Activity-Based Budgeting at Digital Semiconductor

Richard Block and Lawrence P. Carr

EXECUTIVE SUMMARY

- Digital Semiconductor adopted *activity-based budgeting* so that it could better understand its cost structure and make reasonable projections of future product costs.
- *Activity-based costing* (ABC) laid the foundation for activity-based budgeting by improving the assignment of costs and clearly identifying *non-value-added* activities. Managers also wanted to use ABC to make critical investment decisions based on projected cost structure.
- Activity-based budgeting followed Digital Semiconductor's value chain, thus providing accounting and cost information across all functions. Departmental spending was captured by activities and also by beneficiaries of the activities (i.e., internal and external customers).
- Projecting cost structures to estimate future product costs was critical in determining product-line profitability, which was complicated by the short product life cycles for microprocessors.
- Ultimately, activity-based budgeting made the entire budgeting process easier through a clear, cross-functional cost review of related business processes and activities. Key operational and investment decisions could thus be made with a better view of their future financial impact.
- Finally, Digital Semiconductor used activity-based budgeting as a springboard for *target costing,* which enhanced the firm's ability to establish itself as a competitive supplier of semiconductors.

Digital Semiconductor, which produces the alpha chip and other semiconductor products, was acquired by Intel in May 1998. Until then, Digital Semiconductor (DS) was a strategic business unit of Digital Corporation.

DS adopted activity-based budgeting (ABB) for two main reasons:

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1. To understand its cost structure better; and
2. To establish reasonable projections of product costs.

When DS first adopted ABB in 1993, it was experiencing major changes in an always-dynamic technology. The deteriorating financial performance of its parent company, which led to pressure for higher profits, meant that DS faced major—and difficult—investment decisions. Yet compiling product costs was a lengthy process that led to divisive debates but little management insight. The sheer complexity of the process meant that the only ones who really understood DS's cost structure were the cost analysts in the finance department.

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ABB followed the value chain at DS, so it provided accounting and cost information across all functions. Departmental spending was captured by both activity and beneficiary of each activity. ABB served as a forward-looking, transparent, and cross-functional planning tool to help managers make sound decisions. ABB also provided a business and economic model for managers to help them make better pricing decisions and to perform pro forma financial projections.

TRANSPARENT COST BEHAVIOR

When DS first became a profit center, senior management wanted cost behavior to become "transparent." They realized that—because of DS's growing product offerings and the high costs for fixed equipment—they needed to know the true *drivers* of their costs. The company's traditional standard cost system simply did not provide this information.

Consequently, DS installed an *activity-based costing* (ABC) system. Manufacturing and financial personnel quickly became strong believers in ABC, because it gave managers a better understanding of their processes and of the cost drivers of their activities.

COST ASSIGNMENT AND NON-VALUE-ADDED ACTIVITIES

ABC improved the assignment of costs at DS and clearly identified *non-value-added* activities. This insight led to a detailed plan for reducing or eliminating non-value-added activities. When this plan had been put into action, managers felt that they could make much better decisions because of the more accurate costs that resulted and also because of the process analysis that ABC required.

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Ultimately, ABB made the entire budgeting process at DS easier. Gone were the difficult debates that had formerly occurred over the value of proposed increases in departmental spending, which had been detailed according to the traditional expense categories.

Instead, a clear, cross-functional cost review of related business process activities—and following the value chain—significantly improved people's understanding of costs. Key operational and investment decisions could thus be made with a better view of their future financial impact.

This article outlines the successful process that Digital Semiconductor followed in implementing ABB. Topics discussed include:

- How costs were analyzed according to DS's value chain;
- How applying ABC principles improved DS's ability to identify non-value-added work;
- How cost analysis and the identification of non-value-added work led to a more effective budgeting process;
- How ABB tied into target costing.

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STANDARD COST AND BUDGET CYCLES

Before ABB was introduced, the vice president of finance at DS had doubts about the quality of the annual budget process at DS and the reasonableness of projected product costs. Because budget processes were sloppy and inaccurate, the standard costs generated were often unreliable. The vice president of finance concluded that better integration of product costing into the budget process would thus prove beneficial.

Standard product costs at DS were prepared using production capacity, capital spending, and related spending plans for depreciation, material, labor, and overhead. Standard costs were set during the annual budgeting process, but they were produced without considering the budgeted spending assumptions of the various production support departments.

