
CHAPTER N

Establishing Quantitative Economic Value for Features and Functionality of New Products and New Services

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INTRODUCTION

This chapter has two key themes: (1) a list of customer needs is interesting, but insufficient for many development decisions, (2) establishing a quantified, dollar value for each requirement is more helpful. To that end, we present an approach and method to establishing the quantitative monetary value for new product features and performance. This approach is targeted to product development managers and engineers engaged at the “front-end” of the product development process when the decisions about selection and trade-off of product functions and features are made. This approach examines the customer’s business operations and essentially establishing their business case for your product down to the feature and performance levels. This provides for much better trade-off decisions in new product development. This approach also helps to identify *whitespace* opportunities, those new product and/or service opportunities that are not being served by any current product. Moreover, because the methodology is fine grained, the whitespace opportunities are resolved into clear and actionable product development projects.

Our process begins by describing a customer’s actual business activities and by determining the costs and the economic performance of the customer’s business unit. Then we develop ideas that improve the customer’s business activities. These improvements, enabled by new product features and performance, result in benefits that can be represented by cost reductions and higher economic performance by the customer. We show how to calculate the cost and economic performance in monetary units. We also show that this approach, of deriving the monetary value from new product features and performance, applies to products as well as services. The explicit focus on new services is significant. “The US is already a services

economy, (Baumol et al. 1984)” and “all of America’s employment growth has occurred in the services sector (Thurow 1999).”

The approach is particularly well suited to uncovering new whitespace opportunities. Whitespace opportunities exist because of two reasons: latent needs unrecognized by the manufacturer, and efficiency opportunities unrecognized by the customer. The latter are often solved through integration of various technologies and/or services. Though often discussed, whitespace opportunities are particularly difficult to value.

At face value, white space opportunities are attractive since they are unoccupied by competitors’ offerings. Marketing functions are exhorted to be creative and to find these unserved opportunities. However, they turn out to be problematic for two reasons.

First, whitespace opportunities are simply difficult to identify. The approach here helps in this problem, particularly at valuation. But second, once identified, whitespace opportunities are often difficult to exploit, even in the best of situations, without internal and external organizational changes to deliver the new solutions (Leonard-Barton 1997, Henderson and Clark 1990). Most R&D organizations are not capable of making required changes of technology (Christensen 2000, Utterback 1996). Most businesses are not capable of making required changes in services. Even more difficult are solutions requiring organizational changes *by your customer* to make use of the efficiency gains enabled by the proposed white-space solution. Nonetheless, all such changes are often ultimately inevitable, driven by the market. The issue is how soon they can be determined relative to the competition. The approach here is well suited to identify and develop these opportunities early.

Finally, another major use of the approach is under circumstances of apparent *market or technology saturation*. “There are no saturated markets, there are only undifferentiated products” is an accepted doctrine of business. Regrettably, when a market appears “saturated,” many product managers elect to focus on price to differentiate their offering in the eyes of the customer. However, there is a more sustainable approach to product differentiation, i.e., they can *compete on value* (Kotler and Armstrong 2001). Competing on price succeeds with a relentless focus on using the least cost supply and delivery chain and trading off new features and performance. Competing on value, on the other hand, succeeds with a relentless focus on providing additional benefits generated by the product’s new features and performance, which

can be quantified in monetary terms to the customer. It is this quantified value that can differentiate a new feature or performance in an apparently saturated market.

Furthermore, including service elements as part of the product offering generates additional value to the customer and amplifies the product's differentiation in a "saturated" market. The challenge is to understand what elements the customer is really willing and able to pay more for. For example, Intel competes on value by increasing functionality and computational speed with backward compatibility; functionality and the number of instructions of its microprocessors per unit price has consistently increased over time. BMW vehicles compete on value by providing additional electronic vehicle controls, in-car entertainment, and assistance services. The approach presented in this chapter uncovers and quantifies which benefits a customer will additionally pay for. We show how to develop a quantified value proposition.

MOTIVATION

All businesses develop new products to meet an expected market demand, i.e., attract paying customers – customers that will value and will be willing to pay for new features, functionality, and business performance. Yet, often this assessment is done with little understanding of how the customer will make this value determination, especially with respect to particular feature decisions of the product. Further, the distinction between consumer and business customers is often overlooked. Consumer-buying behavior is affected by psychological factors. However, in order to diminish the impact of subjectivity during the buying process, companies have formal procedures to define and select a product, service, or vendor (Webster and Wind 1996, Johnston 1994). This customer set is known as the *business market* (Anderson and Narus 1999). Work has shown that in the business market, the dominant decision factor is economic value expressed in monetary units (Anderson and Narus 1999). Our focus in this chapter is on the monetary value of products and services for business markets.

The challenge is then to derive the monetary value of a product's features, functions, and performance. Current approaches to understanding the voice of the customer are weak on quantifying the benefits of new product features. House of Quality (Cohen 1995) and KJ approaches (Language Processing Method 1995) are good for identifying what customers seek in a product. They do not, however, assess the monetary value of these needs. Conjoint approaches (Green and Srinivasan 1990) do provide quantitative value for features, but are

complex to administer. Moreover, they really only work for derivative products that the customer can readily identify with. They are less effective at even moderately radical departures from current and familiar offerings.

Although business case analysis methods for new products do work to provide the means to estimate monetary value, the focus is on estimates of sales, cost, expenses, and profit. Most approaches are divorced from technical feature levels. We address this void in this chapter. We link customer activities and business case analysis with the definition of a new product at the technical feature level. Our approach makes a contribution to manufacturer's ability to determine the monetary value of its product's features and performance at a new granular level and resolution. We also show how our approach to determining monetary value of a physical product applies as well to services.

VALUE IS NOT PRICE

During our research, customers had this to say:

“More expensive can be cheaper in the long run.”

“For something more, we'll pay more.”

“We always want to meet with the highest bidder to understand what are the business benefits that explain the higher price.”

