PRODUCT MODELING AND QUOTATION UNDER THE REVOLT PROJECT

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Abstract

Product modeling and configuration for new communications products can be time consuming and perplexingly complicated when quoting network proposals. Often the process involves multiple individuals from different organizations all pulled together to assist in the quotation process. In many instances, where products are still in the idea or prototype stage of development, detailed engineering, configuration and financial specifications are not available, requiring the configuration specialist to work from crude and often uncontrolled spreadsheets or documentation. During the Revolt Program/Project several new products were all introduced to various international markets simultaneously. This introduction of multiple products, product configurations and network configurations of the combined products, necessitated a solution for the configuration problem. This paper describes one approach that was successfully used.

Keywords: Configuration, Business Process, Financial, Excel, Quotation, Product Marketing, Modeling

Introduction

The creation, configuration and modeling process for new communication products is often timely, cost ineffective and requires considerable collaboration between multiple technical and commercial experts. With shorter product life cycles, the need to replenish product pipelines increases the pressure on developing new products for the marketplace. New request or ideas received from customers, external and internal, must be analyzed responsively or face being lost to the competition. This paper analyzes one company's attempt to address the model creation process for new products. It describes a rather simple approach that was used to decrease modeling inaccuracies and speed the process from idea creation to model generation and financial quotation. The new approach was launched during the Revolt Program, which introduced several new communications products to the market, all simultaneously.

A considerable amount of research has been conducted on configuring and modeling complex products. Much of this research focuses on creating or extending expert systems to deal with specific customization and configuration issues. Large scale commercial configuration can trace its origin to the XCON configuration system at Digital Equipment Corporation (Barker, O'Connor, 1989). The findings from XCON offer several key lessons for configuration experts. One was that expert systems involve more than just technical knowledge. It requires creating business processes that support the configuration process throughout all phases of the product life cycle.

Today, configuration technology is finding its way into many e-commerce offerings, such as Dell.com where users build and quote their own PC directly online. As broadband penetration continues to expand, more and more people will purchase products and services over the Internet, thus requiring the creation and usage of product configurators or Choiceboards (Slywotzky, 2000). These sites allow the user to build and configure products –to their own specifications.

The proper usage of configuration tools can also reduce the ongoing cost of product configuration, which by itself may contribute 20% to overall product cost (Fleischanderl, Friedrich, HaselBöck, Schreiner, Stumptner, 1998). This extra cost is born from multiple user needs and skill levels in the organization, from sales to engineering. Models configured incorrectly require additional adjustments necessitating extra time and overhead on the overall configuration process. For the salesperson the objective may be to quote within certain margin requirements. For the engineer the objective may be the accuracy or

structure of individual components comprising the model. In either case, the user is dependant on the accuracy and completeness of the configuration process.

This paper describes a high-level process and financial configuration tool created during the Revolt Program. The primary objective was to create a modeling and configuration process for new communication products entering the prototype or new product introduction (NPI) phase of development. Although the company maintained an AI configuration tool and program for generally available products, no such process existed for new or organic products. Since the process and tool worked with high-level components, the number of models and configuration rules were keep to a workable number allowing the team to use Excel and Visual Basic (VB) for model creation and rule configuration. Although most industrial strength configuration tools use a declarative-based programming environment (Sabin, Weigel, 1998; Fleischanderl, et al., 1998; Haag, 1998), we found the versatility and ease of use with Excel and VB worked well in our particular situation. Product managers created their preliminary model configurations and financials in Excel, and creating a process to reuse this existing work saved time and created an easily understandable tool and process for even novice users.

Configuration Review and Processes

During the design and development of a new product, software and or hardware, product management and marketing teams cannot always rely on highly specialized commercial or in-house modeling tools for pricing and configuration. New products are based on a conceptual request, without a complete knowledge-base for the actual product or service. Product managers and marketing teams often rely on spreadsheet-based tools in developing initial configurations and models for products. Although these tools are generally available, usable, and understandable by a wide audience, the mass propagation and uncontrolled production of spreadsheet-based models presents a problem in the organization if used inappropriately (Eckerson, 2003).

