Ecodesign in the Development Process

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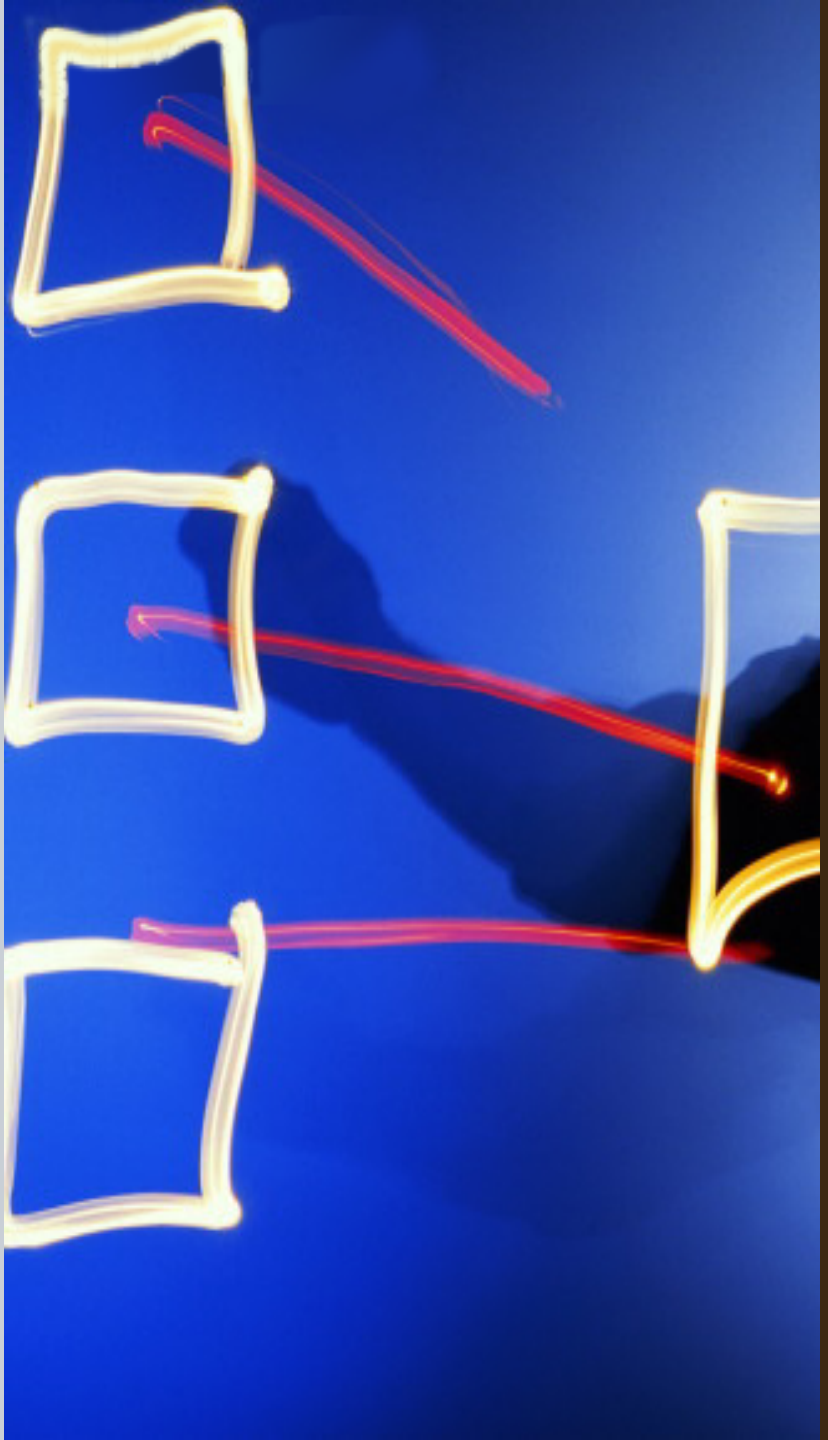
Ecodesign planning is a powerful way to improve a company's environmental performance.

Designers are well placed to initiate discussions and educate design team members about opportunities that integrate life cycle thinking.

We explore a few examples of methods that companies can use to integrate ecodesign in the development process.