How can more expensive be cheaper? Why would a customer be motivated to meet with a highest bidder? Customers were telling us is that there is a distinction between value and price. The producer of a product sets the price. The customer determines value. Price is sum of the product cost and a profit margin for the producer, all expressed in monetary units. Customer value, on the other hand, is the monetary worth of the benefit stream accrued by the customer that is enabled by a product's features and performance. The difference between customer value and price determines the customer's *incentive-to-buy* (Anderson and Narus 1999). Given two competing products, the one with the larger incentive-to-buy will be the winning product.

This is illustrated in Figure 1. Product *A*, given its features, can deliver value V_a to the customer. Product *B* will deliver a different value V_b to the customer. Note $V_b > V_a$; *B*'s incentive-to-buy exceeds that of product *A*, even though *B* has a higher price. Customers will prefer product *B* in spite of its higher price. This is the meaning of “expensive can be cheaper,” and “for something more, we will pay more.” The lessons to product engineers are: (1) do not confuse price with value, (ii) design for features and performance that will generate a value

stream that can be reduced to monetary terms, (iii) customer value must be quantifiable in monetary terms; otherwise it is a vacuous sales argument.

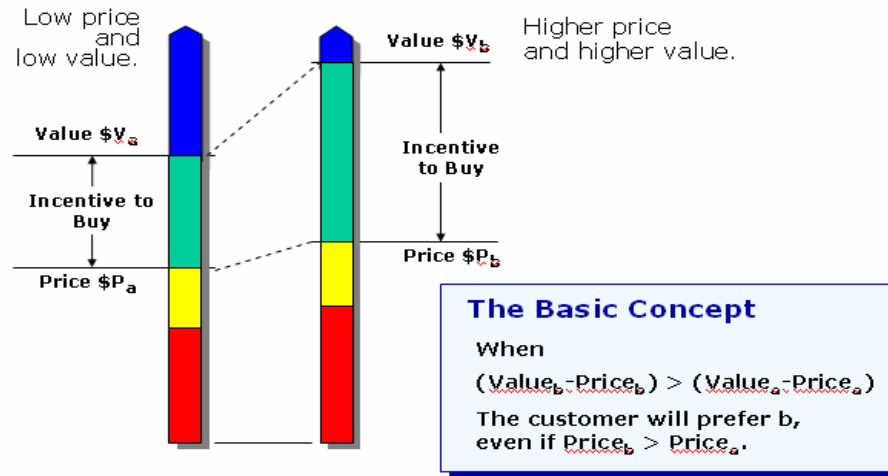


Figure 1: Value is not price.

As an illustration of the ideas presented above, we adapt an example from Kotler (1991) for Caterpillar. As shown in the table below, its price is \$30,000 higher than its leading competitor, but it has a larger incentive-to-buy. Relative to its competitor, Caterpillar is able to produce the benefits listed in Figure 2 that have the estimated monetary value shown. For example, its durability, which results in a longer product life for the customer, produces a savings of \$15,000. Its superior design and product quality requires less repair and purchase of parts, this produces a savings of \$5000. Altogether as shown in the figure, the benefit stream produces a value of \$40,000. On the competitor's base price of \$100,000, Caterpillar offers an incentive-to-buy, which has an incremental value of \$10,000. This explains why Caterpillar consistently wins in the market.

RELATIVE PRICE	
• Caterpillar	\$130,000
• Competitor	\$100,000
	<hr/>
	\$30,000
RELATIVE VALUE	
• Longer Usage [Durability]	\$15,000
• Less Maintenance [Quality]	\$10,000
• Less Downtime [Superior Service]	\$10,000
• Fewer Replacements [Superior Parts]	\$5,000
	<hr/>
	\$40,000



Figure 2: Caterpillar tractor value.

EXAMPLES: FORTUNE 500 TELECOM AND FORTUNE 500 SERVICES

To demonstrate the approach, we show two examples. The first is a Fortune 500 telecommunications systems provider of telephone and IT networks. The second is a world-class information technology (IT) services provider.

Consider our Fortune 500 telecommunications systems provider of telephone and IT networks. The company had a long history of providing communications equipment and network infrastructure, traditionally as a hardware manufacturer and supplier, where technical performance and reliability allowed the equipment to sell itself. The company was organized horizontally around technical hardware, from small to large systems. This strategy then gradually divorced the end users from the company, with value added resellers purchasing a bulk of the equipment. With increased competition, the company found itself disconnected from the users in the market, and it lacked a strategy for innovation.

It was not clear, for example, how important reliability really was to the customer. Everyone wanted reliability, but the market was becoming much more focused on price at the expense of reliability. Was 99.999% reliability really that important? The same question arose on technical features. Was Caller-ID important? How is it really used in a business context, and how could it be improved? Was wireless data capability important? Was integrated internet protocol (IP) and voice telephone services what the customers wanted, and why? What other R&D opportunities existed for telecommunications that were not being explored – whitespace not being addressed in the market? What level of R&D investments should be made where?

Similarly, consider our information technology (IT) services provider. This company had a long history as one of the best engineering companies of computer hardware products. Recognizing the importance of services, the company created a division for IT services. However, given this company's product culture, it developed a bias to hardware installation, maintenance, and repair services. They acquired an image as very competent "plumbers" that were unable to see how "good plumbing" and excellent products made a difference to customer's business. Why is a new IT service procedure in the organization important for the core business? Unable to explain the business value of their services to their customers, they found themselves competing on price. They became increasingly disconnected with the customer's executives and decision makers. They found themselves consistently excluded from key customer planning meetings where it was important to explain the benefits of excellent products and services, not only in engineering terms, but also in monetary terms. In spite of these weaknesses, this company learned how to bridge technology and customer value. They established formal communications with key business executives to understand the business problems they were trying to solve. They used the economic valuing method we present in this chapter. This process also provided additional reinforcement of the importance of product development to concentrate on features and performance that very directly produce customer value.

