



DESIGN FOR SUSTAINABILITY

A Step-by-Step Approach

UNITED NATIONS ENVIRONMENT PROGRAMME
DELFT UNIVERSITY OF TECHNOLOGY



Copyright © United Nations Environment Programme, 2009

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UNEP would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

ISBN: 92-807-2711-7



DESIGN FOR SUSTAINABILITY

A STEP-BY-STEP APPROACH

DESIGN FOR SUSTAINABILITY
A STEP-BY-STEP APPROACH



UNITED NATIONS ENVIRONMENT PROGRAMME
DTIE
SUSTAINABLE CONSUMPTION AND PRODUCTION BRANCH
15 Rue de Milan
75441 Paris CEDEX 09, France
Tel: +33 1 44371450
Fax: +33 1 44371474
E-mail: unep.tie@unep.org
Internet: www.unep.org

DELFT UNIVERSITY OF TECHNOLOGY
FACULTY OF INDUSTRIAL DESIGN ENGINEERING
DESIGN FOR SUSTAINABILITY PROGRAMME
Landbergstraat 15
2628 CE Delft
The Netherlands
Tel: +31 15 278 2738
Fax: +31 15 278 2956
E-mail: dfs@tudelft.nl
www.io.tudelft.nl/research/dfs

ACKNOWLEDGEMENTS

This document has been a 'work of art in progress' for some time. D4S: A Step by Step Approach reflects the vision and insights of many people, as noted by the number of contributing authors and supporting organizations. We gratefully acknowledge the support of the Swedish Environmental Protection Agency, the Ministry of Housing, Spatial Planning and the Environment, The Netherlands and InVEnt, Capacity Building International Germany. We would also like to acknowledge the efforts of UNEP colleagues, Anne Solgaard, Desta Mebratu, Bas de Leeuw, Sonia Valdivia and Guido Sonnemann. A special note of thanks also belongs to Erica Allis, UNEP DTIE consultant who untiringly wove together the many visions and insights presented.

SUPERVISION, TECHNICAL EDITING AND SUPPORT

Mrs. G. Clark and Ms. E.A. UNEP DTIE, France
Ms. E. Long, Intern, UNEP DTIE, France
Ms. M. McCall Johnson, Intern, UNEP DTIE, France

EDITORS

Dr. M.R.M. Crul and Mr. J.C. Diehl
Delft University of Technology, The Netherlands
Faculty of Industrial Design Engineering
and
Prof. Dr. C. Ryan, University of Melbourne, Australia

CHAPTERS AND MODULES AUTHORS

Chapter 1: Dr. M. Crul
Chapter 2: Dr. M. Crul, Mr. J.C. Diehl and Dr. Th. Lindqvist
Chapter 3: Prof. Dr. C. Ryan
Chapter 4: Dr. M. Crul and Mr. J.C. Diehl
Chapter 5: Dr. M. Crul and Mr. J.C. Diehl
Chapter 6: Mr. J.C. Diehl
Chapter 7: Mrs. U. Tischner, Prof. Dr. C. Ryan and Mr. C. Vezzoli

Module A: D4S Benchmarking: Prof. Dr. C.B. Boks and Mr. J.C. Diehl
Module B: Design-Oriented Scenarios: Prof. Dr. E. Manzini, Mr. F. Jégou and Mrs. Dr. A. Meroni
Module C: PSS Tools: Mrs. U. Tischner, Prof. Dr. C. Ryan and Mr. C. Vezzoli
Module D: Creativity Techniques: Mr. J.C. Diehl and Mr. M. Tassoul
Module F: D4S Management: Mr. M. Karlsson
Module G: D4S Communication: Mrs. U. Tischner and Mr. A. Meta
Module H: Eco-materials: Dr. X.H. Nguyen, Dr. T. Honda, Dr. Y. Wang and Prof. Dr. R. Yamamoto
Module I: Energy: Mr. J.C. Diehl and Mrs. A. Mestre
Module J: ICT: Prof. Dr. C. Ryan

