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**HEWLETT-PACKARD CASE STUDY:  
PRODUCT STEWARDSHIP: GREEN COMPUTES**

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This case study is based on several papers written by Hewlett-Packard's personnel over the years that product stewardship was in development. Information in these papers was augmented with focused personal interviews of select HP personnel. Note, case studies by their nature are snapshots of an organization. Today, the details of the program and the perspective of participants are likely to be somewhat different from the ideas presented here.

**HEWLETT-PACKARD IS A MULTINATIONAL CORPORATION**

Hewlett-Packard manufactures products and systems for computation, communication, and test and measurement. The three major business sectors of the corporation are the Computer Organization, the Test and Measurement Organization, and the Measurement Systems Organization. These sectors are broken down into groups, businesses, and product-line divisions, which are quite fluid and independent entities. Revenues for the company as a whole in 1996 were \$38.4 billion<sup>1</sup> and reached \$42.9 billion in 1997, according to Hewlett-Packard's web site. Some of this equipment, such as computers and printers, is produced in large volumes, while others, such as test and measurement equipment, are not. Manufacturing facilities are located worldwide—in North America, South America, Europe, Australia, and Asia. In 1995, more than half of HP's products

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<sup>1</sup>*HP 1996 Annual Report*. Financial Highlights, <http://www.hp.com/financials/96annrep/Financials/Highlights>.

sold were designs that were two years old or less.<sup>2</sup> In 1997, more than 123,000 employees worked for HP in 120 countries.

Environmentally conscious product design, or design-for-environment, is called product stewardship at HP. It is

the philosophy and practice of designing products and their associated accessories and processes to prevent/minimize adverse health, safety, and ecological impacts throughout their life cycle. (Bast, 1996, p. 42.)

Differences in product and market characteristics influence the implementation of product stewardship between the various business units that constitute the corporation. HP corporate managers have not implemented product stewardship with the expectation that all product managers will (or should) be equally responsive to the program.

The HP product stewardship program is still very new. The first HP business to begin design-for-environment was the Computer Products Organization. This program was initiated in 1992 and was extended corporatewide one year later. According to the Corporate Product Stewardship Manager, the strategy for product stewardship implementation at HP is to develop the product stewardship process, provide tools and information, and then rely on the merits of the program and innovative individuals who champion its merits to drive implementation (Bast, 1996b). Table B.1 represents a time line of product stewardship developments and shows how HP has been laying in the procedures, tools, and information to get the program started since 1992.

### **SEVERAL FACTORS INFLUENCE DESIGN-FOR-ENVIRONMENT AT HEWLETT-PACKARD**

Regulatory and market forces, environmental policy, and corporate culture and values influence how product stewardship is imple-

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<sup>2</sup>HP 1996 Annual Report, Financial Highlights, <http://www.hp.com/financials/96annrep/Financials/Highlights>.

**Table B.1**  
**HP Corporate Product Stewardship Time Lines**

Year	Milestone
1979	Environmental audits begun at HP
1992	Environmental policy revised to include product design
1992	Computer Products Organization product stewardship program begun
1993	Environmental Management Steering Committee established
1993	Product stewardship program extended to all product lines corporatewide
1993	Product design guidelines package formalized
1993	Product metrics developed
1994	Fountainhead database developed
1995	Self-assessment process tested
1996	Self-assessment process implemented worldwide

mented at HP. Specifically, the organizational structures and procedures used to consider environmental issues in design are shaped and driven by these three broad areas. Taken together, these areas can be considered as elements of the overarching factor—business processes and contexts—that drives design-for-environment at HP.

### **Regulatory and Market Forces**

Motivation or drivers for the Hewlett-Packard product stewardship program are a mix of regulatory and market forces, including customer preferences and competitor actions. In particular, German packaging takeback legislation enacted in 1993 drove manufacturers to consider packaging volume. Proposed legislation extends manufacturer responsibility to the entire product, and will require original equipment manufacturers (OEMs) to take back products after their useful life.

