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Setting Priorities, Requirements, and Goals

With a rudimentary lifecycle model such as the one we constructed in the preceding chapter, you can see where your product or service will have impacts. The next question is what to do about them. In general, you'll find that there are some areas where you *must* make improvements, some areas where it's advantageous to make improvements, some areas where it's easy to make improvements, and some areas where it won't be worth your time and effort.

Once you determine your priorities, then you can establish the requirements and goals for those areas. In setting priorities, we have found that it is useful to look at your product or service from four different points of view.

- What are the legal requirements?
- What are the business requirements or opportunities presented by your target market?
- What are the largest impacts?
- Which things would be easy to fix?

Each of these perspectives will provide a different insight regarding where to focus, and will provide a framework for establishing requirements and setting goals. Let's look at each of them individually.

Knowing the Law

If you're on the wrong side of the law, nothing else will matter. It's critical that you understand all the regulations, restrictions, and government policies that will apply to your product or service so that you can achieve—and sustain—legal compliance. As they say, ignorance of the law is not an excuse.

Typically, laws fall into the following categories:

- Banned or restricted chemicals, toxins, and hazardous substances
- Directives on packaging and packaging waste
- Product take-back, recycling, and waste disposal regulations (such as the European Union Waste Electrical and Electronic Equipment [EU WEEE] Directive)
- Emissions limits, including electromagnetic radiation, noise, other emissions, or exhaust

Laws in these areas vary by country, state or province, and even municipality. In short, you need to understand the legal landscape in any market where you will potentially sell your product or service.

While this sounds daunting, there are lots of resources to help you. Industry trade groups and consultants exist for all major industries and can help you understand the overall landscape as well as the details of specific laws. Most large companies also have internal compliance groups, and often have established a common requirements list that is known to be compliant with all target markets. So, don't try to figure these issues out on your own; it's a very complex topic and there's no reason to take the risk of missing a key law or misinterpreting the applicability or requirements of some piece of legislation.

One important question to answer at this point is whether you are going to make one product that you will sell worldwide, or whether there will be separate versions that comply with specific laws on a regional basis. For example, today many electronics companies make global products, but the differences in regulations cause car manufacturers to make and sell different, region-dependent models. This is a really big decision that touches many parts of the organization. If your company doesn't already have a policy on this, you need to spend some time and make sure you've devised a plan that will work for your company.

One challenge with environmental compliance today is that many new laws are under development. Since products are often in development for years, you will need to make sure you're up to speed on potential laws that may be in effect when your product eventually ships. In some cases, you or your company will need to get involved in the legislative process, educating government officials on the nature of your products or market. You may find a need to lobby for exceptions, help with the definition of product classes (which products are covered by a law and which aren't), and influence the levels, quantities, or thresholds specified in the legislation. Again, you may do this directly, or you may find that others in your industry share the same issues, in which case it may be more efficient and effective to engage the government through an industry group.

Finally, if you are developing something in an emerging product space, you need to pay extra attention to which regulations are or aren't applicable to you. Is a digital video recorder (DVR, e.g., a TiVo) a computer or a piece of consumer electronics, like a DVD player? Are the new "cross-over" vehicles cars or SUVs? Are thin desktop systems the same as PCs or are they just smart monitors? If you have any doubt, engage the applicable government agencies and get a formal ruling. Nothing would be worse than finding out your awesome new product can't be sold in some country or region because the government there viewed your product as being in a different class than you did, so as a result you used the wrong set of design requirements.

At Sun, we started paying much more attention to the legal aspects of environmental responsibility beginning in about 2000, when it became clear that local, regional, and statewide hazardous substance laws were gaining momentum. We saw that the EU RoHS (Restriction of Hazardous Substances) Directive initiated in Europe was likely to be implemented globally in some form, and we understood that RoHS would continue to evolve, expanding to encompass more and more of the REACH model (Registration, Evaluation, Authorization, and Restriction of Chemical Substances). At different points in time, we've looked at whether we needed regional products, but have continued to stay the course and produce products that meet the sum of laws around the world so that they can be sold anywhere in the world. This is important to many of our large customers that have IT operations around the world and want to be able to standardize on specific product models and use them everywhere they operate.

At the same time, we began paying more attention to regional and local recycling regulations, such as the WEEE initiative launched in Europe. We also began focusing more resources on complying with Energy Star guidelines and EU Energy-using Products (EuP) directives. Finally, we've been

spending a lot more time in Washington, Brussels, Beijing, and elsewhere lobbying for consistency in regulations and standards. Any differences between countries, regions, states, and so forth can significantly raise the cost of doing business, often with no added benefit to the planet.

Business Requirements and Opportunities

“It’s more obvious each day that extreme efficiency is good for the environment and great for business.”

—Jonathan Schwartz, *president and CEO, Sun Microsystems*

Corporations are recognizing that environmental responsibility and fiscal responsibility are not mutually exclusive—that, in fact, they can mesh well. And that’s great for engineers who want to improve the eco-effectiveness of a product or process. Of course it also means you have to be up to speed on the economic impact of being ecological.

In some cases, changes to a product or service to address ecological issues or opportunities will be synergistic with business. They will reduce costs for you or your customers, or may add capabilities or features that grow the market appeal of a product. For an engineer, this is fun stuff because it’s a double win—you’re helping the environment and the company’s bottom line at the same time. It is important to recognize these opportunities and maximize the business upside. When you look at each of the processes and impacts of your lifecycle model you should ask yourself: Is there an opportunity for us or our customer to save money? Can we make the product more desirable?