To identify what R&D investments to make, whether extensions to current products or whitespace opportunities, we quantify the value that any new features or performance would really provide the business operations of a customer. This approach is useful for determining what new white space opportunities exist within in a market segment.

APPROACH AND METHODOLOGY

Our approach can be summarized in six steps, shown in Figure 3. The first step in our process is to identify the market in order to select the customers to serve. The customer's business processes are then modeled in detail as to their business operational activities and flow of value added goods and information. This result is then analyzed for difficulties to the customer and the pain these difficulties inflict at various levels in the customer's organization. The general solutions to the pains in the customer's business activities are generated, as a concept generation activity. Then, the impact these solutions have on the customer's business activities is analyzed.

From this, a business case that the customer would make is generated, thereby establishing the value of the solution to the customer. We now discuss each of these steps in detail and illustrate our approach and methodology first using a case study of a retail customer that uses products from our Fortune 500 Telecomm provider.

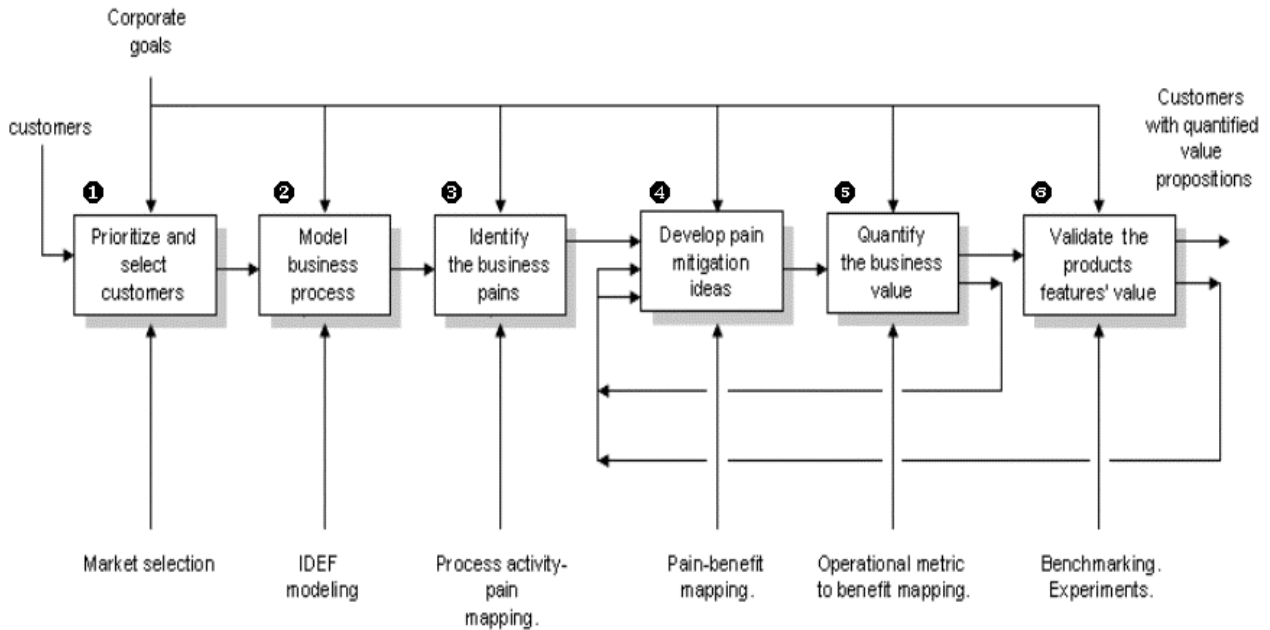


Figure 3: Developing the Value for New Products and Services.

[Step 1] Prioritize and select customers

This step is the well known process of *market selection*, i.e., market segmentation, targeting, and positioning (Kotler 2001). The marketing group that is part of the product development organization performs this step. The conceptual foundations and procedures for market selection and segmentation are presented in Kotler (2001), Urban and Hauser (1993).

This step is important because: (i) not every customer will buy on value, and (ii) because our approach is targeted at customers that can obtain the benefits and the concomitant value that the product can produce in their usage environment. The market will segment into those who must buy on price because they are struggling financially, and those who buy on price simply because manufacturers must compete on price – their products provide imperceptible or no distinguishing features. One should examine the customer base for those who could benefit from higher value products and services (Kotler 1980). These include customers who have relatively complex or performance sensitive operations. That is, they may require rapid

execution, or intensive capacities, high reliability, or some other distinguishing output feature of their offerings relative to their competition. These are the customers who can understand and appreciate the higher value that unique product features and capabilities can provide.

[Step 2] Model the customer's business process

The next step is to understand the customer's business and its operational processes. It is impossible to compete on value unless you are intimately connected with your customers and have insight into the sources of inefficiencies and ineffectiveness in their business operations. You cannot compete on value and be a disconnected supplier who sells to value-added resellers, for example, unless you also have contact with the end users. You won't know what to value, and your unvalidated internal knowledge and corporate guesses on what the customer wants will most likely be wrong.

To understand the customer's business, the best approach is to construct a flow model of goods and services of the customer's business operations. Creating a business *process model* is well researched (Damelio 1996, IEEE 1999). A business process model describes how goods and services are developed and transformed by activities within the organization. The *Identification-of-Function* (IDEF) process modeling methods (IEEE 1999) are the common and effective approach to modeling business process, though typically for process improvement through forming metrics (Frost, 2000, Harbour, 1997) or reengineering practices such as lean manufacturing (Womack and Jones, 1996).

The heart of IDEF modeling is constructing *activity diagrams* of required tasks (IEEE 1999). In IDEF, we represent process activities as individual black boxes with explicitly identified *inputs*, *outputs*, *controls*, and *mechanisms*, represented by links between activity boxes. Outputs are what the value added result of the activity. Inputs are what is needed to complete the activity. Controls are what regulate the activity. Finally, mechanisms are the tools needed to convert the inputs to outputs.