In addition to legislation, the second significant set of motivators in the HP product stewardship program consists of two eco-label programs, the German Blue Angel Program and the U.S. EPA Energy Star Program. Product standards in these two programs influence HP product design. The German Blue Angel Program is considered one of the most mature eco-labeling programs. Similarly, according to a survey performed by the German Fraunhofer Institute, 67 percent of the Germans surveyed said that they considered the Blue Angel label when making a purchase. Blue Angel criteria for personal computers

were introduced in 1994, and HP has qualified several of their products under this label (Dirksen, 1996, p. 302). Under the EPA's Energy Star program, a manufacturer may use the Energy Star label on product and marketing literature if they meet product criteria for energy use. This voluntary program was backed up with a presidential executive order requiring federal agencies to purchase only computer and printer products that met these criteria.<sup>3</sup>

Third, HP plans to use product stewardship to meet market demand more generally. That is, it intends to meet and anticipate customer preferences for a product's environmental attributes. For some products, the HP marketing organization has detected customer preferences for environmentally superior products (Korpalski, 1994, p. 207).

These drivers affect the HP products to different degrees, so HP corporate has focused attention strategically. Their strategic attention has been placed on the products produced in higher volumes, as well as those expected to grow because of its concern regarding the generation of mass. For instance, computer products are produced in high volumes and any seemingly minor change to product design can have a large impact on the environment. In contrast, test and measurement devices are produced in smaller volumes. While improvements could be made, HP has decided to focus implementation on the products with higher leverage. This mix of regulatory and market forces around the world has influenced members of the company to consider proactively these and impending forces in product design as a means of finding solutions that can meet both environmental and business objectives.

### **HP Environmental Policy**

HP's own environmental policy is a second factor that influences design-for-environment implementation. The environmental policy is the overarching mission statement for all environmental activities in the company, and it establishes a framework for thinking about the issue. The HP environmental policy was revised in 1992 to

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<sup>3</sup>Requiring the purchase of environmentally favorable products is often called affirmative procurement (Bast, undated, p. 2).

include a corporate intent to design and manufacture environmentally sound products and services, and it now reads:

To provide products and services that are environmentally sound throughout their life cycle and to conduct business operations [worldwide] in an environmentally responsible manner. (Hewlett-Packard, 1993.)

Because HP sells products and has manufacturing operations worldwide, product stewardship is very important. Unlike manufacturing operations, which need only worry about local regulations and laws, product-related environmental attributes are influenced by regulations and laws in all markets. For HP, that means its products must satisfy regulations and standards promulgated worldwide. The corporate intent to design and manufacture environmentally sound products, in worldwide markets with varying standards and legislative requirements, while additionally fulfilling or exceeding customer preferences and competitor actions, is extremely challenging.

HP seeks to meet these challenges by integrating product stewardship into all normal business processes—R&D, marketing, manufacturing, procurement, distribution, and especially design. HP hopes that, by utilizing the creativity and expertise of its product designers when product attributes are relatively easy to change, it can effectively meet these challenges over the long term. HP seeks to find more environmentally responsible solutions through design rather than to have others in the company dictate responses through various means (Korpalski, 1994, p. 207). Furthermore, consideration of these issues in the design phase is a means of positioning products to meet or exceed anticipated future requirements (Bast, 1997b).

Included with the environmental policy statement are 11 fairly specific guiding principles. Several of the principles particularly relevant to product stewardship are listed below. Especially key aspects are in italics.

- Ensure that environmental policies, programs, and performance standards are an *integral* part of our planning and decision-making process.

- Regard sound environmental management as an integral part of our total quality commitment and to apply these principles and practice of *continuous improvement* accordingly.
- *Design* and construct our facilities to minimize waste generation, and to promote energy efficiency and ecosystem protection.
- *Design* our products and services and their associated manufacturing and distribution processes to be safe in their operation, minimize use of hazardous materials, make efficient use of energy and other resources, and enable recycling and reuse throughout their manufacture, distribution, and operation.
- Ensure that our *suppliers* support our Environmental Management Policy and encourage them to adopt similar principles.

The rest of the principles address reduction of chemical and solid waste generation, remediation activities, openness to all stakeholder interests, employee involvement, and active engagement in public policy discussions. These principles are employed as product stewards make connections to standard HP business processes. Note that the key aspects of the environmental policy and principles relevant for product stewardship implementation are the life-cycle perspective, integration of EH&S with standard planning and decision-making processes, the link to quality and the desire for continuous improvement, and supplier involvement (Bast, 1997b). All of these are used to implement design-for-environment in the context of business processes. The most important factor, however, is customer interests and expectations.