To address the configuration problem, companies such as Trilogy and Selectica specialize in configuration technology. Enterprise Resource Planning (ERP) vendors, such as SAP and Oracle include product configurators as part of their integration software packages. These tools while providing a viable solution require considerable capital expenditures and ongoing support and maintenance. Without the proper support, knowledge-based users of the configurator often stop using the tool altogether.

Extracting the domain knowledge from technical experts and transforming that knowledge into the configurator also requires frequent access to domain experts, distracting them from more important task. Prior studies have found that product modifications can occur as much as 40 to 50% per year for complex, new and or upgraded products (McGuinness, Wright, 1998). The author's work during the Revolt Project confirms this statistic, especially for new products in the prototype stage. Modifications to the model's structure can occur from various sources within the organization ranging from design constraints to commercial modifications from marketing. Capturing these changes into a highly dynamic product model requires considerable resources.

To address this "middle ground" issue between uncontrolled spread sheets and expensive in-house or commercial-based configurators, we developed a business and modeling process between several key inter-organizational departments. The following discussion describes this process during the Revolt Program/Project.

Revolt Project Overview and Configuration Process

The organizational process for model conceptualization, configuration and support, requires understanding the functional and or cross-functional businesses roles surrounding the Revolt Project. Each organizational role carried some degree of stakeholder significance for the definition, delivery, maintenance and or use of the product model. The inter-organizational entities involved during the project are shown in high-level form in Figure 1. Processes within the dash box represent new processes that were added to handle the configuration of new product models.

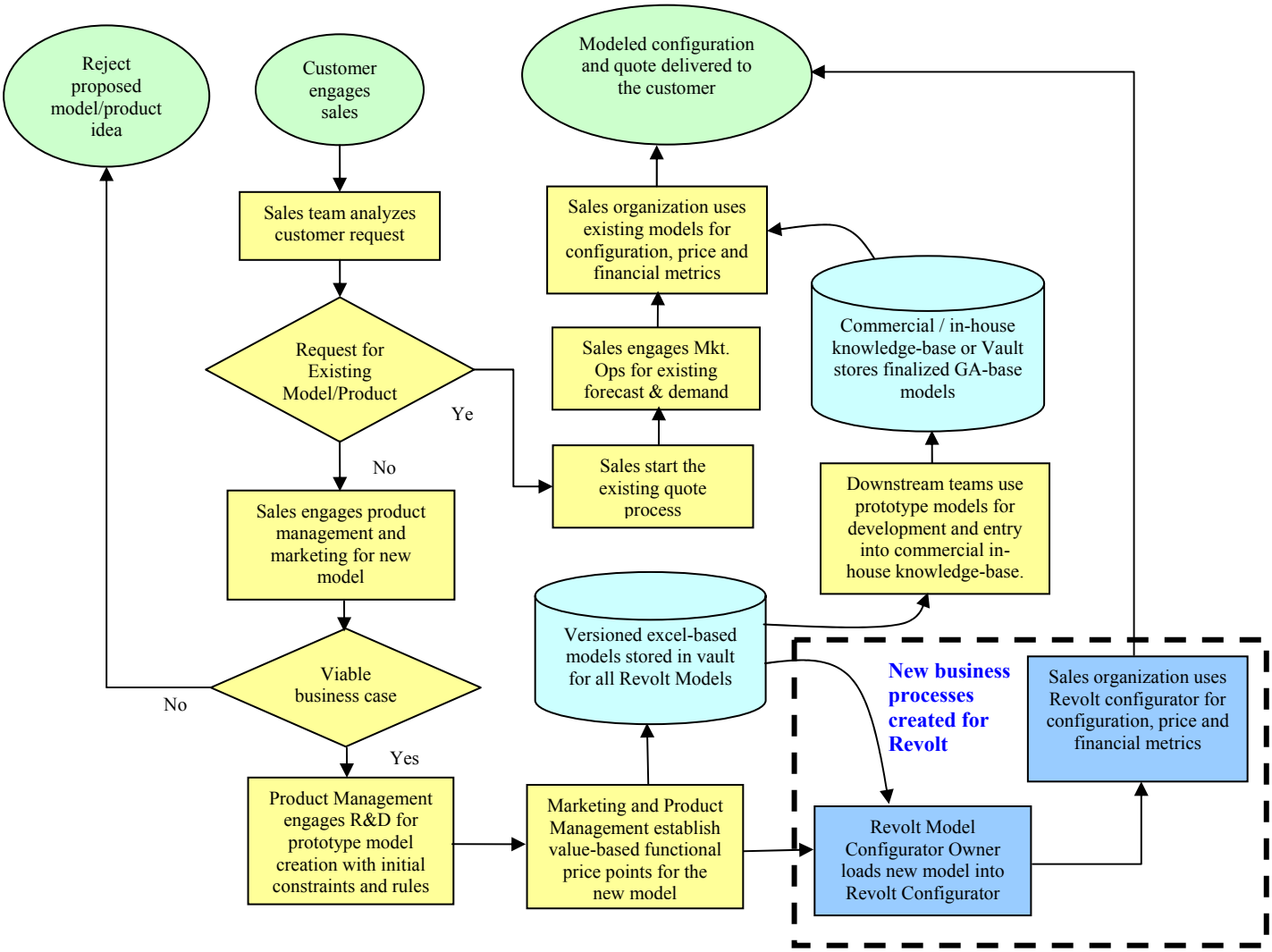
From this diagram two distinct paths are identified, the first describes the creation of a new model, along with any engineering rules. The second path shows configuration when ordering a generally available model. As shown in Figure 1, the paths diverged if the quotation was for a new product or service verses an existing service or product. Commercialized products/models already in manufacturing were quoted using the legacy knowledge base and configuration tools that consisted of four separate applications:

- The engineering application holding the rules and model configurations for the completed product
- The software definition application maintained software lineups for the models

- The pricing application holding price and cost information for the modeled products
- And the configuration application, which pulled information from the each of the above individual applications, was used to produce a complete configuration with price, cost and margin metrics

Users of the existing legacy configuration system were primary sales and sales engineering teams. Because the product or service was already well into life-cycle production, detailed configuration and cost metrics were obtainable directly from the knowledge-base.

Figure 1. Organizational Roles during Modeling



Quotations or proposals for new products or services differed from those of existing products and services in several key areas. New products or services usually have no existing model, price or cost information. This requires the sales team to engage product management and marketing teams for development of an initial model including preliminary configurations, cost and price points.

The customer request (RFP, RFQ) was usually a competitive bid sent simultaneously to the company's competitors. Not only were new price points, configurations and financial metrics required, the information must be compiled quickly with a higher degree of responsiveness not found in the pre-existing product path. Quotes were also stated in standard functional terms used by the industry, for example DS1, DSL line, and OC1 port. This allowed the customer to easily compare (apples-to-apples) quotes from opposing venders.

Once a new product request was received into product management, a joint team was formed to provide an initial response and discuss the merits of the customer's request. The team consisted of inter-organizational participants from R&D, Product Management and Marketing. After an initial business case analysis a decision to pursue the new idea was either rejected or approved by the team[1]. If accepted, the idea was scheduled for preliminary project planning, from which initial quotes and model configurations were eventually provided to the customer.

Initial configurations and price point decisions were almost always completed using spread sheet based tools. Although these tools were easily available and useable to team members, no standard process to communicate, control and track the newly created models was available. Add to this situation multiple teams and multiple programs and it quickly became an unmanageable process. To address the problem, an inter-organizational modeling process and tool were created and tested during the project. Since the stakeholders consisted of several teams from sales, marketing and product management, the project provided an idea environment for validating the new approach. The project impacted approximately one hundred people throughout the organization(s). Several members were directly responsible for producing the models, but almost all members were considered potential users.

The following summary provides a list of the key features created and or used by the new process.