As a result, managers in manufacturing could not directly associate their budgeted spending to product costs. Similarly, line managers considered cost of goods sold to be an accounting mystery. Product costs were often changed after the budgets were set, then adjusted throughout the year.

Manufacturing overhead (which was significant) was allocated imprecisely, often by using simplistic allocation techniques. DS had no methodologies for identifying and assigning specific overhead costs to a particular product or to a manufacturing process.

Because budget processes were sloppy and inaccurate, the standard costs generated were often unreliable.

A Departmental Focus

Budgeting at DS also had a strong departmental focus. Spending levels were set and measured based on engineered historical trends. Departmental managers presented their annual spending projections by item to the vice president of manufacturing. "Goodness" was taken to mean a decrease in spending from one year to the next—

Microprocessor Manufacturing

Semiconductor devices are made from *silicon*, a material refined from sand or quartz (see Exhibit 1, Step 1). Silicon material can be easily altered to promote or deter the conduction of electrical signals (thus the name "semiconductor"). Electronic *switches* (transistors) to control electrical signals can be formed on the surface of a silicon crystal. Altering this electrical conductivity is central to the design of the many functions required of a microprocessor.

The first step in the manufacturing process is to melt silicon to remove impurities. The melted silicon is then grown into long crystals (or *ingots*) that vary in size from 0.5 inches to 16 inches in diameter (see Step 2). Typical sizes today are 6 or 8 inches, though 12-inch-diameter *wafers* are on the horizon. The ingots are cut and polished into wafers onto which *integrated circuits* will be patterned.

Thousands of circuits can be formed on a wafer at the same time. Integrated circuits (*chips* or *die*) are an array of transistors made up of various connected layers. Each layer is a specific circuit pattern. A glass plate called a *reticle* is used to pattern each layer on the wafer during the fabrication process by shining ultraviolet light through the reticle (Step 3).

Photoresist

In the fabrication process, blank wafers are first insulated with a film of oxide, then coated with a soft, light-sensitive plastic called *photoresist*. Then the wafers are masked by a reticle and flooded with ultraviolet light to expose the circuit pattern of the reticle on the unmasked portion of the wafer (Step 3). Exposed photoresist hardens into the proper circuit layer outlined. Acids and solvents are used to strip away unexposed photoresist and oxide. The circuit pattern is then etched (i.e., scarred) into the wafer by the use of chemicals or superhot gases.

More photoresist is placed on the wafer, masked, and stripped, then implanted with chemical impurities, or *dopants*, which form negative and positive conducting zones. Repeating these steps builds the layers required for the integrated circuit to be completed on the wafer (Step 4). (continued)

which usually meant a short budget review. A spending *increase* from the prior year typically led to a much longer review.

In the early 1990s, the budget process at DS became particularly intense, largely because of two restructuring charges at Digital Corporation that totaled $2.5 billion. When Digital mandated large spending reductions throughout the corporation, the pressure to reduce costs at DS (which had high capital investment costs) became acute.

The new ABC system at DS proved valuable in coping with this pressure. Management wanted to use ABC to take a forward-looking view of the cost structure at DS. They also wanted to link the identified spending reductions to the cost of specific products.

Capacity

The operational focus in the budget process for manufacturing was capacity. Managers closely monitored the key operational measurement—"wafer starts per week" (see sidebar "Microprocessor Manufacturing," as well as Exhibit 1)—to determine the appropriate production levels necessary for both production and new product development. This required critical decisions about product demand, mix, yield, and capital availability.

Because these factors vary widely and also because lead times for capital were long, managers usually erred on the side of conservatism. They would plan for low yields, which meant requiring more capital equipment. As a result, profit forecasts were low and operating costs high, so many people felt that costs were out of control. Yet capacity underutilization resulted whenever actual yields exceeded the planned yields.

Optimization of capacity was made difficult by two factors: demand and yield. Demand was strongest for the fastest, most-current microprocessors. Unfortunately, these microprocessor typically had the lowest yields because they were still early in their production learning curves. The low yields meant that manufacturing needed enough capacity to produce large quantities of work-in-process wafers to ensure a sufficient supply of good units.

Because process equipment was expensive ($650 million per fabrication facility, or "fab"), fab capacity was a critical item for review during the budgeting process. But installed equipment drives many other costs (such as maintenance, spare parts, and network connectivity for data analysis and data storage). When yields finally improve, far less productive capacity is required, so equipment underutilization ensues. Unfortunately, equipment has to be maintained even if it is not being used, so operating costs remain high. DS's traditional budget process never identified cross-functional dependencies or cost-reduction opportunities in the company's value chain.