### **HP Corporate Values and Culture**

A third factor that influences design-for-environment implementation is HP's corporate values and culture, which have included concern for the local community for some time. In 1957, Hewlett-Packard established corporate objectives that call for the company to be an asset to the nation and to each community within which the company operates. Dealing with environmental, health, and safety issues is one element of good corporate citizenship (Hewlett-Packard, 1994, p. 1). Internally, corporate culture is characterized as decentralized and cooperative. Corporate values, described as "the HP way," refer to cooperation with co-workers, which is a valued

employee asset. Corporate values are best described in the words of the company co-founder, David Packard.

I want to discuss why a company exists in the first place. In other words, why are we here? I think many people assume, wrongly, that a company exists simply to make money. While this is an important result of a company's existence, we have to go deeper and find the real reasons for our being. As we investigate this, we inevitably come to the conclusion that a group of people get together and exist as an institution that we call a company so they are able to accomplish something collectively that they could not accomplish separately—they make a contribution to society, a phrase which sounds trite but is fundamental. . . . You can look around [in the business world] and still see people who are interested in money and nothing else, but the underlying drives come largely from a desire to do something else—to make a product—to give a service—generally to do something which is of value. So with that in mind, let us discuss why the Hewlett-Packard Company exists. . . . The real reason for our existence is that we provide something which is unique [that makes a contribution]. (Collins and Porras, 1994, p. 56.)

In summary, three categories contribute to implementation of design-for-environment at HP. The first includes the regulatory and market forces that motivate the specific analyses and investments made during design and that can vary considerably for the individual products designed and produced by HP. The environmental management policy emphasizes integration of environmental, health, and safety with general business practices, a life-cycle perspective, continuous improvement, and supplier involvement. Customer interests and expectations are the primary driver of what the product stewards do. Finally, the decentralized corporate structure and core values of good citizenship, community involvement, and cooperative behavior among staff shape the activities used to implement product stewardship. All of these factors affect the specific organizational structures and processes used to promote HP's product stewardship programs.

### **AN EXECUTIVE STEERING COMMITTEE SPONSORS A DECENTRALIZED PRODUCT STEWARDSHIP ORGANIZATION**

The corporate office orchestrates and supports the product stewardship program, but responsible individuals in each of the businesses and product lines make it happen.

Organizationally the program is decentralized and integrated with design and other business activities, such as procurement and marketing. Networks are created among the corporate, business, and product-line product stewards to develop and implement the program. These networks, informal and formal, are critical to implementation. The corporate product steward has worked, and continues to work, with business product stewards and product-line stewards to establish a process for product stewardship consistent with their corporate culture and policies. They have also worked together to develop the tools and information required for success and to make these available corporatewide.

The overarching coordinating body for environmental, health, and safety issues at HP is the HP Environmental Management Steering Committee. Established in 1993, this committee is responsible for developing the companywide environmental policy and strategy in general. Executives representing all HP groups or businesses are on the committee. At HP, these executives are at the general manager level, which is equivalent to a vice president of a strategic business unit for a typical major corporation. Because the HP sectors, groups, and businesses are so diverse, the executives that sit on the committee come from a variety of business functions. Some groups may be represented by R&D, manufacturing, or personnel. Generally, the group representative to the committee is from a functional area, which, for that group, coordinates across all group functions. The variety of business functions present on the committee is an asset to integrating environmental, health, and safety issues into these processes. The HP Environmental Management Steering Committee sponsors the corporate-level Product Stewardship Council, which is a key part of design-for-environment implementation because it develops the tools and information to aid all the product-line stewards companywide. This sponsorship gives the Product Stewardship Council clout.

The Product Stewardship Council develops corporate processes, procedures, and organizational principles for product stewardship specifically. This council identifies and develops corporatewide projects to advance and support the product stewards. Business-level or group-level product stewards and the corporate coordinator for product stewardship sit on the council. Members represent such business functions as material procurement, quality, public affairs, legal, electronic assembly development, packaging engineering, and computer systems personnel. The corporate product stewardship organization itself is lean, so different projects are staffed by individuals from across the corporation to draw on expertise as appropriate to the project.

