

# Preface

When we started writing this book we were aware of the complexity of the task, but we did not imagine that it would take us almost three years to complete it. Furthermore, during the analysis and comparison of the literature from different fields, it clearly emerged that important results have been achieved, but that much more important ones are still out of reach. Then, the spirit of the book changed, by itself, from the intended assessment of the past to a stimulus for the future. We would be happy if the reader, instead of being content with the ideas we propose, would take them as a motivation and starting point to go beyond them.

We present a large selection of works on abstraction in several disciplines; nonetheless many relevant contributions to the field have been necessarily left out, owing to the sheer amount of pages they would fill. We apologize for the missing citations.

In this book we present a model of abstraction, the  $\mathcal{KRA}$  model, but this is not the core of the book. It has a limited scope and serves two main purposes: on the one hand it shows that several previous proposals of abstraction theories have a common root and can be handled inside a unified framework, and, on the other, it offers a computational environment for performing abstraction by applying a set of available, domain-independent operators (programs). In fact, there is still a gap between general abstraction theories, mostly elegant logical formulations of representation changes, and concrete approaches that heavily rely on specific domain characteristics. The  $\mathcal{KRA}$  model is meant to be something in between: the domain-independence of the abstraction operators achieves both generality (it can cover a broad spectrum of applications and application domains), and synergy (by instantiating in different contexts some code written just one time).

Independently of the model, we believe that the basic ideas on which it relies are more important than the model itself. These ideas are certainly arguable; some reader might think that our view of abstraction is exactly what he/she has always looked for, whereas some other might think that abstraction is totally something else. Both reactions are welcome: what matters is to trigger interest in the subject and stimulate more research.

The book is not intended to be a textbook: it is targeted to scientists working on or using abstraction techniques, without limitation of fields. Computer scientists, Artificial Intelligence researchers, artists, cognitive scientists, mathematicians, and

curious minds can read the book. Some parts are more formalized, and they may look complex at first sight. However, we believe that the greatest part of the content is graspable by intuition.

Finally, we mention that we have set up a companion Web site (<http://www.abstractionthebook.com>), where implemented operators are uploaded. Anyone interested in abstraction is welcome to contribute to it.

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