To construct an activity diagram for business operations, start with outputs of the entire process – what goods and services do they provide their customers? Generally, they are flows of information or materials to their customers. For example, consider the Fortune 500 Telecommunications Hardware Provider, whose customer is a retail store chain. The retail store operations needed to be modeled with an IDEF activity diagram. To construct this, we start by

examining the outputs of the retail store, namely goods in the retail shopper's hands as they leave the store. From these outputs, one traces the flows back into the organization, and examines what activities are done as a part of transforming these flows. This is traced back completely to the inputs of the customer's organization. This is done for each output flow.

For example, again consider the Fortune 500 Telecommunications Hardware Provider and their retail store chain customer. We are examining the retail store chain operations for their business value of IT hardware. We looked at the flow of retail goods and information between the corporate headquarters, warehouses, and retail outlets. Within the retail store, the primary outputs flows leaving the store are goods sold to consumers and various forms of payments. These flows can be back traced into the store, chaining through the front point of sale, the shelves, restocking, backstore operations, and delivery from the warehouse. And so on. The results are chains of activities linked by inputs and outputs. For example, there is a chain of activities that are linked by the flow of goods from shipping to store shelves to the buying customer. There are also chains of cash flows. There are also chains of order information flows. Each of these are constructed as independent chains.

The next step is to examine each activity in the chains constructed so far, and determine what is needed as mechanisms to complete the activity, and what is used to initiate, stop or regulate the activity as controls. The customer-facing point-of-sale needed the networked terminals (a mechanism), for example, and the store manager was a control when problems arise (a control).

The last step is to merge the flow chains into a network of inter-linked activities that represent the customer's total business process. The independent chains will have unconnected inputs, outputs, mechanisms and controls, which when merged, will link with the activities of other flow chains. Missing activities or flows may be included as a part of this step. The result is a complete process map for the customer's business operations, from inputs through value added activities to the sold outputs. As an example, Figure 4 shows a simplified retail store's business process.

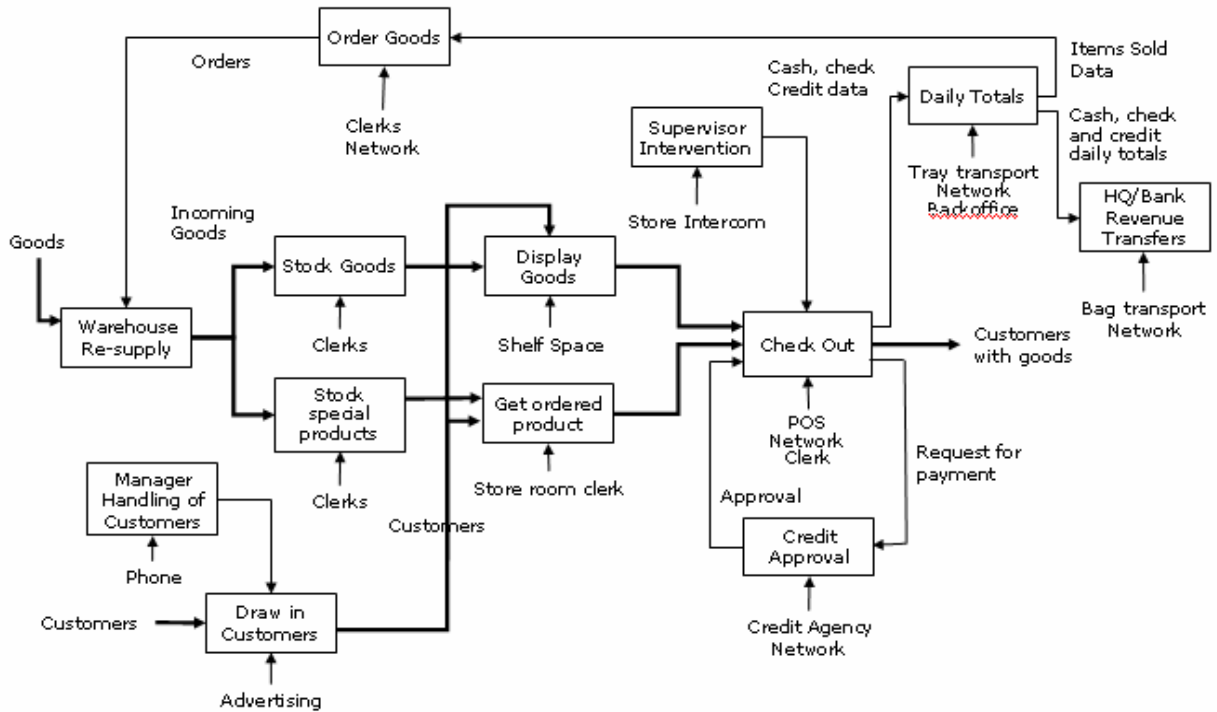


Figure 4: IDEF diagram of store retail activities.

[Step 3] Identify the business pains

The next step is to explore, through customer interviews, where in the customer’s business process they are experiencing problems. These problems identify the source of business *pains*, such as shown in Figure 5 column 1. Uncovering these pains is naturally accomplished as a part of the previous step. The point here is to establish a working document of these pains in a systematic and in a structured way. The interviews will help pinpoint the exact source of the business pain and the way in which it is expressed. The critical issue about business pains is that the pain must be reduced into actions.

For each pain, we next need to estimate how important it is to alleviate this pain. We initiate this by first developing a metric for a solution to this pain, a *benefit metric*, Figure 5 column 2. This is the non-monetary, but quantifiable number that will be used to assess each pain, in units that are sensible and directly measure the pain in its units. Typically benefit metrics are in units of speed, volume, or quality. Benefit metrics must be quantified so that they can then be transformed into a monetary assessment.

The logical next step is to examine the modeled business system at a higher level of abstraction than the individual activities. Rather than improving any particular internal activity,

one should pose questions on replacing parts of the entire business system. For example, in the retail store example, customer-purchasing queues can be entirely eliminated with home delivery. This, however, would be a new service offering the retail chain that they may or may not be capable of providing.