Table 1: Process and Tool Requirements

Process / Tool Requirement	Description
Process	One member from the product management team (with VB programming skills) was chosen to oversee the modeling tool, process and the creation of models into the configurator.
Process	All product managers under the Revolt Project were required to standardize their specific models to use the new modeling tool.
Tool	A standard Excel-based workbook would be created to hold all new models for a specified program. For example, the Revolt Project/Program consisted of appropriately ten configurable communication products. Each of these products could be ordered and configured using the same configuration tool.
Process & Tool	All configurable models would be given orderable product codes. These codes would be used as the high level orderable part numbers for the model(s), similar to a Bill of Material (BOM) for each model.
Process & Tool	Models were quoted at the highest level possible. For example a soft-switch communication server could be ordered in several different models each based on server real-time capacity or high-level option such as line feature server or network/trunk-based server.
Process & Tool	Models such as gateway devices would be requested by their functional units only and not by specific piece-parts. Since the models being created were for communications equipment, items were orderable by the number of DSL lines, DS1s, DS3, ATM ports, IP ports, etc., and not by any specific hardware type.
Tool	The configuration tool should provide a standard interface where users can easily select all possible items or combination of items. Customer request usually consisted of multiple nodes and a combination of network elements. These items should be visually available on the same interface selection screen.
Tool	The configuration tool should provide the appropriate metrics needed for quoting and financial decision analysis such as gross margins, total revenue and net profit. Metrics should be expressed in per-port terms, such as per DS0, DSL line whenever possible. This provides an apples-to-apples comparison for the customer when comparing competing bids.
Tool	Per-model breakouts showing granular model details (hardware and software listings) should be separated from the high-level model and financials. This would allow users the visibility of quick quoting, but also provide for more granular modifications if needed.
Process & Tool	Prices are stated as a net price with appropriate discounts based customer, volume and initial verses upgrade purchases. Price points (list, discounts, etc.) are set by marketing for each product.
Process & Tool	Models should reflect a modular structure of components and sub-components. This implies that smaller models or components can be used to create higher level models.
Process & Tool	All models maintain a specific version control number. New model versions and tool configuration options were updated on a monthly basis. To ensure users used the lasted tool and model versions, the tool (Excel Modeling Tool) expired at the end of each month requiring the user to download a new

[1] Business cases also originated from within the company, not just from external customer request. In most cases, RFP's were rarely rejected from valid customer request; however, a project's discount rate could vary widely depending on the risk of the proposal.

Process / Tool Requirement	Description
	version over the company intranet.
Tool	Models can be configured in any order. This places no constraints on the order hierarchy. For example it is possible to order a communication server independent of a gateway device, or a gateway device independent of a communication server. Simply stated, the customer can configure products from different vendors to complete a total network solution.

Revolt Excel-Based Configurator

To implement the requirements we created an Excel-based configurator to replace the existing ad hoc method. Before the Revolt Process, individual product managers relied on their own hand crafted models and tools for configuring products. A sales engineer may require the configuration of multiple network elements into a single customer quote. This required contacting each product manager for the latest model configurator.

Working in isolation individual spreadsheet models were simple to use for configuration and quoting purposes; however, combining and using several spreadsheet models from multiple product managers, all with varying nomenclature and rules, required a significant effort for the sales engineer. Standardizing the process and using a common excel-based configurator organized and streamlined the process.

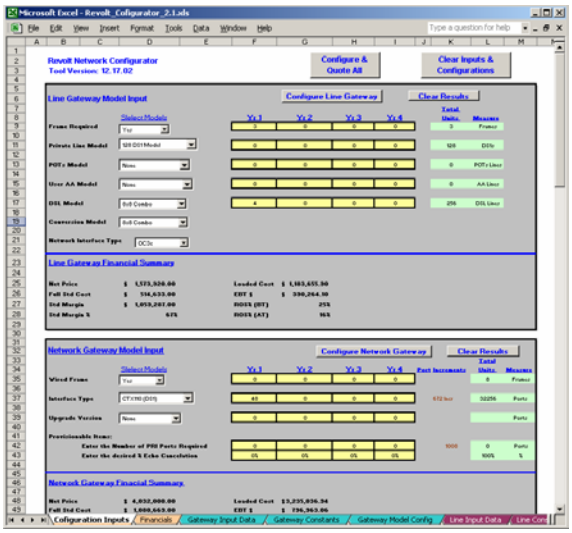
The following description provides an overview of the tool with an example configuration. Figure 2 shows the input screen for the configurator. Selection controls allow the user to configure models based on standard telecommunication industry terms, such as the number of lines, private lines, DSL lines or DS0 ports. After selecting the desired model type and configuration inputs, the user can generate the model configuration or clear the inputs and start over. The user can also configure multiple models simultaneously and obtain a complete network quote via the *Configure and Quote All* button at the top of the page. A financial summary for each configured model is provided under the user-selected inputs.