MICROPROCESSOR COSTING

Semiconductor product costing (as Exhibit 2 illustrates) is a multiple-step process that—midway through the process—requires a switch from *cost per wafer to cost per die.* The absorption of factory overhead (70–80 percent of the total cost) is with the good units yielded from each manufacturing process.

During the *fabrication* and *probe* processes, capacity and cost are measured by wafer. At the end of the probe process, the good die on each wafer are identified. In assembly, the good die are removed, at which point the unit of measure changes to cost per die. To complete the total product cost of a semiconductor device, the cost per wafer for each device must be converted to a cost per die, then added to the cost per die of the assembly and test activities.

Yield acts as a cost multiplier in each of the manufacturing processes (fabrication, probe, assembly, and test). The cost of each process is absorbed into the good units manufactured, so yield is the key in determining product cost.

An electrical performance test of the functions of each of the completed integrated circuits is performed while the chips or die are still on the wafer (Step 5a); this is the *probe process.* The nonfunctioning chips are marked with ink. The functioning die are left unmarked and moved to assembly (Step 5b). Probe is the area of the manufacturing process where yield loss is greatest. For a new product, an entire wafer having hundreds of die my yield only one good device.
A determining factor for yield is *die size.* As size increases (which typically equates to increased function), the amount of good die that can be produced decreases, because defects that render the device inoperative continue to appear on the wafer. The larger the die, the greater the probability for a defect. In the assembly process (Step 5b), each die is cut from the wafer using a diamond saw. The good die are placed in the cavity of a ceramic package (Step 6). The die is connected to the leads of the package by very thick aluminum wires. This creates the necessary electrical connection from the chip to the package. The ceramic package is then sealed with a metal lid placed over the exposed die.
Once the device is completely packaged, it is tested to ensure that all electrical specifications of the integrated circuit are met. The completed, packaged, and tested semiconductor device can then be soldered to a printed circuit board, which (in turn) is installed in a computer system (Step 7).

USING ABC

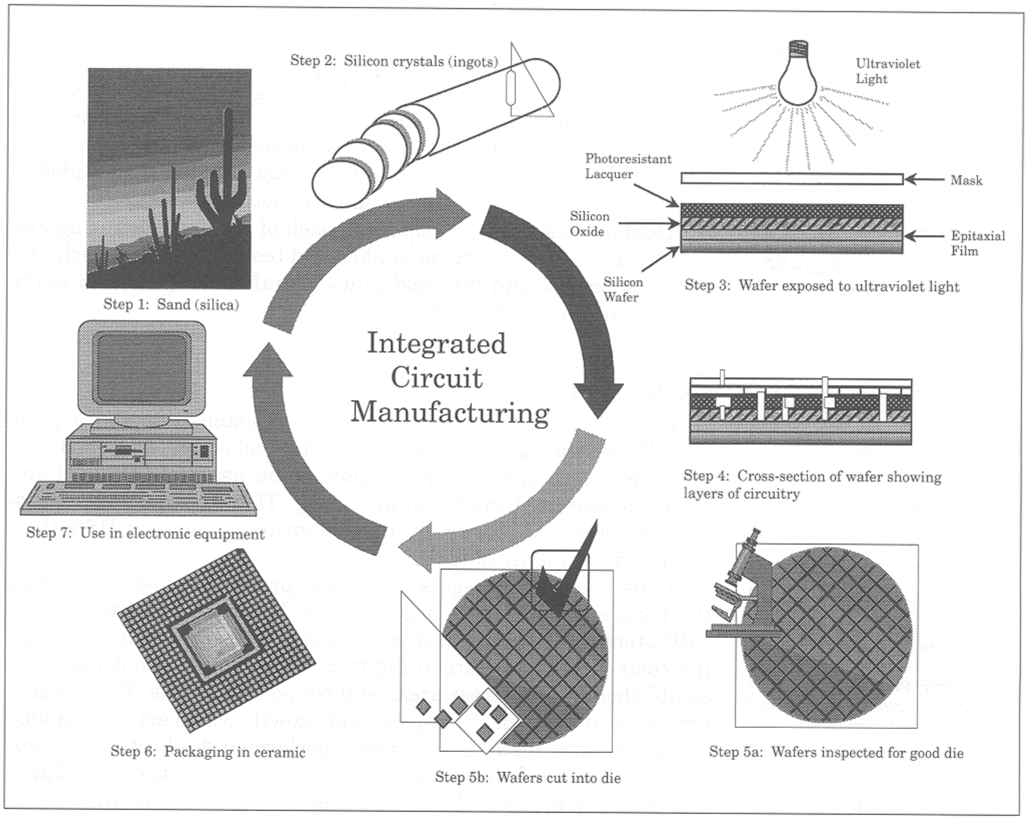
DS began its ABC implementation by extensively redesigning the ABC accounting software that Digital had supplied (ABMS™) so that it would emulate the fabrication, probe, assembly, and test processes of semiconductor manufacturing. This 12-month effort provided a useful ABC software tool and gave managers at DS a thorough understanding of ABC.