An important point in completing these tasks is to not focus solely on cost reductions for the customer. That is, benefits generally fall into two categories: revenue increases and cost reductions. Cost reductions are easier to sell to the customer, but you should also look for ways to increase the customer’s overall business volumes. For example, with the retail store, installing wireless internet will reduce installation wiring costs of terminals, and voice-over-IP will reduce the costs of connectivity to the store. These are all nice opportunities to provide new IT products and features that reduce the customer’s costs. However, there are also opportunities to provide IT products that have increased value to the customer. Providing prioritized calls to the store manager increases their ability to respond to crises and thereby reduces upset customers. Fewer upset customers translate into an improved service reputation and, in turn, into fewer customers defecting to the competition, both of which help improve the retail store’s business volumes. In the sections that follow, we will show the substantial difference in monetary value that these different product features provide to the retail customer.

Pain	Benefit
Electronic transaction hardware down	Speed and reliability of transaction approval
Electronic transaction software buggy	Security of transaction approval
Manager not accessible during crisis at register	Speed of managerial access
Checkout delayed and customers walk	Reliability of connection with checkout
Lines too long and customers walk during peak season	Ease of peak season expansion

Figure 5: Retail store process pains, and a metric.

[Step 4] Develop pain mitigation ideas

The next step is to develop new ideas for products or product features that can improve the attainment level of these benefit metrics; thereby alleviating the customer’s business pains, Figure 6 column 2. This is often an internal concept generation activity with participation from several diverse functional groups of the customer’s organization. Technical research and

development teams can examine the analysis and generate new product concepts (Otto and Wood, 2001). Marketing, sales and services teams can examine the analysis and generate new service plans and activities. The descriptions are in a form that traditional product development activities can readily digest: a customer requirement is well formed as a benefit metric, and the context of the metric is well formed as a pain at a customer activity. As an example, Figure 6 shows various telecommunication system ideas for new products and services to improve the various benefit metrics of a retail store. Note the column that identifies the whitespace opportunities.

This table identifies the new product features that the product development team can potentially design into the product. However, before engineering and management can commit to design and development, it is necessary to determine the economic value to customers and the development cost to the developers. Then management can decide whether to commit resources to developing these new features and functions. The quantification of economic value of product features, to the customer, is the subject of the next section.

Benefit	Metric	New Product Features	White Space
Speed and reliability of transaction approval	Increased credit approval access	Highly reliable external network.	--
Security of transaction approval	Transactions lost due to system being down	Highly secure software.	Yes.
		Rapidly easily updated software.	--
		Service team and help desk.	--
Speed of managerial access	Increased POS throughput from reduced time processing exceptions	Caller ID with call prioritizing software.	Yes.
Reliability of connection with backoffice	Interest income lost when connection down	Highly reliable internal network.	--
Ease of peak season expansion	Increased sales with decreased queues	Field upgradeable internal network.	Yes.
		Wireless POS.	Yes.
		Service team and help desk.	--
Reliability of nightly bank transfers	Interest income lost when connection down	Highly reliable external network.	--
Security of nightly bank transfers	Interest income lost due to system being down	Highly secure software.	Yes.
		Rapidly easily updated software.	--
		Service team and help desk.	--
Reliability of restock order processing connection	Out of stocks due to system down	Highly reliable external network.	--
Ease of establishing connection to vendors on heterogeneous systems	Out of stocks and mis-orders due to communication errors	Interoperability standards.	--

Figure 6: Product benefits, metrics, and features to supply the benefit.

[Step 5] Quantify the business value: Develop quantified value propositions

Having a list of pains, benefit metrics, and ideas, one can now assess the value of the benefits that each idea provides. Much as the business customer will do, one can determine how much improvement on the benefit metric any new product or service will provide. Improving this metric will then directly translate into improved or increased business operations for the customer that can be valued in monetary terms.

Forming the monetary equivalent of the benefit metric improvement is not generally simple or direct. Data are required from actual customer operations to ascertain required activity times, up-time of systems, and flow rates of customers and goods. This is a joint activity between the vendor and the customer, led by the product vendor who is motivated to demonstrate the superior value of its product. It must have active customer participation for the data and value derivation to be credible and convincing.

If a new idea can reduce the customer's operational business costs, this is a direct benefit they would want to accrue, and offers you the direct ability to charge a higher price. This higher price is justified by the increased benefits. If, on the other hand, a new idea can generate more revenue for the customer, such as offering higher business traffic or reduced lost-sales, then this also provides benefits that the customer would like to accrue. Again, this offers you the ability to charge the customer a higher price for your product and services that produce for them higher revenues.

Generally, cost reduction benefits speak louder to customers than revenue increase capabilities. Customers can visualize increased efficiency at providing the same goods and services, whereas they often have more difficulty visualizing increased business. Therefore, the revenue increase numbers generally get discounted until proven by an actual demonstration in the field.

In our telecommunication equipment provider example, they were looking for new product or services offers for retail. One benefit often discussed in the telecommunications industry is system reliability. Many equipment providers advertise their equipment having over five nines of reliability (99.999%) per year (Business Week 2003). Yet, when examining the business operations of retail, very little benefit is gained from this reliability. In fact, three nines of reliability is more than adequate, especially given the typical 3 year replacement rates of telecommunication equipment due to technology capability improvements. Figure 7 details this

calculation for storefront point-of-sale terminals, where the value of 5 nines of reliability over 3 nines is merely \$501 per store. Note that the incremental revenue is \$297; the expenses avoided are \$201. The cost benefit ratio is not sufficiently large. Five nines reliability does not pay for the retail store.

