This text provides a survey on approaches to information systems supporting sustainable development in the private or public sector, and documents and encourages the first steps of environmental information processing toward this more comprehensive goal.

Recommend this title?  yes  no
☐ I recommend this title  change
☒ I don't recommend this title  change

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**Thomas Wilbois** was born 1965 in Mandern / Germany and studied physics at the University of Mainz. His special attention was attracted by theoretical nuclear physics, especially in the investigation of electromagnetic and strong interactions in few body systems. After his research work at the universities of Mainz and Hannover and various international collaborations, he changed to the field of computer science and the management of IT application projects. His main fields are object relational databases and software designs for servers. As a Project Manager he is responsible for development, introduction, and maintenance of customer specific IT systems, especially in the public sector. The currently most important project is the Remote Monitoring of Nuclear Power Plants.

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**Lorenz M. Hilty**

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Organization of Book

This book is organized in three parts, each of which consists of several chapters which cover the topical spectrum ranging from theory to practice. Each part starts with chapters devoted to background knowledge and basic principles, and ends with chapters describing application examples.

**Section I** focuses on the “classical” approach to support the environmental efficiency of companies, their production processes and products by systematically providing information on material and energy flows. This includes methods such as Life Cycle Assessment and other elements of environmental management that depend on the availability of accurate information.

**Section II** reports on approaches that explicitly address and support processes of change towards sustainability, involving social processes such as mediated discussion processes, institutional innovation, the creation of virtual communities, and new types of producer and consumer networks. All change processes mentioned can be supported by information systems.

**Section III**, finally, shows how the safety and risk issue, which has been underestimated for some time in the sustainability discourse, can be integrated in management systems, and how risk monitoring and management can be supported by information systems.

**Chapter I** opens the first part with an introduction into the ISO standardization process for environmental performance evaluation. The ISO14000 series defines basic principles of environmental management along whose lines many environmental information systems have been built.

**Chapter II** describes how national strategies for sustainable development, integrated product policies and product life cycle assessment are connected. These strategies and policies largely depend on the availability of high-quality life cycle inventory data.

**Chapter III** shows an example of providing such data by building a harmonized life cycle inventory database with clearly defined data quality standards, using the case of the Swiss national database “ecoinvent”.

**Chapter IV** reports on the research project OPUS, which provides solutions for the organization of product development and production processes in and between companies. The goal is to support production-integrated environmental protection.

**Chapter V** describes how a system supporting industrial ecology can be successfully integrated in the workplace IT environment. The core idea is to provide the formerly missing link between material flow management and the working environment in companies.

**Chapter VI** presents a methodology with similar goals, but takes a different approach. Here, existing business management software such as an enterprise resource planning (ERP) system is used to match the requirements of consistent material flow management, called flow cost accounting.

**Chapter VII** introduces a middleware system, developed in the ARION project, to support the search and retrieval of scientific information. The system has been used for ocean wave statistics as well as for the inter- and inner-organizational workflow management in scientific organizations.

**Chapter VIII** shows how a software tool for modeling material flow networks can be methodologically and technically linked to economic optimization and simulation.
approaches. This approach has been applied to transport optimization as well as discrete-event production and inventory simulation.

Chapter IX closes the first part by applying environmental information processing to the ICT sector itself, in particular to the Internet. The impacts of this technology on resource consumption and environmental pollution must be taken into account to create a complete view of the effects of ICT in the context of sustainable development.

Chapter X opens the second part by introducing a social context model for the analysis of discussion processes. This model can be used to construct information tools that enable more effective discussions.

Chapter XI explores the link between ICT and organizational and institutional patterns, which are crucial for sustainable development. A normative framework is proposed for judging the sustainability effects of organizational designs and supports the creation of “e-organizations” contributing to sustainable development.

Chapter XII gives an introduction to state-of-the-art corporate sustainability reporting supported by the Internet. Companies are shown how to develop from early environmental reporting stages towards the more comprehensive sustainability reporting, while exploiting the Internet’s specific capabilities.

Chapter XIII describes the principles of “ecoradar,” a Web portal that creates knowledge communities of small and medium-sized enterprises cooperating in environmental management. The system provides the users with low-threshold introductions to environmental management, lists of common mistakes to be avoided, checklists and benchmarks for comparison with other enterprises.

Chapter XIV shows how recycling networks of industrial companies can evolve to sustainability networks, and how this process can be supported by information systems. As an example, the case of the sustainability network in the Eisenerz region in Austria is described.

Chapters XV and XVI both show examples of how a change toward sustainable consumption can be organized by the use of Web-based information systems, the first one in the field of organic food, the second one in carpooling.

Chapters XVII and XVIII discuss examples of information systems that contribute to environmental awareness by making environmental information available, in the first case by the dissemination of high-quality information via multiple channels, in the second case by creating a national portal for public sector environmental information.

Chapters XIX and XX open the last part of the book by describing how safety and risk management can be integrated in other management and information systems, including in-plant monitoring data in the second case.

Chapter XXI shows an example of a risk-oriented information system, providing remote monitoring of nuclear power plants.

Chapter XXII closes the third part by describing a GIS-based decision support tool for technological risk management, which is able to process remote sensing data.
References


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Chapter I: **EPE According to ISO 14031: Concept, Experience, and Revision Issues**

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**Abstract**

ISO 14031 on “Environmental Performance Evaluation” (EPE) was released in late 1999 and published in Germany by DIN in early 2000 also as DIN EN ISO 14031 in two languages (German and English) as the last standard of the original ISO-14000 family started in 1993 as a follow-up to the UN world summit in Rio 1992. But even before 1999/2000 users had already begun gathering experience with this new instrument for measuring performance, which had proven the standard to be an effective instrument especially for small-to-medium-sized enterprises (SMEs) both for continual improvement processes in operative environmental protection and as a basis for lean reporting to external stakeholders. Once again it was the ecological pioneer KUNERT AG which became the first mover to practically apply and test the standard with a view to improving it in view of the first revision process of the standard planned for 2004.