Departmental managers were under pressure to justify or reduce the head counts in their departments. Managers used the classic ABC procedure—first to assign cost pools to activities, then to assign the costs of activities according to *activity drivers*—that had been established in all process areas and support functions. This made it possible to determine, by department, exactly which activities added value. Because many departments performed duplicate activities, managers realized that these duplicate activities also caused duplicate costs. To improve the value added by departments, they determined to find out what was driving these activities, which was the key to understanding the behavior and causes of costs.

DS conducted extensive training to help managers and operators understand ABC principles. This training was critical in demonstrating the usefulness of ABC, and it also helped build acceptance of the techniques. However, as documentation of departmental activities continued, identifying cost drivers became a contentious undertaking and often an obstacle. Debates over what activities were important and what actually caused or “drove” them—and therefore the cost—often became heated and ended unresolved. In many cases, another department’s requirements or problems were the drivers of another department’s work.

Many of the debates were over how—or even whether—to document non-value-added activities. Finance, which was initially the driving force behind ABC, took the initiative by positioning ABC as more than just a better way to assign costs. Instead, ABC was presented as a way to identify and eliminate non-value-added work throughout the process.

Exhibit 1. Integrated Circuit Manufacturing



Some employees worried at first that their jobs might be in jeopardy or that they might sound like complainers if they described their activities as either non-value-added or as having been caused by someone else's mistakes. For the most part, however, employees cooperated, because they were reassured that there would be plenty of opportunities in DS even if changes occurred in existing work flows.

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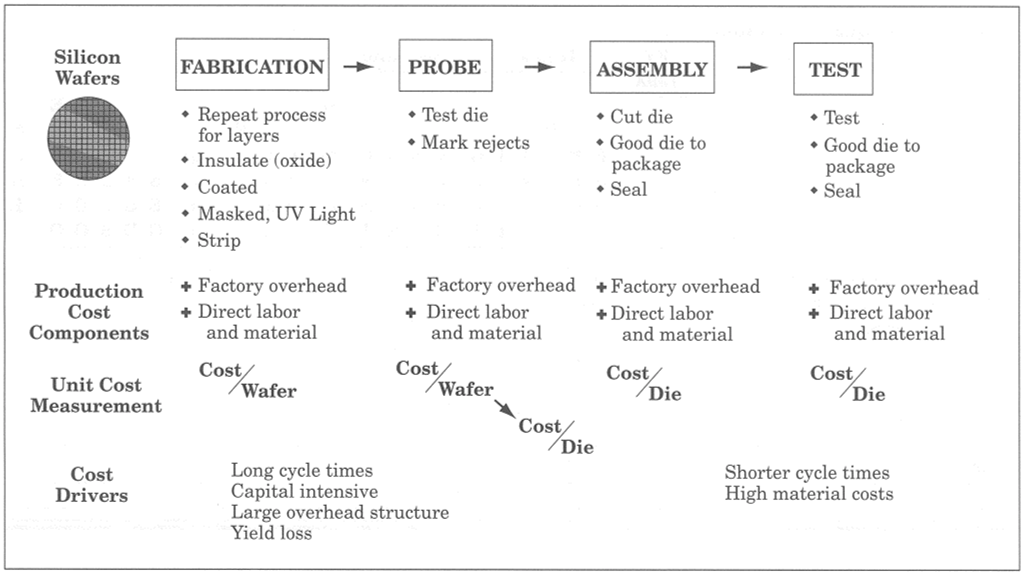
EVOLUTION OF ABC TO ABB

The transition in 1993 from ABC to ABB occurred during the annual departmental budget reviews—and at a time when Digital was downsizing significantly. ABB findings proved invaluable because DS was able to use the results to do all of the following:

- Make selective adjustments to its work force;

Exhibit 2. Semiconductor Process Costing Overview



- Better assign overhead costs; and
- Strategically eliminate planned work.