Added Revenue = $CNf_1f_2(r_2 - r_1)$			
<i>C</i>	Average customer transaction	dollars	\$10.00
<i>N</i>	Number of customer transactions per year	count	500,000
<i>f₁</i>	Fraction of customers paying via e-payment	percent	30%
<i>r₂</i>	System reliability of bank-to-checkout using good equipment	percent	99.999%
<i>r₁</i>	System reliability of bank-to-checkout using cheap equipment	percent	99.900%
<i>f₂</i>	Fraction of customers paying via e-payment who walk when a difficulty occurs	percent	20%
			\$297
Reduced Expense = $(n_1 - n_2)Rt$			
<i>n₁</i>	Number of failures per year using cheap equipment	count	3
<i>n₂</i>	Number of failures per year using good equipment	count	0
<i>R</i>	Labor rate	\$/hr	\$17.00
<i>t</i>	Time to deal with each failure	hr	4
			\$204

Figure 7: Value Proposition for Increased Retail Reliability.

As another example of quantifying the value of telecommunication benefits, Figure 8, consider the benefit of increased speed of managerial access. The store manager is a critical person whose job is primarily to take care of all exceptions to the standard procedures of the store. Improving their efficiency is critical to eliminating problems.

Figure 8 details the calculation of the value proposition for the benefit of this solution. The value of more quickly accessing the store manager equates to \$7000 per store, which would easily pay for the cost of a mobile telecommunications device and in-store system.

Added Revenue = $CNf_1f_2f_3$					
<i>C</i>	Average customer transaction		dollars	\$10.00	
<i>N</i>	Number of customer transactions per year		count	500,000	
<i>f₁</i>	Fraction of customer transactions requiring a supervisor		percent	2%	
<i>f₂</i>	Fraction of <i>f₁</i> not processed because the supervisor didn't show in time		percent	35%	
<i>f₃</i>	Fraction of <i>f₂</i> that is processed because New equipment speeded supervisor access		percent	20%	
				\$7,000	
Reduced Expense = 0					
				\$0	
			Client Value of Integrated Solution:	\$7,000	

Figure 8: Value Proposition for Improved Managerial Access.

An important facet of this managerial access benefit, though, is what it will take to fulfill it. This benefit cannot be delivered alone by a Telecomm hardware solution such as a cell phone or pager. A set of customizable prioritization software embedded into the telecomm systems is also required, to permit front-store calls* to be always passed through to the manager. Because of this combined requirement of both Telecomm hardware that the provider is familiar with and software that the provider has no experience with, this benefit to the retail store chain customer is unfulfilled. In fact, it is a benefit not even considered by the telecommunications company, it was not understood until the retail store operations were examined as described. It was a whitespace opportunity unmet in the market.

While telecommunications systems can provide this benefit through new innovations such as in-store cell phones, caller ID, pagers, or some form of technology, there is a fundamental reason why the whitespace remains unsolved. The notifications must be customizable and offer prioritization of notification, or the managers will not use them. That is, simply providing a telecommunications piece of hardware will not suffice, and providing a set of software code will not suffice, a new solution combining telecommunications hardware and software is

* Telephone calls from customers to the retail store are called “front store calls.” Many of these calls are customer complaints, purchase inquiries, or disputes that require retail store management or supervisors to handle.

required. The Fortune 500 Telecomm company needed to expand its R&D capability beyond what it current understood. That is typical of whitespace opportunities.

Nonetheless, the value benefit calculations need to be constructed and calculated. There are assumptions built into the value equations that need to be calibrated at the customer sites. But the basic approach is to understand the customer's business operations, understand the difficulties within those processes, understand how new solutions can improve the business operations, and then to quantify the value of these improvements.

[Step 6] Validate numerical worth of your product's features

After constructing these value propositions, they need to be validated in the field. This validation comes in four forms. One needs to compare the results against known summary financial statistics, to compare the results against customer field measurements, and to compare against benchmarks such industry sector specific and competitive performance.

The first validation is to sanity check the summary numbers. The cost savings results should sum up to a reasonable fraction of total customer expenses. The revenue increases should sum to a reasonable fraction of existing sales. The second validation is to sanity check the inputs against the client operations. Time constants, failure rates, costs of equipment and labor, and similar inputs should be realistic to the actual operations. The third validation is to determine whether the improvements are sufficient to compete against leading competitors. Note that one should be vigilant to avoid double counting.

Lastly, the final validation is to complete a demonstration prototype implementation, and measure the actual value brought to the customer. This needs to be set up as a controlled experiment, to fully understand cause and effect. It must be said, though, that this can be problematic as revenue changes can also be due to exogenous factors beyond the control of the experiment. Nonetheless, some form of such a prototype validation should be an objective and is most effectively performed as a team with the customer.

Summary of Telecomm example

By means of a field study of our Fortune 500 Telecomm provider's products in a retail store, we have illustrated how our approach works. We described the six steps of our method and illustrated in detail how to derive the monetary value of a product's features and performance to a customer in their actual usage environment. We have shown that value is obtained through a

series of successive mappings, which begin with the customer's pains and ends with a derived monetary value. We have also shown how this methodology unambiguously identifies whitespace product opportunities that product managers and engineers can capture for a competitive advantage.

EXAMPLE: FORTUNE 500 SERVICES COMPANY

As our next example, we present a case study of a Fortune 500 services company in a financial retail institution. We undertook a pilot study to determine whether the approach and method described in the previous section would apply for services in a business market. To that end we worked together with a world-class information technology (IT) services provider.

Services are a unique kind of product. Services, apart from being non-physical, differ from physical products in very fundamental ways (Bitran 2000). Does our approach to products, *ipso facto* apply to services? Services' unique defining characteristics are *intangibility*, *heterogeneity*, *simultaneity*, *perishability*, and *mutuality*. Unlike products, which can be described by physical properties, services must be experienced. Products are tangible and physical; services are intangible and experiential. This is services' intangibility property. Key aspects of products are separable; in services, they are inextricably fused. For example, the inseparability of function and delivery is one of the most salient properties of services. Whereas products can be inventoried, services cannot. This is the perishability property of services. Closely tied to perishability is simultaneity. Services are produced and consumed at the same time. It is impossible to inspect a service before it is delivered. The customer buys a service as well as its delivery, they are inseparable. People deliver services. In spite of best efforts, skills and attitudes vary widely among individuals. This makes services heterogeneous. The effectiveness of a service also depends on customers fulfilling their roles and responsibilities. This customer dependency of services is the property of mutuality. Given these fundamental differences between services and products, how do you demonstrate value for something you can't touch, or weigh, or which has to be experienced, and which makes demands on customers to succeed? The example below shows how this is done.