Therefore, at the corporate level, two bodies contribute to the product stewardship program. The HP Environmental Management Steering Committee develops overarching environmental, health, and safety policy and procedures for environmental management in general. A high-level committee sponsors the product stewardship activity. The Product Stewardship Council aids the individual product stewards with information, policies, and processes specific to product stewardship or design-for-environment, ensuring that these are consistent and integrated with other business practices.

### **NETWORKING IS A KEY COMPONENT OF PRODUCT STEWARDSHIP**

Each HP business and product line has designated product stewards so that corporatewide there are between 75 and 100 throughout the world. This organizational structure was begun and tested in the Computer Products Organization in 1992. Then, in 1993, each of the other HP businesses was asked to designate a product steward to champion activities at the business level (which may be equivalent to sector, group, or a business, depending on the breadth and depth of the entity's product lines). In turn, the business product stewards identified product-line product stewards to champion efforts. For example, the Computer Products Organization has a product stew-

ard for the business overall, as well as 19 product stewards for each of its product lines.<sup>4</sup>

The business-level product steward works with each of the product-line stewards and the Corporate Product Stewardship Council to establish the policies and tools necessary for implementation for the business overall. The business-level product stewards perform several important functions. First, they communicate with all parts of the company, such as the marketing and procurement organizations, to gather information as well as raise awareness about environmental issues. They also track, assess, and relate relevant market and legislative forces to the business's product portfolio. And they increase the awareness of business staff on these market and legislative forces as well as the benefits of considering them early—for example, in design. Business-level product stewards are also key players in the development and implementation of procedures that will improve the treatment of environmental issues in procurement, design, etc. Finally, they develop and employ such tools as product design guidelines and metrics.

For each product line, responsible stewards are the critical link between environmental issues and the design team. Furthermore, their knowledge of the product, market, and business processes issues is extremely important to integrating environmental issues in these contexts. The stewards provide information to the design team on

- environmental legislation
- customer interests
- eco-labels
- competitors' actions.

These stewards are the initiators and facilitators of discussions on environmental issues with the product-line manager and the design team. Ultimately, the product-line manager and the design team decide which criteria are feasible and desirable to meet.

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<sup>4</sup>These product lines include personal computers, such as the HP Vectra; printers; servers; monitors; scanners; faxes; and multifunction devices, such as printer/faxes.

Product stewards at both the business and product-line level are not necessarily environmental experts. Depending on the division, a more appropriate choice may be an R&D expert, a marketing expert, or a manufacturing expert. R&D, marketing, and manufacturing, the “triad” as they are called, are the three functional areas predominantly relevant to product stewardship at HP. However, this may differ for each product line. In Grenoble, for example, the steward is a customer service expert.

HP has found that some champions or stewards are more influential than others. Part of this is because the product steward job description is evolving and it may take a couple of iterations before the right person is matched to the job. Experience to date suggests that it takes the right mix of salesmanship, enthusiasm, aggressiveness, and influence. Dialogue and a thorough understanding of the strategic business issues are the key elements in this process. The product steward must know the relevant functional issues and use these, with general business objectives, including customer preferences, to drive environmental actions. It is difficult to measure a product champion’s effectiveness, because HP does not have good methods to relate product steward actions to results (e.g., the number of additional units that were sold because of environmental attributes or an eco-label). In some divisions the product stewards are full-time, and in others they are part-time.

To help jump-start the stewardship program, the product stewards met for two days every six months during the first three years of the program. These meetings were to discuss issues of mutual concern. Some of this involved “show and tell” to exchange lessons learned. For example, a product steward from one product line described how they engaged the design team. On other occasions proposals for corporate product stewardship policies (not division policy) were discussed. For example, at one of these meetings product stewards decided that a good way to engage business managers in the stewardship program was through a unit self-assessment. Details of the procedure were discussed and fleshed out at these meetings. On another occasion, corporate strategy regarding environmental criteria for suppliers was discussed. Now that the product stewardship program has been jump-started, these formal meetings are less frequent. Information among product stewards is exchanged through a

combination of electronic mail, audioconferencing, and a corporate worldwide database described below.