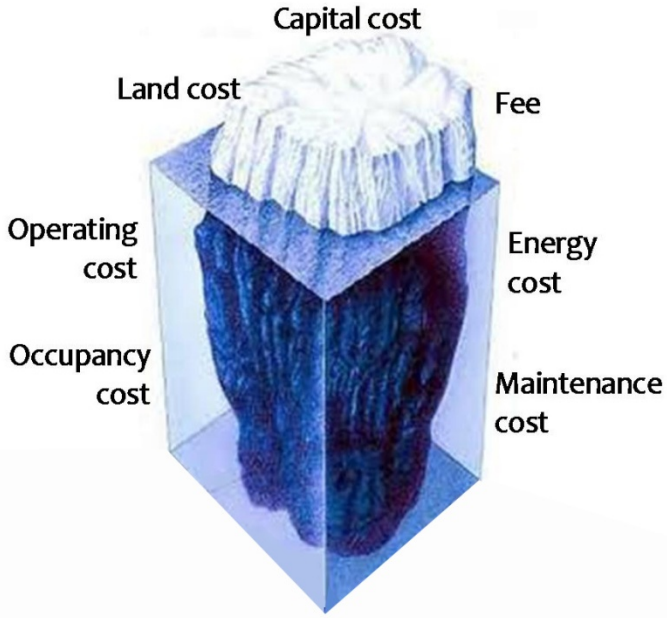


Life Cycle Costing

Life Cycle Costing (LCC) assesses all costs of a product over its entire life cycle. LCC is often applied in high capital, long term investments, such as building or transportation construction. Economic costs of environmental impacts are usually not included in LCC.

However, products analyzed with LCC models can be scrutinized with an environmental life cycle assessment (LCA). LCC and LCA share the same network of linked material flows over the product life cycle.

LCC and LCA can be usefully combined to help build ecodesign business models.



Depending on the product or service system, life cycle operating costs can comprise 2/3 of the total asset cost.

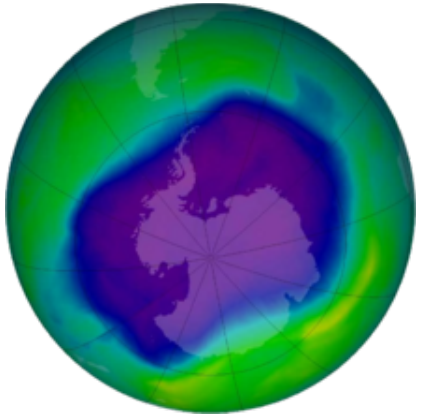
Mandatory Regulations: International

A few international agreements directly address environmental aspects of products.

The Montreal Protocol (1991) bans the use of substances that destroy stratospheric ozone.

The Basel Convention bans the transport of hazardous waste (including electronic waste) outside the country of origin. The US signed the convention but is (as of 2013) one of only three countries that have not ratified it.

Trade regulations such as **GATT and NAFTA,** overseen by the World Trade Organization (WTO), stipulate rules that have large environmental implications, often to the detriment of the environment.



"Ozone hole" over the South Pole, 2006

BASEL CONVENTION

WORLD TRADE ORGANIZATION

Mandatory Regulations:
European Producer Responsibility laws

Producer responsibility laws give manufacturers direct responsibility for products over their entire life cycle. The European Union Waste Electrical and Electronic Equipment (**WEEE**) directive requires collection and recycling of electronic equipment by the manufacturer.

The Restriction of Hazardous Substances (**RoHS**) directive restricts the use of toxic substances (mercury, chromium V1, lead, cadmium, and three brominated flame-retardants) in electronic products. Global electronics companies sell in the EU, so they must design products to conform to the directive.

The Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (**REACH**) regulation aims to protect human health and the environment through better identification and control of toxic substances.

WEEE logo

Mandatory Regulations:
US National Laws

The US passed environmental laws that affect product system designs and the industrial manufacturing infrastructure. Key US environmental legislation includes the following:

The National Environmental Policy Act, 1969
(creating the US EPA)

The Clean Air Act, 1970
(leading to automobile CAFE standards)

The Clean Water Act, 1972

The Endangered Species Act, 1973

These powerful laws have many implications for product system manufacturers. In the US, many state and local laws also regulate air quality, toxic content in packaging, bottle deposits, battery and hazardous waste disposal, and materials recycling.

Voluntary Standards:
ISO 14000 standards

Many companies adopt standards such as those developed by ISO (The International Organization for Standardization).

ISO's 14000 series standards address environmental topics. ISO 14000-series standards are described in the Okala Practitioner guide.

Over time these standards may be adopted on a de facto basis, similar to the now widely used ISO 9000 series for quality assurance standards.

