Preface

AI has provided computational approaches to design processes and the representation of design knowledge. Design of materials, products, buildings and other artifacts have long been a focus of artificial intelligence research and application. Artificial intelligence representations and reasoning models have been influenced and inspired by design cognition resulting in AI methods as the basis for computer-aided design and decision support in many contexts. “Design for X” has become a way of changing design thinking so that downstream concerns are considered early in the design process.

Imperatives for environmental and societal sustainability are challenging designers to think beyond Design for X and more broadly to consider factors that had been previously given little attention. Life cycle costs should be considered along many dimensions; including energy requirements during manufacture and use phases, and material loss and environmental damage at the end of a product's life. In fact, a long-term vision for the field of AI and sustainable design is cradle-to-cradle design, so that products are not designed to be thrown away or recycled in very limited ways, but products are designed and built in a way that enables full reuse, with nothing thrown out and nothing degraded.

Our presumption is that the increased complexity of design necessitated by a desire for very long-term planet sustainability requires application of and advances in artificial intelligence.

This symposium considers the challenges of sustainable design and the role that AI plays in understanding and achieving sustainability. The primary contributions of the symposium are expected to be in the elaboration of current research and tentative research directions at the intersection of AI, design, and sustainability. Paper topics include AI applications in sustainable design of materials, products, appliances, buildings, and communities; computational models of sustainable design thinking; biologically-inspired models of sustainable design; and collaborative design environments that support sustainable design decision-making.

– Douglas Fisher & Mary Lou Maher