (2003) "Value Chain Analysis in Interfirm Relationships: a Field  
Study". *Management Accounting Research* 14.1: 1-23.

- Dekker, Henri C. (2004) "Control of Inter-Organizational Relationships: Evidence on Appropriation Concerns and Coordination Requirements". *Accounting, Organizations and Society* 29.1: 27-49.
- Deshotels, Robert and Zimmerman, Robert D. (1995) *Cost Effective Risk Assessment for Process Design*. McGraw-Hill, Inc.
- Erdmann, M., and Studer, R., (1999) "Ontologies as Conceptual Models for XML Documents." Research Report, Institute AIFB, University of Karlsruhe.
- Escudero L. F., Galindo E., Garcia G., Gomez E. and Sabau V. (1999) "Schumann, a Modeling Framework for Supply Chain Management Under Uncertainty." *European Journal of Operational Research* 119.1: 14-34.
- Farber, Dan. (2003) "Turning Data into Actionable Information". Feb. 5, 2003.  
[http://techupdate.zdnet.com/techupdate/stories/main/0,14179,2910313,00\\_print.html](http://techupdate.zdnet.com/techupdate/stories/main/0,14179,2910313,00_print.html)
- Fayez, Mohamed S. (2005) "An Automated Methodology for Comprehensive Definition of the Supply Chain Using Generic Ontological Components". Ph.D. Dissertation, University of Central Florida, Spring 2005.
- Farris, Tom and Solberg, Jim. (2004) "SOS Connects the Seemingly Different Parts with the whole to Solve Large-Scale Problems".  
<https://engineering.purdue.edu/Engr/Signature/SoS/>

- Fensel, D., van Harmelen, F., Horrocks, I., McGuinness, D.L., and Patel-Schneider, P.F. (2001) "OIL: An Ontology Infrastructure for the Semantic Web," *IEEE Intelligent Systems*, Vol. 16, Issue 2, pp. 38 – 45.
- Fisher, M, Hammond, J., Obermeyer, W. and Raman, A., (1997) "Configuring a Supply Chain to Reduce the Cost of Demand Uncertainty." *Production and Operations Management*, 6(3), 211-225.
- Fishwick, Paul and Miller, John. (2004) "Ontologies for Modeling and Simulation: Issues and Approaches." Proceedings of the 2004 Winter Simulation Conference.
- Fujimoto, Richard M. (1999) "Parallel and Distributed Simulation." December 12, 1999 Winter Simulation Conference.
- Gan, Boon Ping, Li Liu and Sanjay Jain. (2000) "Distributed Supply Chain Simulation Across Enterprise Boundaries." Proceedings of the 2000 Winter Simulation Conference Washington D.C.
- Ganeshan, Terry P. Harrison. (1995) "Introduction to Supply Chain Management." Penn State University, 1995.
- Ganeshan, R. (1999) "Managing Supply Chain Inventories: A Multiple Retailer, One Warehouse, Multiple Supplier Model." *International Journal of Production Economics*, 59, pp. 341–354.
- Garcia-Serrano, A., Martinez, P., and Ruiz, A. (2001) "Linguistic Engineering Approach to the Enhancement of Web-Searching." International Conference on Systems, Man, and Cybernetics, Vol. 1, pp. 447 -452.

Goetschalckx, Marc, Ahmed S., Shapiro A., and Santoso T. (2001) "Designing Flexible and Robust Supply Chains." Quebec, Canada: IEPM. August 20-23, 2001

Gomez- Perez, A. (1998) "Knowledge Sharing and Reuse," in the *Handbook of Applied Expert Systems*, edited by: Jay Liebowitz, CRC Press.

Gomez-Perez, A., and Corcho, O. (2002) "Ontology Languages for the Semantic Web." *IEEE Intelligent Systems*, Vol. 17, Issue 1, Jan.-Feb., pp. 54 – 60.

Gruber, T. R. (1995) "Toward Principles for the Design of Ontologies Used for Knowledge Sharing." *International Journal of Human-Computer Studies*, 43, pp. 907 – 928.

