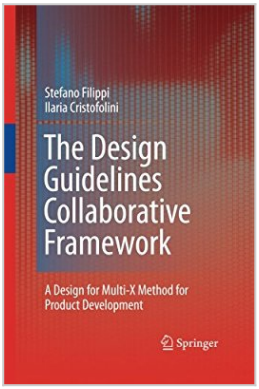

The Design Guidelines Collaborative Framework: A Design for Multi-X Method for Product Development

By Stefano Filippi, Ilaria Cristofolini

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In the industrial design and engineering field, product lifecycle, product development, design process, Design for X, etc., constitute only a small sample of terms related to the generation of quality products. Current best practices cover widely different knowledge domains in trying to exploit them to the best advantage, individually and in synergy. Moreover, standards become increasingly more helpful in interfacing these domains and they are enlarging their coverage by going beyond the single domain boundary to connect closely different aspects of the product lifecycle. The degree of complexity of each domain makes impossible the presence of multipurpose competencies and skills; there is almost always the need for interacting and integrating people and resources in some effective way. These are the best conditions for the birth of theories, methodologies, models, architectures, systems, procedures, algorithms, software packages, etc., in order to help in some way the synergic work of all the actors involved in the product lifecycle. This brief introduction contains all the main themes developed in this book, starting from the analysis of the design and engineering scenarios to arrive at the development and adoption of a framework for product design and process reconfiguration. In fact, the core consists of the description of the Design GuideLines Collaborative Framework (DGLs-CF), a methodological approach that generates a collaborative environment where designers, manufacturers and inspectors can find the right and effective meeting point to share their knowledge and skills in order to contribute to the optimum generation of quality products.

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- Sales Rank: #11571737 in Books
- Published on: 2014-11-29
- Released on: 2014-11-29
- Original language: English
- Number of items: 1
- Dimensions: 9.25" h x .46" w x 6.10" l, .64 pounds
- Binding: Paperback
- 186 pages

Editorial Review

From the Back Cover

The Design Guidelines Collaborative Framework describes a knowledge-based ‘design for multi-X’ method, aimed at improving and assisting the work of designers, manufacturers, and inspectors in the areas of product redesign and process reconfiguration.

Designers are not necessarily experts in manufacturing and verification processes; likewise, manufacturers and inspectors may not be experts in design. For this reason, the Design Guidelines Collaborative Framework (DGLs-CF) constitutes a meeting point for all three parties, where their knowledge is formalized, expanded upon, and put at the designers’ disposal, thereby maximizing the user-friendliness of the results.

The DGLs-CF is characterized by the homogeneous union of different algorithms, clear interfaces among the modules that implement them, and clear roles assigned to the different actors. These elements, together with a strong adherence to the ISO GPS standards, make the DGLs-CF the perfect environment for researchers, experts in different fields, and industrial partners to formalize their knowledge, and develop and implement their own algorithms and procedures.

The Design Guidelines Collaborative Framework uses the simple IDEF0 formalism to describe the DGLs-CF framework in a top-down way, in order to facilitate readers’ comprehension, and their adoption and development of the framework. Several case studies on the application of the DGLs-CF in industrial environments show the framework’s effectiveness and robustness.

Industrial and academic researchers will find this book a useful guide to the DGLs-CF and mechanical engineers will be quick to appreciate the streamlined approach it describes.

About the Author

Stefano Filippi is an associate professor of Design and Methods in Industrial Engineering at the Electrical, Management and Mechanical Engineering Department of the University of Udine, Italy. He received his PhD from the Polytechnic of Milan, Italy. His research is mainly focused on Knowledge-based Engineering; Knowledge-based Innovation Systems (he has co-founded APEIRON, a non-profit association focused on studying and disseminating the TRIZ theory in Italy); Rapid Prototyping in Medicine and in Cultural Heritage; and Usability. He has been developing the Design GuideLines framework since 2002, always in strong connection with industrial environments and trying to solve real problems. The usability aspects of methods and tools have always had a key role in his research topics. His research has been published in the International Journal of Production Research; Research in Engineering Design; the Journal of Oral and Maxillofacial Surgery; and the IEEE Robotics&Automation Magazine.

Ilaria Cristofolini is an assistant professor in the field of Design Theory and Methodology at the Mechanical and Structural Engineering Department at the University of Trento, Italy. She received her PhD from the University of Padua, Italy. Her research areas concern Knowledge-based Design Systems;

Geometric Dimensioning and Tolerancing; Standards Evolution; and Application and Verification of Geometric Tolerances. She also worked as Head of the Quality Assurance System in a firm producing sheet metal components. She participates in projects like Laser Interferometry Space Antenna, a joint mission of NASA and ESA for Fundamental Physics Studies, and Study for the Production of Exotic Species. Through her work she managed problems concerning the influence of manufacturing and verification technologies on the final quality of products, and she experienced the need for consideration of these technologies to start with the design process. Her research has been published in Research in Engineering Design; Classical and Quantum Gravity; Powder Metallurgy; the International Journal of Powder Metallurgy; and Measurement and Control.

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