Proposed investments that clearly added little or no value were canceled. Having the ABB information also helped DS respond to questions—and the inevitable requests for additional reductions—without negatively affecting the business plan.

Budgeting based on key activities performed and the beneficiaries of those activities—rather than by dollars spent—was the key to ABB. In this way, all the activities performed for a major manufacturing process could be "chained" together.

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As product costs were developed using the spending, volumes, and capacities of each major manufacturing process, ABB made it possible for DS to map each direct and support activity to each product. This allowed senior management to see the major cost drivers of each department, each process, and each product. With this information, top management gained a better perspective of strategic alternatives, such as product mix, manufacturing cycle times, product yields, and service levels for production support. The positive impact of these factors on process and product cost soon became apparent. Mapping all the activities also helped managers make cogent staff decisions. Gone were the simplistic discussions about head count. Instead, managers could focus on managing the drivers of costs.

Exhibit 3. Manufacturing Activity-Based Budget Process FY199X & FY 199Y ($M)

Organization: Quality and Reliability

	FY 199X		Hudson						Scotland															
Activity	**$**	**%**	**Fab3**	**Fab3**	**Probe**	**Assy**	**Test**	**Genl**	**Fab5**	**Assy**	**Test**	**Genl**	**ProDMgmT**	**Peng**	**CIMT**	**Facil**	**Qar**	**Matl**	**SEG**	**ASD**	**Fab6**	**SBO**	**ExSCO**	**Admin**
A1. Document Control-Fab3			1.0																					
A2. Failure Analysis-Fab3			6.5																					
A3. Customer Satisfaction-Fab3			.5																					
.																								
.																								
.																								
An.																								
Total Spending			8.0																					

Examples

In the Purchasing Department, buyers of capital equipment and production consumables used ABB to trace their efforts and staffing needs to specific factory ("fab") capital-procurement plans and to the operational demands of specific manufacturing processes. They could thus determine which investments and products drove the demand for resources in the purchasing department and for purchased assets and supplies.

Similarly, the Quality Department was able to document, cost out, and explain which processes or products drove activities such as reliability testing and returned-material inspection. Product and Manufacturing management were able to determine the benefits and costs of changing such activities through the use of ABB information. The key for a successful use of ABB was a complete and timely understanding of each functional area's activities, its costs, and the related products that benefited from the activities.

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Interdependencies: Internal Customers and Suppliers

ABB accounted for all factory spending, so it made the interdependencies between the various factory overhead departments quite clear. Because the drivers of costs often originated outside the specific production or support department where the costs were actually incurred, Finance was inspired to initiate a negotiation process between internal customers and suppliers to identify value-added and non-value-added activities for each department. As Exhibit 3 shows, the activities of each department (supplier) were listed vertically, while the beneficiaries of the department's activities (that is, the internal customers) were listed horizontally.

Because many of a department's activities were established and approved during budget reviews, Finance required each department to document its proposed activities and costs for the next year during the budget process. The most controversial requirement was to then identify which department benefited from the activity.

As each supplier presented its activities and costs, the customer had a chance to affirm or deny whether they benefited from the work in question. At times, these discussions became contentious. Often supplier departments did not want to change or felt that they provided more value than the customer perceived. Some activities were thus exposed as having no benefit to other departments, which marked the activities as non-value-added work.

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Resolving Interdepartmental Disputes

To resolve interdepartmental disputes that arose during the annual budgeting process, Finance arranged for each department to make a presentation about its activity costs and the beneficiaries of those activities. With senior management present, each department's costs were reviewed (see Exhibit 4). These summaries made budget reviews dramatically easier. As beneficiaries were identified for each activity cost, it became clear how each department and its proposed activities fit into DS's major cross-functional processes. ABMS (the ABC software that DS used) linked each activity across all departments and process areas, then summarized the costs, as illustrated in Exhibit 4. With a clear picture of how activities fit across the value chain, senior managers could thus make more informed funding decisions.