To summarize, organizationally, HP has placed environmental stewards, responsible for incorporating environmental issues into design decisions and processes, within each product line. They are the critical link toward integrating environmental issues with other business issues, and their market knowledge and business expertise is crucial. These stewards are guided and helped both by the business and the corporate level. The decentralized structure is quite consistent with HP organization in general. Initially, product stewards met twice per year to share lessons learned and to develop standardized policies and procedures. According to the corporate product stewardship manager, these meetings were very useful in jump-starting the program (Bast, 1997a). Frequent communication between the product stewards across the company as well as between the stewards and designers is crucial. Because the product steward job is still evolving, specific skills have not been explicitly enumerated. However, a strong ability to communicate and understand both the division or product-line strategy and the design process is critical. Individuals with R&D, marketing, or manufacturing experience most often have the requisite knowledge of market, product, and business issues.

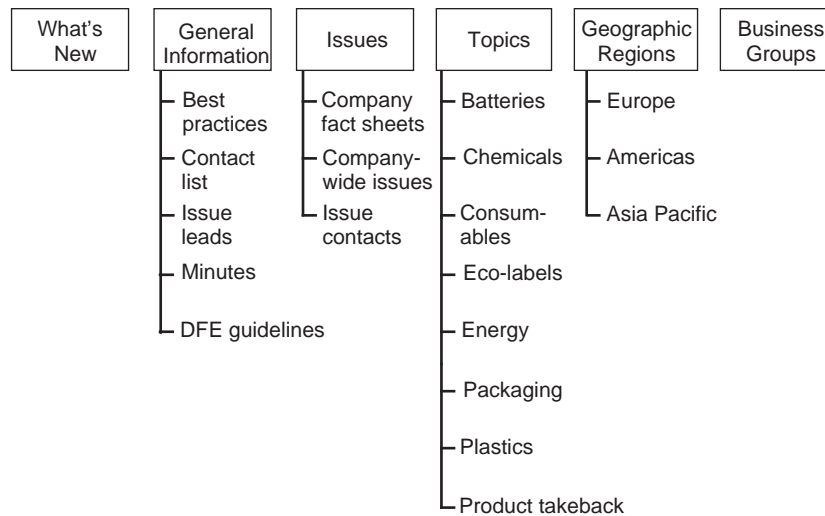
### **INFORMATION GUIDES PRODUCT STEWARDS**

Because HP is so decentralized, and because the corporate culture is cooperative rather than hierarchical or rigid, one of the key facilitators to design-for-environment at HP is information. The parallel organization for all the sectors and businesses, with clearly identified product stewards, aids information flow. Information is also contained and shared in a database called Fountainhead, which is available corporatewide. Developed by the corporate Product Stewardship Council in 1994, this is the primary formal vehicle for information exchange among the corporate, the division, and the product-line stewards, numbering between 75 and 100 individuals worldwide. Included in the database is information on worldwide environmental trends both market and regulatory. Also included in the database are corporate environmental policy and principles, product steward points of contact, design guidelines, suggested

metrics, benchmarking data, and meeting notes. Figure B.1 shows the file structure in the Fountainhead database.

As noted in the figure, the “General Information” area contains information on product stewardship contacts, issue leads, design-for-environment guidelines (created by the corporate council), minutes from product stewardship meetings, and information on best practices. “Issues” includes corporatewide fact sheets on such issues as ozone depleting substances and energy. “Topics” contains more technical information for the headings shown in the figure (batteries, chemicals, etc.). Finally, the “What’s New” area contains information updated within the last month. The other areas, “Geographic Regions” and “Business Groups,” contain information specific to those areas, including business group metrics and design criteria (Holbrook, 1995, pp. 301–304). All sorts of information is collected from industry associations, standards organizations, government agencies, consultants, HP employees, and others and assessed before it is included in the Fountainhead database. A crucial step is the evaluation of this information and its relation to HP businesses.

RAND MR1009-B.1



**Figure B.1—Fountainhead Database Structure**

If appropriate, recommendations on compliance strategy or corporate position are also included. It has been placed on a standard HP information system, which is currently available to 55,000 users.

### **GUIDELINES AND METRICS ARE USED TO INTEGRATE ENVIRONMENTAL LIFE-CYCLE ISSUES INTO DESIGN PROCESSES**

Generally, HP products turn over quite rapidly. Product design life averages 12 to 18 months and in some cases may be less than 12. PCs and a few printers are especially affected by market forces. All product performance criteria are linked to the financial system. In some cases, design teams know their margins down to the penny. Generally, the bottom line is that they cannot increase their purchase price. So product design decisions must be pragmatic and consider customer preferences.