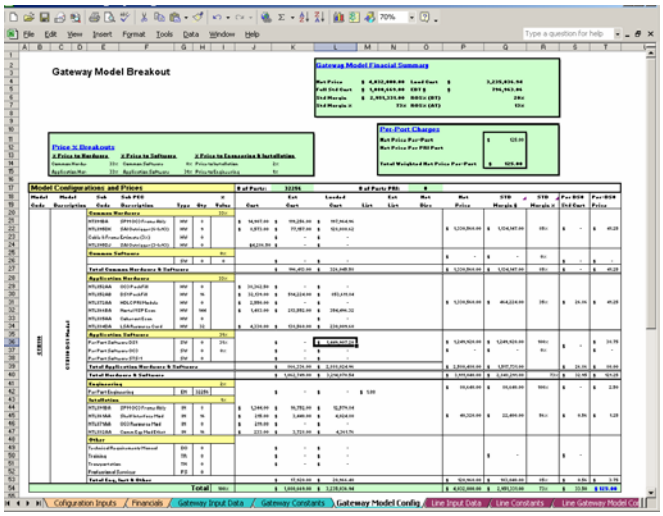
The configurator also generates a component breakout for each model selected on the input screen, and provides the user with a unique model number, sub models (codes) and quantity needed to complete the configuration. Sub models or codes provide a list of all hardware and software required to build the model. Included with the configuration are any necessary installation, engineering, training and documentation charges for the completed model.

The model's financial metrics included everything from simple component cost to per-port margins. For example, the configuration model in Figure 2 shows the components needed to build a simple network gateway device, configured as model number CTX110. The configurator generates financial data including: component cost, extended cost, loaded cost, standard margins, margin percentages, number of ports, per-port cost/price/margins, and a total financial summary for the model.

Figure 2. Revolt Configurator Input Screen and Model Output

Configurator Input Page **Configuration Model**





The actual configuration engine was developed in Visual Basic. Separate VB modules were created for each model and or sub-model. Modules were also created for the input interface and financial engines. Resource data, such as cost and price points used during the configuration process, were imported manually using Microsoft Query. A separate external database provided standard cost and overhead cost factors for the components. Each new configurator release contained the latest release of available standard cost and overhead rates. Since the Revolt configurator was used during new product development, before general product availability, users could manually insert cost data when database information was unavailable. Separate display sheets provided financial summaries, customer specific discount and volume discount percentages for each configured model.

Conclusions & Results

The configurator and modeling process created for the Revolt Project reduced response time for prototype-model quotation from 4.5 days to approximately 2.2 days. Eliminating 2 days from the quotation cycle allowed the organization/engineer to complete accurate quotations quicker than with the ad-hoc approach and allowed the sales organization to focus on other value-added projects and or possibly other quotes. Since the tool was created in Excel and VB, retraining and resource requirements were minimal. Stakeholder participation, especially between product managers, was deemed critical for the success of the process and tool. Funding for new products was competitive between the product management teams, and receiving upper management buy-in and support created synergy and information sharing between product teams. Models that eventually made general availability status provided pre-established models, model codes, constraints and rules needed for downstream applications. Current plans are to provide a tighter coupling between the new NPI-based quoting process created during the Revolt Project and the downstream legacy low-level modeling processes needed in engineering and asset acknowledgement.

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