ABB and the cost process at DS had many positive repercussions. The debates over which internal customer or department benefited from another department's activities led to a far better understanding of the support work required for each major manufacturing area, and also to a better understanding of which activities add value. This made aligning each activity and its costs more efficient. The identification of non-value-added work was done during the budget process instead of after the budget had been approved.

The debates over which internal customer or department benefited from another department's activities led to a far better understanding of the support work required.

Focusing on the Value Chain

As it turned out, for example, many entities other than the Material Planning group performed material planning. This apparent duplication of work was brought to light during the budget review.

Downstream departments in the value chain would sometimes second-guess the production plans made by the Material Planning group. Although resources in downstream departments were used for these material-planning activities, the costs of those activities were buried in traditional budgets. When the costs were uncovered by the ABB reviews, fingerpointing quickly subsided as the causes for the duplication of effort were finally discussed. Senior manage-

Exhibit 4. FY199X Budgeted Spending by Activity Summary and by Spender Organization ($M)

Group	Fab3	Fab4	Hlo Prb	Hlo Assy	Hlo Test	Sqf Fab5	Ayo Test	Total Prod	Major Development Projects A	B	C	D	Total Dev'p	Ext'nl to Mfg	Total Admin
Fab3	50.0														
Fab4															
Fab5-Fab															
Fab5-Prb															
Hlo Probe															
Hlo Assy															
Hlo Test															
Ayr Test															
Cr/Cimt	2.5														
Materials	.9														
Prod Eng	1.0														
Qar	8.0														
US Mfg Admin	.3														
US Mfg Train	.4														
Mfg Admin	.4														
FY9X Totals	$63.5														

Exhibit 5. FY199X Budgeted Spending by Activity and Wafer Costing Overview

Examples of Activities by Org'n

A1.	CMOS 2 Full Equipment Cap	10.0
A1.	CMOS 2 Plan'd Equipment Cap	15.0
A3.	CMOS 2 Build Plan	2.5
A4.	G/A Full Equip Capacity	10.0
A5.	G/A Plan Equip Capacity	10.0
A6.	G/A Build Plan	2.5
		50.0
A1	Document Control	1.0
A2	Failure Analysis	6.5
A3	Cost Satisfaction	0.5
		8.0

Summary Spending by Org'n

GROUP	FAB3
FAB3	50.0
-	
-	
-	
-	
-	
-	
-	
CR/CIMT	2.5
MATERIALS	0.9
PROD ENG	1.0
QAR	8.0
US MFG ADMIN	0.3
US MFG TRAIN	0.4
MFG ADMIN	0.4
FY9x Total	**63.5**

Wafer Costing Bridge

ACTIVITIES		WSW CAP	$M	C2 Cost/ WAFER	GA Cost/ WAFER
CMOS 2	Full Equip Capacity	2000	$10.0	$100.00	
CMOS 2	Plan Equip Capacity	1500	15.0	200.00	
CMOS 2	Build Plan Capacity	1000	2.5	50.00	
			$27.5	$350.00	
Gate Array	Full Equip Capacity	1000	$10.0		$200.00
Gate Array	Plan Equip Capacity	800	10.0		200.00
Gate Array	Build Plan Capacity	500	2.5		100.00
			$22.5		$550.00
	Total Direct		$50.0		
CMOS 2	Mfg Support	2000	$10.0	$100.0	
Gate Array	Admin Support	1000	$2.0		$40.00
FAB3	Admin Support	3000	$1.5	$10.00	$10.00
	Total FAB3		$63.5	$460.00	$600.00
	Raw Wafer Cost			$50.00	$50.00
Line Yield				90%	85%
	Total Wafer Cost			**$566.67**	**$764.70**

ment soon realized that manufacturing measurements were determined too much by departments rather than being determined by the value chain. This important cause of excess inventory and inefficient spending finally surfaced.

ABB helped management clearly see departmental activities costs, the beneficiaries of those costs, and the product costs that resulted from the cross-functional mapping of each department's activities, as shown in Exhibit 5. Consequently, decisions to increase, decrease, or reprioritize production or to realign support work could be conducted with little pain and much faster. Rather than imposing across-the-board cost reductions, DS's senior management reviewed each department's changes to its business plans immediately. Exhibit 5 shows how the Production Support Department's activities (as shown in the column on the left of the exhibit) are rolled into the various support departments (the middle column), then how the costs of these various activities are used to determine product cost (the column on the right side of the exhibit).

Decisions to increase, decrease, or reprioritize production or to realign support work could be conducted with little pain and much faster.