Gruber, T.R. (1993) "A translation approach to portable ontology specifications." *Knowledg Acquisition*, Vol. 5, pp. 199 – 220.

Grieger, Martin. (2003)"Electronic Marketplaces: A Literature Review and a Call for Supply Chain Management Research." *European Journal of Operational Research* 144.2: 280-94.

Gunasekaran, A. (2004) "Supply Chain Management: Theory and Applications." *European Journal of Operational Research* 159.2: 265-68.

Gunasekaran, A. and Ngai, E. W. T. (2004) "Information Systems in Supply Chain Integration and Management." *European Journal of Operational Research*. 159.2: 269-95.

- Gunasekaran, A., Williams H., James, and McGaughey, Ronald E. "Performance Measurement and Costing System in New Enterprise." *Technovation*, In Press, Corrected Proof.
- Handfield, Robert B., and Nichols Jr., Ernest L. (1999) *Introduction to Supply Chain Management*. Upper Saddle River, N.J.: Prentice Hal.
- Higuchi, Toru and Troutt, Marvin D. (2004) "Dynamic Simulation of the Supply Chain for a Short Life Cycle Product--Lessons from the Tamagotchi Case." *Computers & Operations Research*. 31.7: 1097-1114.
- Investorwords.com. "Supply Chain Definition" in Investing Glossary on the Web.  
[http://www.investorwords.com/4823/supply\\_chain.html](http://www.investorwords.com/4823/supply_chain.html)
- Jiao, Jianxin, and Tseng, Mitchell M. (1999) "A Pragmatic Approach to Product Costing Based on Standard Time Estimation." *International Journal of Operations and Production Management*. 19.7: 738-55.
- Jones, A., Ivezic, N., and Gruninger, M. (2001) "Toward Self-Integrating Software Applications for Supply Chain Management." *Information Systems Frontiers*, Vol. 3, Issue 4, pp. 403 – 412.
- Joseph N.; Turley S.; Burns J.; Lewis L.; Scapens R.; Southworth A. (1996) "External Financial Reporting and Management Information: a Survey of U.K. Management Accountants." *Management Accounting Research* 7.1: 73-93.

- Jung, J.; Blau, G.; Pekny, J.; Reklaitis, G.; Eversdyk, D. (2004) "A Simulation Based Optimization Approach to Supply Chain Management under Demand Uncertainty." *Computers & Chemical Engineering* 28.10: 2087-106.
- Kim, Bowon. (2000) "Coordinating an Innovation in Supply Chain Management." *European Journal of Operational Research*. 123.3: 568-84.
- Klastorin, T. D., Moynzaheh, K., and Son, J. (2002) "Coordinating Orders in Supply Chains Through Price Discounts." *IIE Transactions*. 34(8), 679-689.
- Kokar, M. M., and Wang, J. (2002) "Using Ontologies for Recognition: An Example." *Proceedings of the Fifth International Conference on Information Fusion, Vol. 2*, pp. 1324 –1330.
- Lacy, Lee (2005). *OWL: Representing Information Using the Web Ontology Language*. Trafford Publishing. 6E-2333 Victoria, BC, Canada.
- LaLonde, Bernard J. and Pohlen, Terrance L. (1996) "Issues in Supply Chain Costing." *International Journal of Logistics Management*. 7.1: 1-12.
- Lassila, O., van Harmelen, F., Horrocks, I., Hendler, J., and McGuinness, D. L. (2000) "The Semantic Web and its Languages." *IEEE Intelligent Systems*. Vol. 15, Issue 6, Nov.-Dec., pp. 67 – 73.
- Lea, Bih Ru, and Fredendall, Lawrence D. (2002) "The Impact of Management Accounting, Product Structure, Product Mix Algorithm, and Planning Horizon on Manufacturing Performance." *International Journal of Production Economics*. 79.3: 279-99.