In other cases, changes to a product or service will have negative economic impact. Often this is because costs will have to go up without any upside in revenue. Other times this is because the need to implement an environmental feature will reduce the desirability of a product in the market (does anyone really want to be troubled with taking his light bulbs to a specialized recycler?). When this happens, engineers need to be aware and look to minimize the negative business impact.

Finally, many corporations today have begun to formalize specific environmental objectives. For example, your company may have a public goal to decrease its greenhouse gas (GHG) emissions or water usage by a certain percentage by a specific date. Or the company may have overarching product goals to decrease packaging or increase product energy efficiency. It is important to understand these objectives and factor them into your project plans. Helping the company meet them may give your project some extra resources or support, whereas ignoring them may keep the company from meeting its goals and bring problems to your project.

Businesses are clearly eager to participate in the green movement. But that doesn't mean your particular project will sail through your company's approval and budgeting processes simply because it's eco-friendly. From the company's point of view, it's still about money. You need to be specific about how your project will solve customer problems, contribute revenue, and create competitive advantages.

For engineers, this is an enormous opportunity. By mastering the economics of eco-effective design, you can play a crucial role in improving the environmental impact of products and services throughout the lifecycle—from using more eco-responsible source materials, to creating more eco-efficient manufacturing processes, distribution techniques, and packaging materials, to inventing more cost-effective and environmentally sustainable disposal methods.

Many books and dozens of Web sites are available to lay out the business case for eco-effective products and services. Among the best:

- *Green to Gold: How Smart Companies Use Environmental Strategy to Innovate, Create Value, and Build Competitive Advantage* by Daniel C. Esty and Andrew S. Winston (Wiley)
- *Business of Green: A Global Dialog on the Environment*, a blog published by the *International Herald Tribune*
- GreezBiz.com, a leading online information resource on how to align environmental responsibility with business success

You don't need an MBA to get a handle on the economic advantages of eco-friendly design. You *do* need to understand and communicate the advantages of your particular project from a business perspective.

Areas of Greatest Impact

Among the various impacts of your product or service, one or two typically stand out as being significantly larger than others. If you burn coal or petroleum, maybe it's CO₂ emissions. Or maybe you use a manufacturing process that requires lots of fresh water or some other key natural resource. Or maybe it's a specific hazardous chemical that you require.

Whatever it is, you need to understand the areas where your product has its largest environmental impact and start working to minimize that impact, no matter how hard that may be. For one thing, it's the right thing to do. But beyond that, if it is a major impact for you, sooner or later someone will start

asking questions and it will be important that you have recognized the impact, can talk about it coherently, and are executing a plan for reduction.

Consider an example from our own experience at Sun. A few years ago we saw that electricity costs represented an increasingly large share of our customers' IT costs, and that customers were having trouble getting sufficient electricity for their data centers. With the rapid build-out of Internet-based services and new Web 2.0 applications, the deployment of new infrastructure was outpacing the ability to provide adequate power and cooling of equipment.

A back-of-the-envelope calculation showed that it was by far our biggest environmental impact—many times the energy and emissions required to make our product or run our own operations. Furthermore, we understood that it was a growing issue for our customers, and they were going to expect progress. We began investing—and innovating—more in areas such as energy-efficient chip design, core operating system efficiency, and innovation in data center consolidation techniques and virtualization technologies. Our coming-out party occurred in 2005 with the launch of the “Niagara” processor, a new UltraSPARC architecture that used only 74 watts of power and ran at 1.4 GHz—far faster than previous generations. Industry analysts have credited this innovation with saving customers many millions of dollars in energy costs—and catapulting Sun into new business opportunities.

Quick Wins and Low-Hanging Fruit

Through analysis and measurement, not only will you identify opportunities for making major improvements in terms of environmental impact, but you'll also run across areas where quick fixes can be made with minimal effort or expense. When you find such low-hanging fruit, go ahead and pick it. Quick fixes may not have a huge impact individually, but lots of them add up.

For example, there may be simple things you can do to reduce the weight of your product. The weight has huge ripple effects in terms of environmental impact: Every ounce represents more raw materials used, more energy expended to produce and assemble and distribute your product, more GHG emissions (especially when you factor in multistage shipping), more waste to deal with, and so on. Reducing the weight of your packaging or documentation by a small fraction can provide a nice reduction to the total carbon footprint of your product.

Some of these opportunities will become apparent in your modeling activities, but others will bubble up from your company's employees. They are the ones who know how things really work, sometimes in ways that aren't ideal.

We get a steady stream of emails that start with “Did you know...”, and some of our best quick wins have come from such employee observations and suggestions.

In addition to the environmental benefit, we often find that small, quick wins can provide good momentum to the organization, and provide stimulus for tackling some of the tougher problems. Also, focusing on low-hanging-fruit projects with a positive economic return (lower shipping costs, for the weight reduction example we just discussed) is a good vehicle for engaging the finance department and business management.

So, to quickly recap our guidelines for setting priorities, requirements, and goals:

- Make sure your product or service will meet all applicable environmental laws for every country, state, and province where you plan to offer it.
- Place a high priority on environmental features that will cut costs or increase market appeal for your product or service.
- Place a high priority on minimizing the effect of any environmental features that are required but will not have a negative business impact.
- Place a high priority on environmental features that will help your company meet its overall environmental goals.
- Understand the largest impacts of your product or service and make sure you have a plan to decrease the impact steadily over time.
- Be on the lookout for low-hanging fruit—opportunities to make changes that have a positive business impact, no matter how small they are.