Voluntary Standards:
Sustainability Consortium

The Sustainability Consortium (TSC) is comprised of major consumer goods companies. They develop integrated tools to inform decision making for product sustainability across a range of market sectors. TSC integrates life cycle impact assessment methods, metrics and standards for member use.

Global Reporting Initiative

Many companies frame their sustainability principles and initiatives via the Corporate Sustainability Reporting (CSR) protocol developed by the Global Reporting Initiative (GRI).

Their goals include the mainstreaming of disclosure on environmental, social and governance performance. The protocol is developed through a consensus-seeking, multi-stakeholder process.

Voluntary Standards:

Third Party Certifications

Third Party Certification can credibly verify the performance of a product or service.

Energy Star

Energy Star is a joint program of the U.S. EPA and the U.S. Department of Energy. Energy Star develops energy standards for a growing range of products, and is the most recognized certification in the US.

Underwriters Laboratory

Underwriter Laboratory's (UL's) Ecologo is for environmentally preferable products, processes and materials. UL now certifies carpeting, furniture, and information technology.

EPEAT

The Electronic Product Environmental Assessment Tool (EPEAT) is an environmental rating system that identifies greener electronic equipment. EPEAT evaluates products against 51 environmental criteria.

MARKS SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY

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discussion:

Considering the two groups of approaches to environmentally responsible product development (Mandatory Regulations and Voluntary Standards) what are some benefits and drawbacks of each group?

Mandatory Regulations:

Montreal Protocol
Basel Convention
GATT & NAFTA
WEEE Directive
RoHS Directive
REACH Regulation
US National Laws

Voluntary Standards:

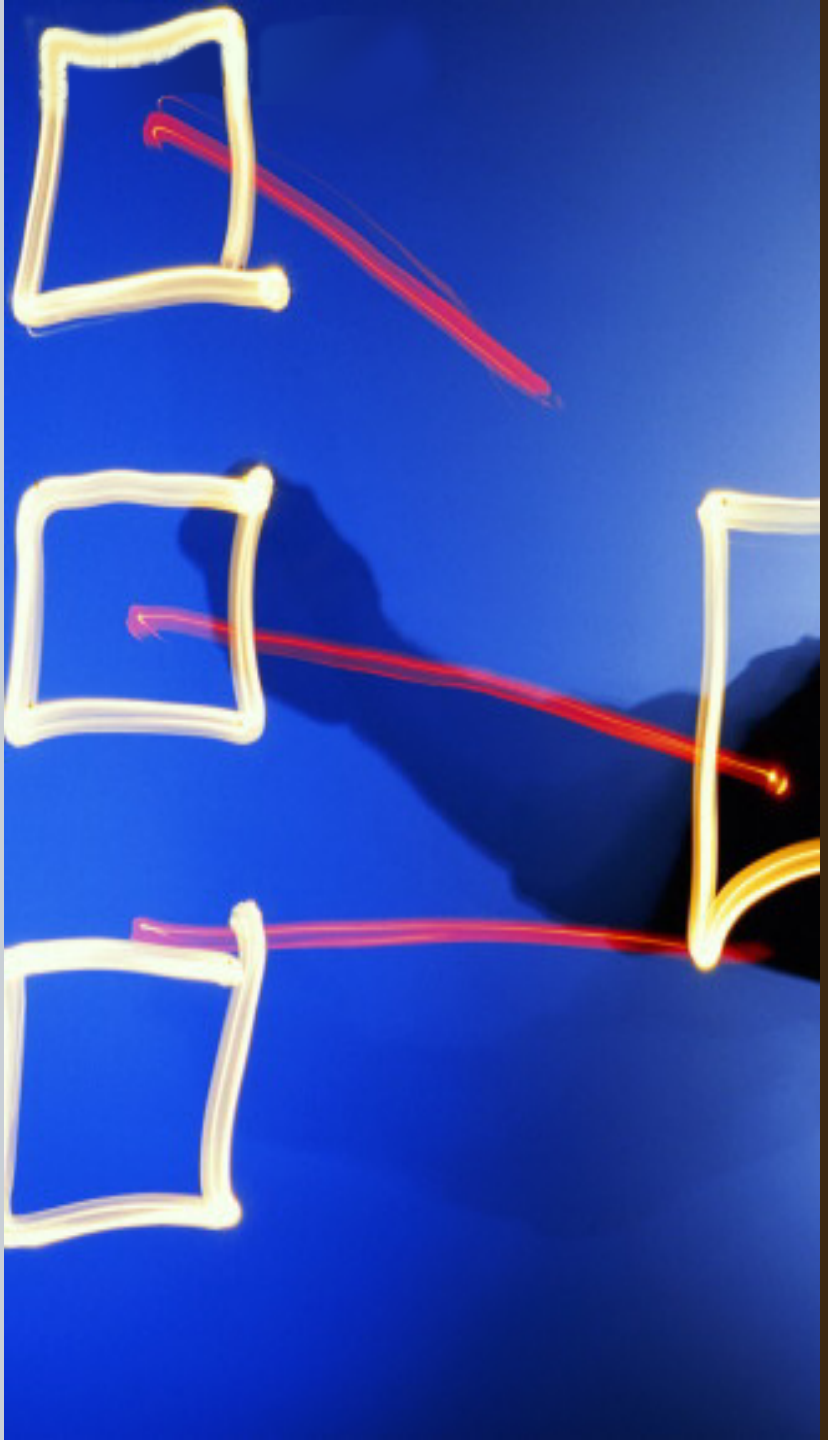
ISO 14000 standards
Sustainability Consortium
Global Reporting Initiative
Energy Star Certification
UL certification
EPEAT Certification