Opportunities for Change

During the first ABB review, changes—or opportunities for change—identified, recommended, or realized included the following:

- Excessive material handling in the assembly and test areas was eliminated when inefficient workflow was identified as ABB was being documented.
- Duplication of domestic acquisition work in overseas fabrication plants was identified and then reduced.
- Material planning was simplified. The Material Planning group was "reempowered," and manufacturing groups were instructed to manufacture according to the plan.
- The true cost of equipment networking for real-time data access and analysis was determined and reassessed.
- Continuation of failure analysis testing for mature products was questioned and substantially reduced, because failure analysis testing was extensive and quite costly.
- Product yield improvement work was substantially reprioritized; activities on proposed products were aligned with the production and engineering schedules.
- The cost of computer system maintenance was identified and the various non-value-added work efforts across many departments caused by years of unintegrated software customization were finally documented.
- Product Design Engineering drove 50 percent of the Production Support Department's work. Cost assignments were changed and all new product returns on investment (ROIs) were reevaluated.
- A 90 percent reduction in the time traditionally required to review product costs with external auditors was achieved by improving documentation and clarifying product cost roll-ups.

ABB budget reviews soon focused on a critical and previously difficult goal: the identification and elimination of non-value-added work.

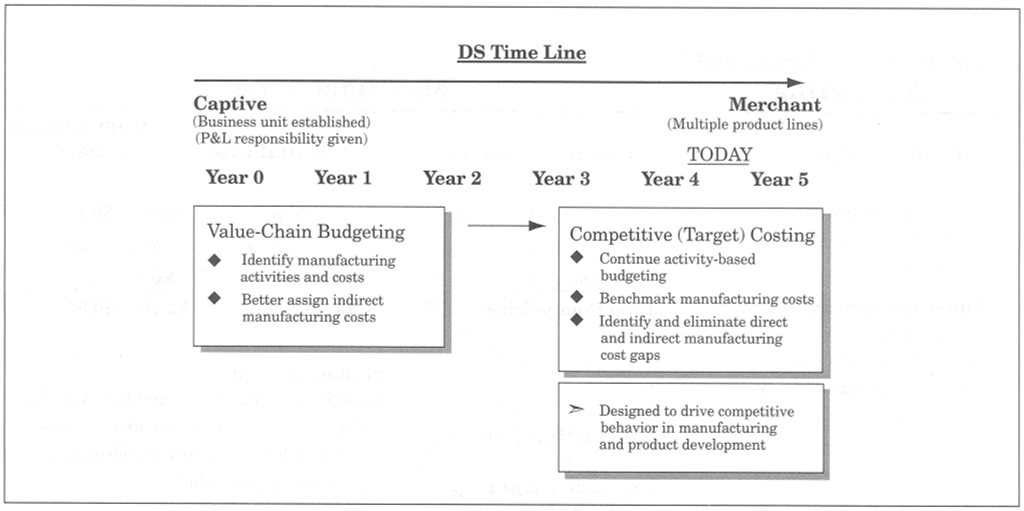
ABB budget reviews soon focused on a critical and previously difficult goal: the identification and elimination of non-value-added work. Work realignment or elimination set during the budget review was mapped to a manufacturing process and monitored to ensure implementation during the year. The expected impact on product costs could thus be determined with reliability. As a result, departments were able to reduce their overall spending in ways that did not negatively affect other departments or increase overall product costs.

TARGET COSTING

Soon after the successful implementation of ABB, the business model at DS changed, as shown in Exhibit 6. Before, DS was a *captive supplier* (a cost center) of microprocessors and peripheral semiconductor devices for Digital Corporation, but it became a *merchant supplier* (a profit center) of semiconductors. DS's goal was to become a profitable division through sales to the industry as well as a supplier to the corporate parent.

During the next two years, DS created and staffed Sales, Credit, and Marketing Departments and established seven product lines having profit-and-loss (P&L) responsibility. Each product line sold

Exhibit 6. Digital Semiductor's Business Model Evolution



all of its products at market-based prices, including internal sales to Digital.

With a P&L and product margins to manage, DS quickly focused on product costs. An early cost management and accountability issue was manufacturing underutilization. The product lines had been established to develop and sell new products to be manufactured in the newest DS wafer fabrication plant. But until full production was achieved, capacity costs remained very high. The issue of which product line "owned" what—and, thus, who was accountable for underutilization—was hotly debated. The product costs that accounted for the factory's underutilization substantially exceeded the manufacturing costs of competitive products.