Armed with strategic market and regulatory information from the Fountainhead database, support from the organizational links across the division as well as the company, and their own understanding of the specific product market and business issues, the product-line stewards integrate environmental issues into the design process with a couple of tools—design guidelines and product metrics. Again, the process of developing and applying these tools is somewhat decentralized.

Corporate design guidelines were developed by the Product Stewardship Council, select business-level product stewards, and personnel from manufacturing, procurement, marketing, alternative sourcing and recycling, and R&D. In order to develop these guidelines, the staff did not perform a full-blown life-cycle analysis of all environmental effects. Rather, they worked through the product value chain from R&D through disposal and performed a gross assessment of the environmental effects.

Using the results of this gross-level analysis they developed a set of generic design-for-environment guidelines that can be applied as appropriate to all HP products. These guidelines are broad and generic enough so that, irrespective of the specific product, they will help position the product better on environmental issues. Guidelines cover the areas of product use, packaging, consumables

and supplies, manufacturing processes, and end-of-life strategy. They include such preferences as reduce mass, eliminate hazardous materials, and reduce the number of components. Some of the guidelines were easier to develop because of the company's experience recycling and reusing parts in their Roseville, California, and Grenoble recovery facilities.<sup>5</sup> The guidelines have been revised once and as a result are more detailed. Once the guidelines were created they were spread to the product stewards worldwide through the Fountainhead database.

In addition to the "dos and don'ts" design guidelines, more specific product metrics were also developed by a cross-functional team in late 1993. Several ground rules for metrics were established at this time.

- Metrics should be simple and easy to apply.
- Metrics should focus on strategic issues (those that regulations, standards, or the customer will require) and should incorporate knowledge gained from the field (particularly recovery centers).
- Product designers should have the ability to influence the metrics.
- Metrics represent a starting point for environmental improvement strategies and do not reflect a full-blown life-cycle analysis.

The full metric set is shown in Table B.2. It should be noted that not all of HP products are evaluated and measured for environmental performance improvements. Product teams and product-line stew-

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<sup>5</sup>HP began a recycling facility in Roseville in the late 1980s as an alternative way to generate parts for servicing (rather than tie up manufacturing facilities to generate these parts). This center was not originally developed for environmental reasons, although there is an obvious benefit. The center is profitable in part because it recycles or reuses *select* parts. If it tried to recycle or reuse all parts, it would not be profitable. In some cases, it might make sense to reuse parts or extend the design life or reuse components or scrap materials. The economics of recycling depends on the volume. In 1995 HP recycled or reused 1.25 million pounds of plastic per month. Over the year 1.1 million pounds from the general ABS recycled plastics market were recycled in the outer casing of the HP 850 Deskjet printer. The benefits of this experience help product stewards understand the ultimate fate of materials and recycling costs.

**Table B.2**  
**HP Corporate Stewardship Metrics**

Category	Metrics	Applications
Materials conservation and waste reduction	Mass or weight	Products
	Percentage reused	Consumables
	Percentage recycled	Packaging Learning products
Energy efficiency	Normal operating mode watts	Products
	Sleep-mode or power-down watts	
	Off-mode watts	
Manufacturing Emissions	SARA 313 emissions	Processes
	Hazardous waste generated	Office Waste
	Hazardous waste reused/recycled	
	Site solid waste generated	
	Site solid waste reused/recycled	
Design-for-Environment	Variety or number of materials	Products
	Plastics marked	Consumables
	Recycled material content	Packaging
	Materials requiring special handling	Learning products

SOURCES: Korpalski, 1994, p. 209, and 1996, p. 40.

ards have considerable latitude in determining not only which products should be assessed in which years, but also which metrics to apply and what values or goals to establish.

