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Achieving a Sustainable Environmental Perspective*

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The design profession is in a position to address the environmental challenges faced by society and progress is being made in this direction. However, this paper cautions that achieving a sustainable environmental perspective within design requires educators and practitioners to go beyond the specifics of materials, tools and common strategies and address the very status of the environmental perspective. They will have to elevate this perspective above others and shift it from a relative requirement to an absolute one. Doing so will require several fundamental changes to design education and practice.

Keywords: environmental perspective; design practice; design education; sustainable design; green engineering; design for environment; design requirements

1. INTRODUCTION

DESIGN EDUCATORS and practitioners are well positioned to address the dire environmental situation faced by humanity and all living things. Attention has shifted upstream in production systems from end-of-pipe approaches to the early stages of design where system configurations are established [1]. And, design is one of the few professions that addresses both consumption and production deeply, so it is pre-adapted to address environmental impact broadly. In large part, the designer's challenge is to understand the needs and behaviors of people and specify technology that shapes natural resources to meet them. Unfortunately, this also means the profession is implicated [2] by the current situation, because environmental problems are inextricably linked to patterns of production and consumption.

As members of the design community, we have an urgent need to achieve a sustainable environmental perspective within design education and practice. Progress is being made in design programs–several have stand-alone courses in topics such as sustainable design, life cycle analysis, energy systems and climate modeling. Design firms are identifying sustainability champions, expanding their abilities and changing their processes. However, adding the environment as an additional perspective is insufficient. We need to realize what we are doing in the classroom and in practice largely ignores the realities of growth and natural limits and hence is potentially dangerously ill founded. To achieve a sustainable footing, we will have to elevate the environmental perspective above others and shift it from a relative requirement to an absolute one.

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2. ELEVATING THE ENVIRONMENTAL PERSPECTIVE

Trading off multiple perspectives is fundamental to design practice and the role that designers play in the realization of artifacts, be they products, services, policies or a combination thereof. Designers identify and negotiate the concerns of multiple stakeholders to create a synthesis within a given context. This was perhaps never more apparent than in the flourishing of Design For X (DFX) well over a decade ago [3] where, in any given context, a range of perspectives (the X's) would be in play, such as cost, performance, manufacturability, usability and environmental impact. Thus, DFE was and still is to some extent a way of talking about the environmental perspective [4].

In practice, suitable constraints associated with a long-term environmental perspective have not been active in these negotiations, the result of which can be seen in the current degraded state of numerous natural resources. This can happen when stakeholders representing this perspective are not included, other perspectives win out or these constraints are not built into the circumstances faced.

Neglecting the environmental perspective is understandable when natural resources or services are consumed at rates well below their carrying capacities. Unfortunately, whether it's the collapse of fish stocks, depletion of water supplies or irreversible atmospheric warming, humanity is now exceeding the capacity or resilience [5] of natural systems at an alarming rate and scale [6–8]. As natural limits are reached, designers must elevate the environmental perspective above others in order to avoid significant environmental loss [9]. This perspective effectively becomes a pre-condition to the negotiation of other perspectives.

To do so, educators and practitioners need to give the environment a level of priority analogous to that given to human safety. Students are routinely instructed to include safety within project requirements and that they cannot compromise basic safety for competing concerns. Similarly, there are levels of safety practitioners must maintain as non-negotiable, which are commonly established through regulatory codes of practice or other means. Setting this level of priority for the environmental perspective will still result in considerable environmental impact, just as current socially accepted levels of product safety still permit numerous injures and deaths today.

As with safety, current trends suggest that society will serve as the stakeholder that ultimately requires the elevation of the environmental perspective, and design practice and education will change accordingly. Early environmental regulations were of an end-of-pipe nature and were easily rolled up by supply chains, removing them from consideration in most design practice. However, contemporary environmental regulations increasingly focus on the early stages of product design, by banning the specification of certain materials (ROHS) [10] or prescribing the configurations of whole product systems (WEEE) [11] for example.

Perhaps the most prominent example of elevation involving the design community is the development and adoption of the Leadership in Energy and Environmental Design (LEED) green building rating system in the U.S. [12]. While the LEED system was developed with the participation of designers, its elevation of the environmental perspective appears to be driven by numerous cities and towns passing legislation requiring new government buildings to meet or exceed a Silver rating. Soon, this rating will widely be considered the minimum acceptable level of environmental consideration given in building design.

3. SHIFTING TO AN ABSOLUTE REQUIREMENT

Design requirements associated with stakeholders are a common means by which various perspectives are recognized and negotiated. These criteria for success generally determine the outcome of a design effort regardless of where they appear in the process or whether they are more explicitly or tacitly held. Requirements are commonly stated relative to previous designs as well as in absolute terms. For example, the cost of a new product may need to be lower than an existing one or below a certain specific absolute level in order to sell.