The issue of which product line "owned" what—and, thus, who was accountable for underutiliza-tion—was hotly debated.

Competitive Costs

Management applied ABC techniques to this problem and implemented *target* (or competitive) *costing*. The product lines determined (as part of their budgeting and profit planning) the desired margins and cost levels for each of their products based on sale at market prices. The desired product costs were then given to manufacturing to evaluate. Manufacturing, in parallel, determined the competitive costs for the product-manufacturing process. Cost benchmarking with competitors using comparable manufacturing processes was a critical element in determining the manufacturability of product design as well as of manufacturing's competitiveness. Exhibit 7 outlines this process.

The final stage of the target costing process was the evaluation of Manufacturing's ability to achieve the requested costs.

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Exhibit 7. Competitive (Target) Costing

Product Development/ Marketing

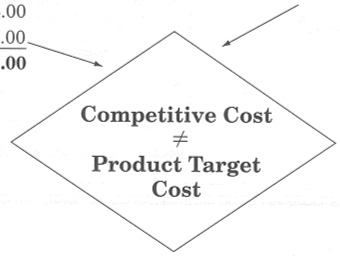
Product Plan

1 **Product attributes**
- Functionality
- Quality

2 **Financials (per unit)**
- Revenue $4.00
- Product target cost 2.00
- **Gross margin** **$2.00**

Manufacturing

Competitive Cost		Actual Cost		"Competitive Gap"
Process step 1	$1.00	Process step 1	$1.25	$0.25
Process step 2	.50	Process step 2	.55	.05
Process step 3	.75	Process step 3	1.00	.25
Total Competitive	**$2.25**	**Total Actual**	**$2.80**	**$0.55**



Product Options

a) Revise product quality and functionality

b) Accept manufacturing competitive cost and look for cost reductions elsewhere

c) Don't invest in product

Manufacturing Options

a) Eliminate "gap"

turing compared its current process-flow cost to the competitive benchmark cost. The gap between the competitive cost and the estimated actual manufacturing cost before cost reduction efforts was then measured, which provided a process (step-by-step) cost comparison, with the appropriate support departments identified by the ABB system. The key to developing a plan to reduce the gap was having clear ownership of the process steps.

Manufacturing was able to present both its competitiveness cost gaps and product design inefficiencies during the budget process. The manufacturing cost center used the best known industry transfer prices. Manufacturing's performance was evaluated based on its ability to reduce the gap in costs, while the product lines (armed with the best cost prices attainable) were encouraged to increase sales volume (and thus capacity utilization).

Manufacturing's performance was evaluated based on its ability to reduce the gap in costs.

Better understanding of costs and drivers (design and operational) reduced fingerpointing, and animosity was eliminated from discussions about not achieving the desired manufacturing cost. Target costing made application of a full value-chain perspective on product cost: from product design to manufacturing, then to special customer requirements, then to sales, and finally to the customer.

CONCLUSION

Successful installation of ABC and of an ABB system significantly improved management's understanding of activity cost driv-

ABB influenced managers to focus on the level of activities consumed rather than on budgeted spending, which, in turn, changed managers' behaviors.

The contentious and unproductive budget process that had prevailed proved to be the natural area for applying ABC.

ers and projections. ABB influenced managers to focus on the level of activities consumed rather than on budgeted spending, which, in turn, changed managers' behaviors. Product Design, Manufacturing, and Finance managers all communicated better using the common language of ABB. Fab operations were managed more effectively as the cost of departmental and divisional activities became clearer. The contentious and unproductive budget process that had prevailed proved to be the natural area for applying ABC.

By using a value-chain approach, managers at DS were able to link costs and internal beneficiaries of the various functional activities to arrive, for the first time, at an understandable product cost. Doing this highlighted the cost drivers and the departmental interdependence in the value chain. DS could thus use ABB as a tool to improve its cost structure and understand its market competitiveness.

Target costing proved to be a logical extension of ABC. After DS split into seven product lines (which meant shared manufacturing and all the complexities brought by such a change), a clear understanding of the root causes of costs became even more important. The ABB system and an understanding of how activities drive costs helped DS to pull together a plan for reducing cost "gaps" and thus bringing costs in line with appropriate benchmarks. Managers were quick to give activity-based thinking credit for the eventual attainment of improved profitability at DS.