Customer Services

[Step 1] Prioritize and select customer

The customer of this example is a retail securities trading business unit of a very large financial institution that places it among the Fortune 100. The business unit has a customer base of approximately 350,000 clients for securities and over a 1,000,000 clients for mutual funds. This customer came to the attention of our IT services provider, when executives of the business unit expressed dissatisfaction with the growth in sales volume and in the productivity of its securities workforce. They were looking for ways to improve. Because of the market potential of the securities industry, our IT services provider elected to respond to this customer.

[Step 2] Model business process

Traders at their desks take orders for securities transactions. Customer orders are taken over the phone, recorded and subsequently executed electronically with an on-line system that is connected to major securities exchanges. A detailed audit of the business processes and operations was performed by consultants and experts in IT systems engineering. A simplified IDEF model of their business processes for securities transactions is illustrated in Figure 9 below. As in the telecomm example, we start with an output of the process, e.g., “placing an order to a stock exchange.” Working backwards from that output, we trace and identify all the activities until we reach the input of this business process, i.e., a “customer call.” The chain of activities – “accept customer call,” “authenticate the customer,” “document the order,” “evaluate the order,” “finalize order status,” and “place order on stock exchange” – form the backbone of the business process. Each activity has a supporting mechanism, e.g., “customer IT system” (mechanism) for the “authenticate the customer” (activity). The supporting mechanism is, in turn enabled by “Authentication Software,” which is regulated by “PIN #, ID, etc.” (control). Another output of the business process “customer bill,” which is produced by the activity “customer billing.” “Customer billing’s” mechanism is the “billing IT system” and the “billing software” is regulated by “rules and regulations” (control).

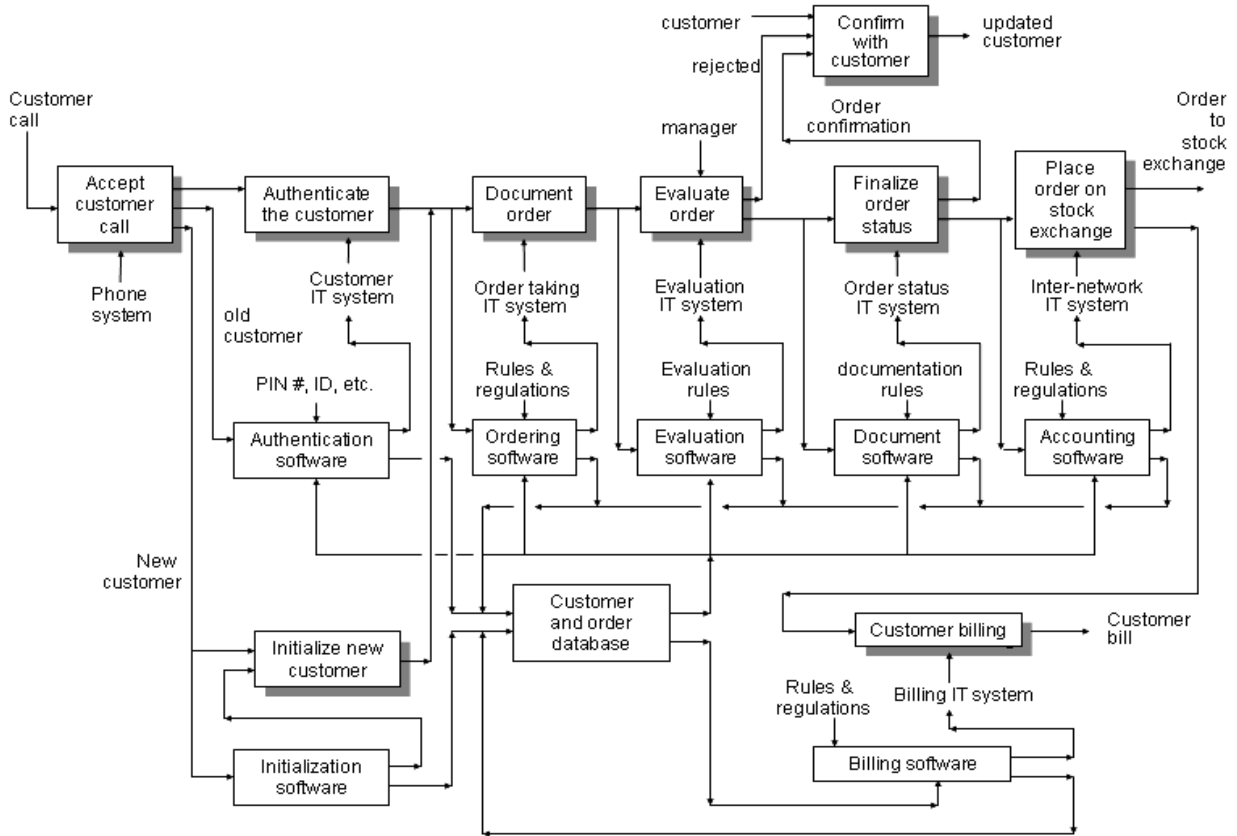


Figure 9: IDEF diagram for securities retailer.

[Steps 3 and 4] Identify the business pains and Develop pain mitigation ideas

Recall that business pain was expressed by the executives of the business unit as their dissatisfaction with the growth of sales and productivity of its securities workforce. Careful observation and measurements of the business processes' activities found that its workforce did meet its productivity targets. But it found that the overall productivity of its workforce was inhibited by frequent system outages. The excessive down time during working hours reduced the overall operational efficiency of its workforce. Simply stated, the system was frequently not available, during peak business hours, when it was needed to execute and complete a transaction. Untimely execution of customer orders made many customers sufficiently dissatisfied that they took their business elsewhere. In order to raise the availability level of the IT system, the proposed solution was to improve key hardware elements of the IT system and also many of its maintenance and crises management procedures. Figure 10 summarizes the pains, the potential benefits, and the operational metrics that were used to calculate the

monetary value of the benefits. Note that the business pain of productivity was reduced to actionable activities that are measurable and quantifiable in monetary terms.