Business-level and product-line product stewards then combine corporate guidelines, market forces identified in the Fountainhead database, and knowledge of their own product and market situation to work with the product manager and design team to develop specific product metrics and goals. An important part of the product-line steward's role is to integrate all this information, to select the metrics relevant to the product for which they are responsible, and to develop goals in cooperation with the product-line manager and team. Thus, the product-line stewards work with the design team to apply the design criteria developed at the corporate level to the particular product. The design team and product manager then either set specific goals for these metrics (e.g., a specific mass target of 15 kilograms) or select a product to serve as a baseline and to measure

improvement against the attributes of this product (e.g., decrease mass by 45 percent from the baseline).

Several elements of the guidelines, metrics, baseline, and goal selection are key. First, product stewards think about environmental issues strategically. They focus on the major environmental issues and their drivers. Information on market forces and legislation has been synthesized to develop general product guidelines to be applied to all HP products. This information is continually updated. Product stewards then work with product managers and designers to incorporate corporate guidelines, market forces identified in the Fountainhead database, and knowledge of their own product and market situation to develop specific product metrics. Specific goals against these metrics are determined by the product managers and designers with the help of the product steward.

### **SELF-ASSESSMENT DRIVES IMPROVEMENT**

One of the last elements of the product stewardship program is the self-assessment process. The aim of the self-assessment is to improve business managers' awareness regarding environmental issues and to capture their attention on the merits of the product stewardship program. This awareness then should lead to improvement in environmental management generally and product stewardship specifically. Only if managers can realize these benefits will the program succeed in the long run.

Self-assessments were developed by the Product Stewardship Council to help product-line and business managers evaluate their programs. The self-assessment process was initiated in 1995 and was sponsored by the CEO of HP. Now the HP corporate product steward and council believe the process is complete.

These assessments are seen as a method to engage business managers through their self-evaluation of their product stewardship program. They are not intended to serve an audit function but are intended as a means for division management to drive its program. Evaluation is performed through a structured process that involves division or product-line stewards as well as relevant functional managers.

The meat of the assessment is a series of TQM systems questions that the product steward asks of these senior managers. In other words, they are provocative questions that are action-oriented, not answer-oriented. The concept is that if a manager has no answer to these questions, then the managers probably do not have a comprehensive process in place. The questions cover the broad areas of market knowledge (including customer expectations, the implications of voluntary standards to each product line, and competitor actions) as well as management processes (including business product steward links to corporate and other businesses, an internal management sponsor, business- or product-specific design guidelines, supplier evaluations, and mechanisms to ensure internal awareness and communication of product stewardship principles). The following are examples of these questions:

- Who is the management sponsor to the product stewardship program?
- Does the sponsor have a customer tracking system in place to understand customer needs and expectations?
- Does the sponsor have a legislative tracking system in place?
- Does the sponsor know competitors' positions?
- Are environmental issues incorporated into the supplier selection process?
- Are product guidelines available to all product lines?

These are general questions recommended for self-assessments. Some HP businesses have developed these further.

As a result of this self-assessment, action items may be generated, and progress can then be tracked by the business itself from year to year. At some point the Product Stewardship Council may initiate another round or issue a reminder to the businesses to perform self-assessments. Feedback from the 1995 self-assessments shows clearly that some managers are aware of market forces on environmental issues. As a result of these assessments, the Product Stewardship Council will put more benchmarking detail and questionnaires in the Fountainhead database. Higher-level background information on legislation and eco-labels was also requested to help guide division

strategy. Early feedback also shows that these self-assessments helped elevate awareness about the purpose and benefits of the product stewardship program. Again, HP product stewards recognize that the program will not succeed by mandate. It will only succeed and survive if product managers and others see the benefits.

### **THE PROGRAM IS COMPREHENSIVE—SUPPLIERS ARE ENCOURAGED, TOO**

The HP environmental management policy specifically states that suppliers will support HP's environmental management system and be encouraged to develop their own environmental management systems similar to HP's. Since HP's suppliers operate worldwide, in countries with less stringent enforcement of environmental regulations than in the United States, HP's basic approach to suppliers is to encourage and inform them. In particular, HP advises its suppliers on environmental market forces. Although each HP product line (of which there are 75 to 100) has hundreds of suppliers, there are only 200 major suppliers corporatwide. These suppliers are called strategic suppliers, and HP purchases large volumes from them. HP requests more input on these suppliers' environmental management activities.