Ecodesign in the Development Process

As noted, Ecodesign planning is a powerful way to improve a company's environmental performance.

The following case studies demonstrate how ecodesign was applied in the development process at different companies.

Detailed descriptions are found in the Okala Practitioner guide.



Hardware Manufacturing Company

An major manufacturer of brand-name building devices, working with a consultant, adopted the **Okala assessment method** to improve the ecological performance of their products.

This company employed hundreds of product development engineers. Few developers initially understood ecodesign methods.

Detailed **ecodesign process steps** and metrics were created. The process steps convinced the technically driven teams to adopt the steps.

The methods helped the company improve competitive advantage and reduce costs through the development of robust products with improved environmental performance.

Herman Miller: Setu Chair

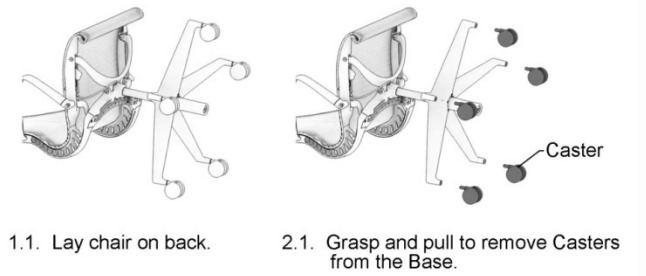
Environmental stewardship at Harman Miller began at the company's inception in the 1950s.

Herman Miller evaluates its products with a **Design for Environment protocol**, measuring these factors in each component by weight:

Material chemistry: %of materials with lowest possible human and environmental toxicity
Recycled content: % of post-industrial or post-consumer recycled content
Disassembly: % of manually disassemble-able materials
Recyclability: % of the recyclable materials

Measured values are compared to the previously defined factor goals. The design is refined closer to the goals. This process iterates until the goals are met.

The Setu chair was designed in 2009 by Studio 7.5



Disassembly instructions are packed with each chair.

Trek: Atwood Bicycle

Trek Bikes hired a consultant to a development process for designing a greener bike. These steps were followed:

A **baseline assessment** was performed on a bike, of all 400 components, using Okala Impact Factors. The assessment found that tires and inner-tubes created the largest impacts of any components over the bike's life cycle.

Redesign proposals were made in a brainstorm by engineers, designers and managers. **Potential design change impacts** were modeled to estimate the impact reductions.

The Atwood was designed and manufactured, with its strong ecological attributes comprising a major part of the promotion message.

The Atwood was designed for low life cycle impacts.

Bike tires were reformulated with more durable elastomers and certified rubber.