- Lendermann P.; Julka N.; Gan Boo P.; Chen D.; McGinnis L, McGinnis J. (2003)  
"Distributed Supply Chain Simulation as a Decision Support Tool for the  
Semiconductor Industry." *Simulation*. 79.3: 126-38.
- Leonhardt, Ulf. (1993) "Transputer Time Warp Environment." Diss. Department of  
Computing Imperial College of Science, Technology and Medicine.
- Li, Gang; Wang, Shouyan; Yan, Hong; Yu, Gang. (2005) "Information Transformation in  
a Supply Chain: A Simulation Study." *Computers & Operations Research*. 32.3:  
707-25.
- Li, Suhong. (2002) Integrated Model for Supply Chain Management Practice,  
Performance and Competitive Advantage." Diss. The University of Toledo.
- Li, Y., Huang, B., Liu, W., Gou, H., and Wu, C. (2001) "Ontology for Modeling and  
Analyzing of Enterprise Competence." *IEEE International Conference on  
Systems, Man, and Cybernetics*. Vol. 5, pp. 2941 – 2946.
- Helms, B.; Grace, L. (2004) "Product Costing Toolkit". Technical Tool Series No. 06  
<http://www.cgap.org/productcosting/tool.html>
- Hively, L.M., and Loebel, A.S. (2004) "Horizontal System-OF-Systems Integration Via  
Commonality." <http://www.ornl.gov/~webworks/cppr/y2001/pres/121553.pdf>
- Luman, Ronald R. (1999) "Upgrading Complex Systems of Systems: A CAIV  
Methodology for Warfare Area Requirements Allocation." 2nd Conference on the  
Economics of Test and Evaluation Georgia Institute of Technology.



- Madnick, S. (2001) "The Misguided Silver Bullet: What XML Will and Will not do to Help Information Integration." MIT Sloan School of Management, Sloan Working Paper 4185-01 (eBusiness@MIT Working Paper 111), October 2001. Available through: <http://ebusiness.mit.edu/research/papers.html>, or <http://papers.ssrn.com/abstract=281823>.
- Maedche, A. (2002) *Ontology learning for the semantic web*. Kluwer Academic Publishers.
- Maedche, A., and Staab, S. (2001) "Ontology Learning for the Semantic Web." *IEEE Intelligent Systems*. Volume 16, Issue 2, March-April, pp. 72 – 79.
- Meade, Phillip. (2003) "Development of a Framework for Managing the Product Life Cycle Using Chaos and Complexity Theories." Diss. University of Central Florida.
- MIT. (1998) "Introduction to Technical Cost Modeling Concepts and Illustrations." [http://ardent.mit.edu/real\\_options/RO\\_current\\_lectures/CostModeling02\\_.pdf](http://ardent.mit.edu/real_options/RO_current_lectures/CostModeling02_.pdf).
- Miller, John and Fishwick, Paul. (2004) "Investigating Ontologies for Simulation Modeling." Proceeding of Winter Simulation Conference.
- Moeller, Anders; and Schwartzbach, Michael. (2002) "The XML Revolution Technology for the Future Web." October 2002. <http://www.brics.dk/~amoeller/XML>
- Moulton, A., Madnick, S., and Siegel, M. (2002) "Semantic Interoperability in the Fixed

- Income Securities Industry: A Knowledge Representation Architecture for Dynamic Integration of Web-Based Information.” MIT Sloan School of Management, Sloan Working Paper 4409-02 (CISL 2002-18), November 2002. Available through: [http://ssrn.com/abstract\\_id=376861](http://ssrn.com/abstract_id=376861)
- Mulholland, P. (1999) “Introduction to Ontologies.” Version 2, Internal Report, code: RichODL-OU-3/1999, Enriching ODL by knowledge sharing for collaborative computer-based modeling and simulation, September, 1999.
- Manunen, Outi. (2000) "An Activity Based Costing Model for Logistics Operations of Manufacturers and Wholesalers". *International Journal of Logistics* 3.1: 53-65.
- Nersesian, Roy L. and Swartz, G.Boyd. *Computer Simulation in Logistics*. Quorum Books, CT, 1996.
- Perumalla, Kalyan, and Fujimoto, Richard M. (1998) "Efficient Large-Scale Process-Oriented Parallel Simulations." Winter Simulation Conference.
- Petrovic, Dobrila; Roy, Rajat; and Petrovic, Radivoj. (1998) "Modelling and Simulation of a Supply Chain in an Uncertain Environment." *European Journal of Operational Research*. 109.2: 299-309.
- Porter, M.E. (1985) *Competitive Advantage*. The Free Press, New York.
- Ptak, Carol A, and Schragenheim, Eli. (2000) *ERP: Tools, Techniques, and Applications for Integrating the Supply Chain*. St. Lucie Press.