INTERNATIONAL SCIENTIFIC AND PROFESSIONAL REVIEW PANEL

Prof. Dr. P. Eagan, University of Wisconsin, USA
Prof. Dr. R. Gouvintas, Universidade Federal do Rio Grande do Norte, Brasil
Dr. Th. Lindqvist, International Institute for Industrial Environmental Economics, Sweden
Prof. Dr. H. Schnitzer, Technical University of Graz, Austria
Prof. Dr. S., Royal Melbourne Institute of Technology, Australia
Prof. Dr. B. Mwamila, University of Dar es Salaam, Tanzania

CASE STUDY RESEARCH

Mr. O. Visser, Delft University of Technology, The Netherlands

DESIGN AND LAY-OUT

Ms. A. Mestre and Ms. G. Campelo, SUSDESIGN, Portugal



FOREWORD

The United Nations Environment Programme Medium-Term Strategy 2010-2013 adopted by the Global Ministerial Environment Forum in February 2008, underlines that current economic growth and development patterns can not be sustained without a significant shift in global production and consumption trends. Decoupling economic growth from negative environmental and social impacts will require producers to rethink design, production and marketing paradigms. Consumers will need to consider real environmental and social concerns along a product's life cycle – in addition to price, convenience and quality, in their purchasing decisions. While these drastic changes face formidable challenges, there are encouraging developments contributing to an expanding knowledge base in the product development field. This publication is the most recent milestone in a series of steps towards more sustainable consumption and production. UNEP proudly supports this latest publication as an update of the successful 1997 manual, "Ecodesign: A Promising Approach to Sustainable Production and Consumption."

As a brief history, in the 1990s, concepts such as ecodesign and green product design were introduced as strategies companies could employ to reduce the environmental impacts associated with their production processes. These strategies also bolstered a company's position and competitive market edge where more and more emphasis was being placed on environmental stewardship. In 1997, UNEP published the ecodesign manual which was one of the first of its kind and helped lay the foundation for widespread adoption of ecodesign concepts by policy makers, programme officers, and project specialists. The manual was instrumental in inspiring other documents and sector specific publications on the topic.

Since then numerous initiatives and programmes have been carried out by industries and research institutions demonstrating how the economic, social and environmental benefits could be achieved through sustainable product design. UNEP working with the Technical University of Delft, led to the convening of leading sustainable product experts to outline the evolution of ecodesign to the concept of Design for Sustainability (D4S).



D4S goes beyond how to make a 'green' product – and strives to meet consumer needs through sustainability-oriented interventions in a systematic and systemic way. UNEP also supports related efforts operating in parallel that strive to achieve similar goals such as the Life Cycle Initiative and Eco-Labeling projects at the national level. Both activity areas seek to improve products by promoting supply chain responsibility and sustainable procurement to assess and manage the social and environmental impacts of products. The recent publication “Life Cycle Management: A business guide to sustainability” is an excellent overview on how to improve products by assessing and managing their impacts throughout their life cycle.

One of the largest challenges to more sustainable operations is a lack of communication about key initiatives, innovative strategies, effective solutions, and successful technical know-how. This publication is an example of one effort to address this limitation by presenting the collective insights of experts in the field. It covers D4S concepts ranging from incremental to radical innovation and provides an overview of D4S potential — why it works and who should be involved. The publication focuses specifically on four practical approaches, and provides a collection of case studies showing D4S applications and their sustainability benefits. Each chapter reflects the knowledge and lessons learned from a multitude of projects and represents years of logged project work. It is not meant to be a comprehensive or exhaustive review of D4S approaches but a presentation of the global picture and the key steps for application of the key areas of D4S intervention.

The publication targets designers and other professionals working in the area of industrial product development. It is useful to those new to ecodesign as well as those interested in breakthrough innovation for sustainability. This is also a sister publication to “Design for Sustainability: A Practical Approach for Developing Economies” (2006) which focused on the specific needs of small- and medium-sized companies in developing economies.



D4S GRAPHIC DESIGN CONCEPT

The D4S graphic design of this publication is based on the sustainability concept and its consideration of the three elements of PEOPLE, PROFIT AND PLANET. The graphic design is comprised of 3 subjects and 3 colours to illustrate these elements:

PEOPLE are illustrated by the expressions of Human beings from different cultures and races.

PLANET is represented by different natural elements of the planet such as water, rocks, trees, sand

预览已结束，完整报告链接和

<https://www.yunbaogao.cn/report/index/repo>