Pain	Benefit	Operational metric	New services offerings	White space
System crashes too frequently impacting sales, maintenance and service expenses.	Sales productivity and customer satisfaction improvements.	Increased sales by increasing system availability.	IT system design and reengineering. Reporting software for itemized business value of availability.	-- Yes.
Customers defecting to competitors.	Improved customer loyalty.	Reducing customer defections increases lifetime value of customer	Software for customer loyalty monitoring, analysis, reporting, and business value.	Yes.
Sales productivity below competitive benchmarks.	Increased working hours through reduced dead-time.	Reducing cost of non-revenue generating time intervals. Improvement of end-user productivity.	System reliability services. End-user productivity monitoring, analysis, and reporting software.	-- Yes.
IT maintenance and service expenditures exceed industry benchmarks.	Fewer skilled resources required and less overtime during crisis outages.	Skilled resources applied to revenue producing applications.	Crisis management procedures.	Yes.

Figure 10: Customer business process pains, and operational metric.

[Step 5] Value Propositions: Quantify the value

As examples of the quantification of operational metrics that are derived from the sequence of pains, benefits, we show how the monetary value is obtained from the knowledge of the customer’s businesses process activities. Figure 11 shows the calculation of the operational benefit of Increased Sales by Increasing Systems Availability. Increased systems availability will make it possible for securities traders to take orders and execute them on demand at the time the customer calls without any delays.

Increased Sales = $T S D P (m_2 - m_1) r$			
<i>T</i>	Average number of trades per minute	count	4
<i>S</i>	Number of securities per trade	count	150
<i>D</i>	Number of trading days per year	count	200
<i>P</i>	Average price per security	dollar	\$35.00
<i>m₁</i>	Original availability per day	minutes	<i>m₁</i>
<i>m₂</i>	Improved availability per day	minutes	<i>m₁</i> +10
<i>r</i>	Fee rate=0.04 of the dollar value of trade	percent	4%
Yearly customer value of extra 10 minutes availability/day			\$1,680,000

Figure 11: Value Proposition for System Availability.

As another example, consider the business pain of customer defections. Customer surveys undertaken by this securities retailer indicate 0.4% of their customer elect to go to a competitor because they consider untimely execution of their transactions to be unacceptable. What is the value of customer loyalty? The calculation is shown below.

Value of Customer Loyalty = $C L r$			
<i>C</i>	Total number of customers	count	350,000
<i>L</i>	Average lifetime value of a customer	dollar	\$16,000
<i>r</i>	customer defection rate	per cent	0.004
Lifetime value of customer loyalty			\$22,400,000

Figure 12: Value Proposition for Customer Loyalty.

Summary of Telecomm example

In contrast with the Telecomm example of the previous section, we have provided another example that is qualitatively different – one that is applied to services. We described the six steps of our method and illustrated in detail how to derive the monetary value of service features for a large financial institution. We showed a monetary value derivation that is obtained through a series of successive mappings, which begin with the customer’s pains and ends with

quantified value propositions. We have also shown how this methodology identifies whitespace that represent new service offerings opportunities.

IMPLEMENTATION

In this section, we describe key factors to consider when implementing our approach. The process was given in Figure 3, where the six steps to constructing quantified value propositions were presented. To do this process, you should follow these steps; do them as described and illustrated by the Telecomm and Services examples.

Before starting, it is important to understand the product strategy under consideration by senior management. This work will explore whitespace, and if the solutions developed are beyond the scope of your company, they do no good. Senior management must not only have buy-in, but exert leadership on this work. New potential business activities will arise that the company currently does not address. They will require a business management decision.

It is also important to suspend judgment while developing the process models, benefit metrics, new potential solutions, and their economic value. We often think that we know what product features are important to the customer. Often these notions have some justification, such as, increased reliability is always better and important from an engineering perspective. What customers are willing to pay for, though, is an economic decision where engineering factors play a role. Forming the monetary valuation is therefore important, and should be used in engineering decisions.

One should pay close attention to whom within your customer sites you are working with during this process. In a business markets, the “customer” is an organization, and there are several perspectives to consider. The end users of your products are one group that you can make more efficient. However, the purchasing agents and their view of the process benefits of new products are also clearly important. Senior executives opinions are also important and their impacts upon use and purchase of your products. All of the ir views of the benefits, metrics, and valuation should be factored into the process model and the benefit valuation.

When doing this work, it is key to include cross functional teams, including but not limited to, engineering, marketing, service, senior management, finance, and sales. Each function can bring up ideas for services and features within their domain that would be attractive to the end users and acceptable to senior management.

Lastly, it is important to validate the results as you progress. Once you have constructed a process model of your customer, you should show it to them for review and approval. You should ask them for benefit metrics that effectively measure the flow of goods, information and services among the customer's activities. You should ask them to check your monetary valuation of various improvements. You do not necessarily want to ask them the value of any particular new product feature or idea, but rather initially ask them if they agree with your valuation of increasing the efficiency of various activities.

CONCLUSIONS

A list of customer needs is nice, but insufficient for many development decisions. Establishing a quantified, dollar value for each requirement is more helpful. This approach provides this by examining the customer's practice and essentially establishing their business case for your product down to the feature and performance levels. This provides for much better trade-off decisions in new product development. This approach also helps to identify whitespace opportunities. Moreover, because the methodology is fine grained, the whitespace opportunities are resolved into clear and actionable product development projects. Finally, we have discussed that in spite of fundamental differences between physical products and professional services; our approach applies to products as well as services.

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