- Reiner, Gerald. "Customer-oriented improvement and evaluation of supply chain processes supported by simulation models." *International Journal of Production Economics*, In Press, Corrected Proof.
- Schreiber, A. T., Dubbeldam, B., Wielemaker, J., and Wielinga, B. (2001) "Ontology-based Photo Annotation." *IEEE Intelligent Systems*. Vol. 16, Issue 3, May-June, pp. 66 –74
- Seal, Willie; Cullen, John; Dunlop, Alec; Berry, Tony; Ahmad, Mirghani. (1999) "Enacting a European supply chain: a case study on the role of management accounting." *Management Accounting Research*. 10.3: 303-22.
- Senechal, Olivier and Tahon, Christian. (1997) "A modeling Approach for Production Costing and Continuous Improvement of Manufacturing". *Production Planning and Control* 8.8: 731-42.
- Shapiro, J. (1999) "On the Connections Among Activity-Based Costing, Mathematical Programming Models for Analyzing Strategic Decisions, and the Resource-Based View of the Firm." *European Journal of Operational Research*. 118, pp.295-314.
- Shapiro, J. (2001) *Modeling the supply chain*. Duxbury.
- Shehab, E.M. and Abdalla, H.S. (2001) "Manufacturing Cost Modelling for Concurrent Product Development." *Robotics and Computer Integrated Manufacturing* 17: 341-53.

- Slade, A. J., and Bokma, A. F. (2001) "Ontologies Within Extended Enterprises." Proceedings of the 35th Annual Hawaii International Conference on System Sciences, pp. 496 –505.
- Southard, Peter. (2001) "Extending Vendor- Managed Inventory into Alternate Supply Chains: A Simulation Analysis of Costs and Services Levels." Diss. The University of Nebraska-Lincoln.
- Spence, Floyed D. (2001) "Modeling the Cost Implications of Alternative FACO Strategies for JSF Production." *FACO Alternatives for The Joint Strike Fighter*. 125-48.
- Stanford University, Protégé 2000 Users Guide,  
[http://protege.stanford.edu/doc/users\\_guide/index.html](http://protege.stanford.edu/doc/users_guide/index.html)
- Strassburger, Steffen; Gall, Gunter Schmid; and Haasis, Siegm. (2003) "Distributed Manufacturing Simulation as an Enabling Technology for the Digital Factory." *Journal of Advanced Manufacturing Systems*. 2.1: 111-26.
- Terzi, Sergio and Cavalieri, Sergio. (2004) "Simulation in the Supply Chain Context: a Survey." *Computers in Industry*. 53.1: 3-16.
- Villa, A. (2002) "Temporary Network of Enterprises: Managing Complexity by a Multi-Agent Architecture." Proceedings of the Institution of Mechanical Engineers Part B: *Journal of Engineering Manufacture*. 216(4),611-616.

- Vitkevich Jr., John A. (1997) "Analyzing the Costs of System-of-Systems Year 2000 Problem Resolution." Engineering & Economics Conference.
- Williamson, Duncan. (2003) "Introduction to Management Accounting." Mar. 3, 2003.  
<http://www.duncanwil.co.uk/manacc/trial/trial3.htm>.
- Xi, Haifeng; Cao, Heng; Berman, Leonard; Jensen, David. (2003) "Distributed Supply Chain Simulation Using A Generic Job Running Framework." Winter Simulation Conference.
- Yusuf, Y. Y.; Gunasekaran, A.; Adeleye, E.O.; Sivayoganathan, K. (2004) "*European Journal of Operational Research*. 159.2: 379-92.
- Zubrow, Dave. (2004) "System of Systems Integration Cost Driver Research". 2-15-2004. Pittsburgh, PA 15213-3890, U.S. Department of Defense, Carnegie Mellon University. Ref Type: Report