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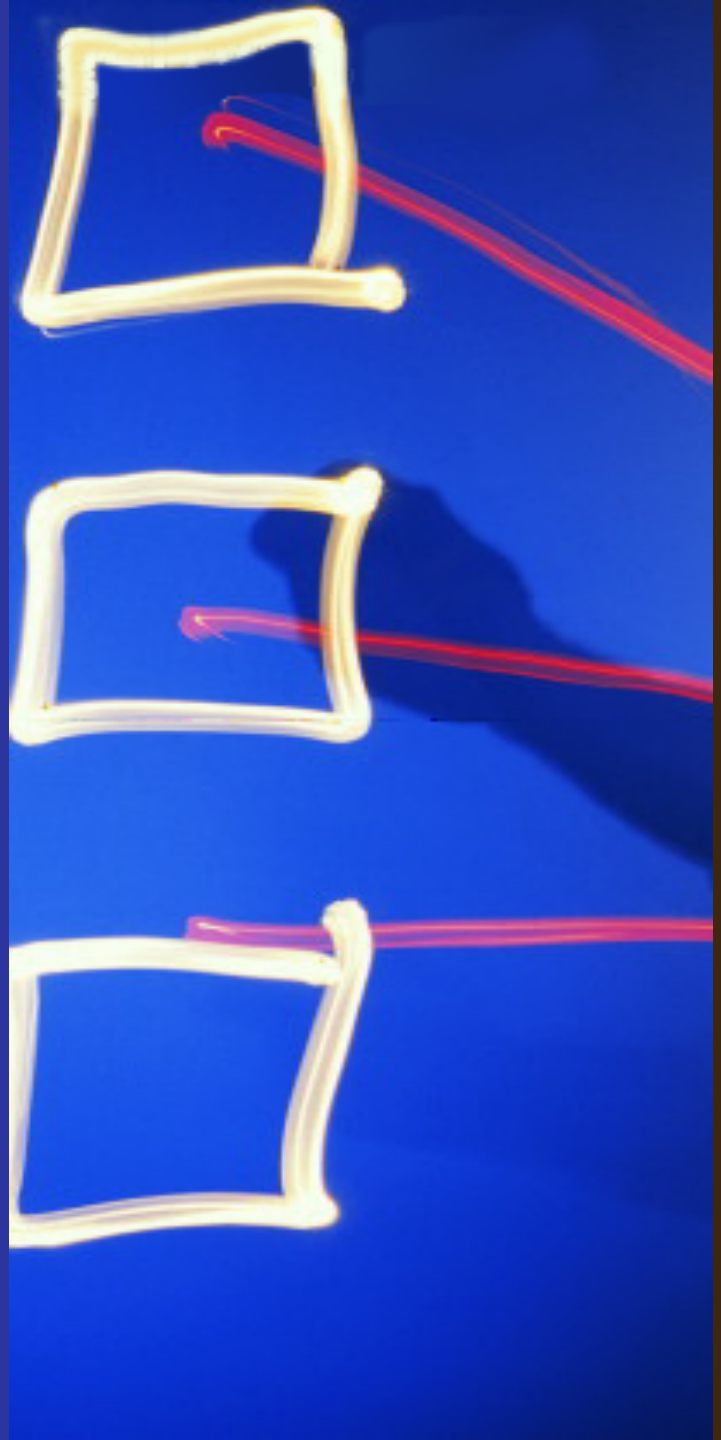
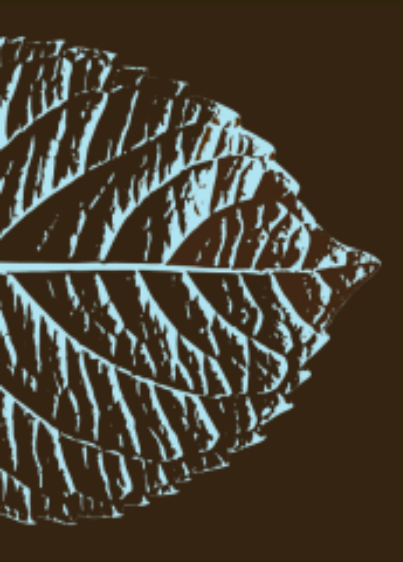
discussion:

Of the three ecodesign development examples described (Major hardware manufacturer, Herman Miller and Trek Bicycles) what were the similarities in their product development approaches?

What were the differences?





Okala Practitioner

Integrating Ecological Design

This presentation is part of an educational presentation series that supports teaching from the *Okala Practitioner* guide.

Okala Practitioner and these presentations were created by the Okala Team to disseminate fact-based knowledge about ecological design to the design disciplines and business.

Unless provided in the presentations, Information sources are found in the *Okala Practitione*r guide.

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The Okala Team initiated the collaboration with the US EPA and the Industrial Designers Society of America (IDSA) in 2003. The team developed *Okala Practitioner* with support from Autodesk, IBM, Eastman Chemical and the IDSA Ecodesign Section.

Okala Practitioner is available through amazon.com.

More information and the free Okala Ecodesign Strategy App can be found at Okala.net.