While stock size and resilience serve as buffers, the ability of natural systems to source and sink materials and energy is limited in absolute terms, such as the rate at which a fish population or an aquifer replenishes or the concentration of carbon dioxide in the atmosphere above which dramatic climate changes occur [6–8]. Thus, if high environmental priorities are to be meaningful, absolute levels of natural resource use must be recognized. Doing so can drive adaptation through behavior change, technology innovation, resource substitution and other means.

Unfortunately, it is all too common for design educators and practitioners, the author included, to accept relative environmental improvements where absolute ones are needed. For example, environmental requirements are stated in terms of an amount or percentage of a resource saved or an emission avoided compared to an existing design. Even goals to reduce environmental impacts below those of a particular historical year may not recognize the absolute change needed to sustain contemporary lifestyles in the future.

Shifting to an absolute basis means determining the life cycle impacts of design alternatives and applying a framework to judge their absolute acceptability. While a complete framework does not yet exist, enough components are available to begin practicing this approach. Adequate life cycle analysis tools are now available [13], although they have not yet matured nor are they widely deployed, a situation analogous to the early years of computer-aided design software. The carrying capacities of some natural systems are sufficiently determined, such as acceptable levels of equivalent carbon dioxide concentrations in the atmosphere [8]. The availability of important minerals is increasing well known [14]. Aggregate global and regional biocapacities give some guidance to the resources available per capita compared to consumption [7].

A significant difficulty is finding suitable means within product systems to recognize absolute limits that take varying lifestyles into account. A fine-grained prescriptive approach, i.e. literally holding individuals to specific limits, is unlikely to be desirable or necessary, although dramatic shifting of consumption norms to achieve a similar result appears promising. Insights resulting from efforts to establish a 2000-watt society are suggestive [15]. Identifying or creating oversight bodies to manage primary resources in either private or common property form [16] can work for some resources, such as the Forest Stewardship Council for wood products. The use of policies and markets to price in so-called externalities does not address aggregate growth although it is believed to effectively facilitate the process of substitution on a resource-by-resource basis [17] and will likely need to be backed by regulatory mechanisms.

4. A CASCADE OF CHANGES

Elevating and shifting the environmental perspective implies several fundamental changes

within design education and practice. Important selected examples are given below.

1. Environmental criteria will have to be articulated and prioritized over other design requirements. This will entail saying no to design alternatives, system configurations, materials, processes, experiences and patterns of use that do not meet these standards.
2. The level of environmental information readily available on the use of resources is too limited to support adequate decision-making. Specifically, the status, capacities and ultimately the resilience of resources will have to be determined and incorporated. More broadly, a shift towards transparency and accountability will be needed that is commensurate with that commonly available to design for the economic and performance perspectives today.
3. The existing needs of society cannot easily be met when realistic limits are taken into account. Thus, the open-ended practice of encouraging the constant identification of new needs cannot be justified. Notions of absolute vs. relative needs [17] and what satisfaction [18] means will have to be addressed.
4. Sustainability cannot be addressed at the component level because the full impacts cannot be tallied nor specified at this level. Thus, a shift from the design of products to product systems, from an emphasis on individuals to communities, and a corresponding increase in systems thinking will be required.
5. Many of the product and service configurations that are part of the state of the art that inform early stage design cannot be adapted to give the level of environmental performance now needed [19]. Whole new configurations of systems will have to be identified and become common knowledge.
6. The overall impact of a system cannot be determined by considering production alone as these impacts are heavily mediated by human behavior [20–19]. Thus, it will be necessary to shift the current focus on production to include consumption patterns. In effect, we will pay much closer attention to both the lifecycles and the lifestyles [21, 22] associated with products and services.

Making these changes will require a commensurate increase in interdisciplinarity and more holistic thinking. Topics such as systems, thermodynamics, psychology, ecology, economics and policy will have to become more central to design programs and practice.

5. CONCLUSIONS

Designers must resist the temptation to only elevate the environmental perspective or only shift to absolute environmental requirements. Ultimately, a practitioner should not set higher environmental goals at the expense of another perspective, such as lower costs, and only seek a relative improvement. Nor should they recognize an absolute level of impact reduction needed and dismiss it in favor of a cost reduction.

The design community should not wait for society to demand these changes within our profession; delaying has significant negative consequences [9]. We have an important opportunity to remake our profession and respond to the enormous challenge society faces. In so doing, we will need to go beyond the specifics of materials, tools and common strategies and address the very status of the environmental perspective within design.

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