In addition, the Product Stewardship Council has developed a set of source selection criteria for the suppliers (in 1992–1993). The environmental criteria are included with other supplier criteria in the categories of technology, quality, responsiveness, delivery, cost, and the environment (TQRDC-E). This is a standard HP supplier evaluation process that continues through contract execution. During source selection, suppliers are rated against these criteria. For the environment category, this rating process is somewhat subjective. Generally, HP divisions and purchasing agents want to see an environmental policy that fits the supplier's corporate culture, complies with its country's laws, saves money, and yields competitive advantage. If these conditions are met, then HP hopes the obvious advantages would provide enough incentive to suppliers to comply, because HP does not feel that it has strong control over its suppliers for the most part. HP is reluctant to audit its suppliers because, in its view, that would be micromanaging, and HP does not have that much power over an individual supplier. The only way HP can

enforce the criteria is through the procurement process. To date, no supplier has been turned away because of an unacceptable environmental management system.

There are two levels of supplier criteria: corporate criteria and product-specific criteria. At the corporate level, in order for a criterion to be included, it must satisfy two conditions. First, the criterion has to be of concern globally. Second, the criterion has to be vetted with suppliers before it is included in the source selection process. The specific environmental corporate criteria, or “E criteria,” are as follows:

- Existence of an environmental policy supported by top management. HP suggests that the policy cover manufacturing processes, materials and labels, source reduction, power consumption, reuse and recycle, packaging, and disposal.
- An implementation plan with metrics tied to the supplier’s environmental policy.
- No use of ozone-depleting substances.

Supplier performance against these criteria is then evaluated and compared to that of other suppliers of the same commodity. These results are included in the overall supplier performance rating that covers TQRDC-E.

Effective relations with suppliers are an important factor in implementation. HP has found that to achieve environmental goals, there must be cooperation and open dialogue between parties. Effective relations are based on mutual trust and long-term commitments. Joint problem-solving and goal-setting between HP and the suppliers are much more effective in improving environmental outcomes than mandates or other approaches are. The key to success is to work as a team toward environmental ends.

### **LESSONS LEARNED AFTER FOUR YEARS OF IMPLEMENTATION**

Based on HP’s recent experience implementing design-for-environment, the HP corporate product steward listed several lessons learned in interviews.

- *Be strategic about the products selected* for environmental product stewardship. Focus on products that really drive environmental performance. Because HP is concerned about generation of mass, it focuses on products with high production volumes. Regulations, customer interests, and eco-labels provide the strategic environmental focus for HP product lines.
- Implement product stewardship in *small evolutionary steps* and *look for breakthroughs*. Do not try to do everything at once.
- Focus management attention on the early adopters and *share this information* with others. For HP, the corporate culture of community and collegiality is important in diffusion of this program. Be flexible and open to change. Dynamic and fluid organizations should plan to adapt the program and product steward personnel during implementation.
- Several activities are associated with the start-up of a product stewardship program. Intensive networking of individuals is important. Once the program is in place, however, and the benefits to the business's bottom lines are evident, it will survive on its own merit. In the end, *corporate has less influence than the product-line personnel on the effectiveness of the program*.
- Environmental issues *must be placed in the business paradigm* so managers can understand and act. Environmental activities that are pursued outside of this context will fail. HP is pushing resource efficiency to drive innovation on environmental matters. Pollution prevention projects are viewed like any other—as a quality issue. While HP does not have explicit financial criteria for pollution prevention projects, experience with compliance and waste disposal activities has given it enough management experience to select proper pollution prevention investments. And, as with new product development, investments are made strategically in manufacturing as well. HP ranks the products and associated chemicals and processes that are likely to experience sales growth in the future and focuses attention here. It is also effective to focus attention on expanding processes and chemicals because *it is cost-effective to incorporate pollution prevention investments while making other new investments in plant and equipment*.

- Industrial ecology is a broader long-term vision that guides strategy. Industrial ecology deals with the fundamental issue of societal needs and wants, products, and the environment. *Out-of-the-box thinking is necessary to analyze the fundamental function demanded by customers and then to think of ways to fulfill this want with products or services with smaller environmental footprints.* For DoD, the environmental security people could work within department planning processes to explore how to meet national security objectives in a way that lessens the environmental footprint either through longer weapon system lifetimes or various upgrades, etc. Pragmatically this can be approached as minimizing the investment required to meet national security objectives.