Preface

The book continues the themes started in the book *Creative Space: Models of Creative Processes for the Knowledge Civilization Age* (A.P. Wierzbicki and Y. Nakamori, Springer, 2006), while concentrating more on software and, more generally, on environments for supporting creative processes, although developing also some further aspects of models of creative processes as well as addressing some related systemic and philosophical issues.

The book was written as an activity of the 21st Century Center of Excellence Program *Technology Creation Based on Knowledge Science* at Japan Advanced Institute of Science and Technology (JAIST) in Nomi, Ishikawa, Japan. It relies also on broad international cooperation, e.g., with the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria; the Institute of Systems Science, Academy of Mathematics and Systems Science, Chinese Academy of Sciences (ISS-CAS); the University of Hull in Hull, Great Britain; the National Institute of Telecommunications (NIT) and the Warsaw University of Technology (WUT), as well as the Polish–Japanese Institute of Information Technology (PJIIT) and the Institute of Philosophy and Sociology in the Polish Academy of Sciences (IPS-PAS) in Warsaw, Poland. The authors also enjoyed cooperation with many Japanese universities and research institutions, e.g., Kyoto University, University of Osaka, Kansai University, Osaka Sangyo University, Hiroshima University, Konan University, University of Tsukuba (Graduate School of Business Sciences, Tokyo branch – GSBS-UT), Industrial Research Institute of Ishikawa (IRII), Kanazawa, and the Japan Institute of Shinayakana Systems Engineering.

The editors of this book are Andrzej P. Wierzbicki and Yoshiteru Nakamori, who also authored Chaps. 1, 3, 16 and 18, but this book is much more a cooperative effort of 21 other co-authors. Chapter 2 was written with the participation of Jing Tian and Hongtao Ren (JAIST), Chap. 4 was written by Tu Bao Ho, Saori Kawasaki (JAIST) and Janusz Granat (NIT), Chap. 5 with the participation of Susumu Kunifuji (JAIST) and Naotaka Kato (IRII), Chap. 6 with the participation of Jifa Gu (ISS-CAS), Chap. 7 with the participation of Tieju Ma (JAIST and IIASA) and Jie Yan (JAIST), Chap. 8 by Adam W. Wierzbicki (PJIIT) and Hongtao Ren (JAIST), Chap. 9

with the participation of Hiroe Tsubaki (GSBS-UT), Chapter 10 with the participation of Marek Makowski (IIASA), Chap. 11 with the participation of Mina Ryoke (GSBS-UT), Chap. 12 with the participation of Wiesław Traczyk (WUT and NIT) and Van Nam Huynh (JAIST), Chap. 13 with the participation of Toshiya Ando (JAIST) and Piotr Górczyński (WUT), Chap. 14 with the participation of Toshiya Kobayashi (JAIST), Chap. 15 with the participation of Fei Gao (JAIST), Chap. 17 by Zbigniew Król (IPS-PAS).

Part I of this book, Basic Models of Creative Processes, besides recalling models developed in the book *Creative Space*, presents an empirical test of the importance of some elements of the Triple Helix model of academic knowledge creation and a new integrated, prescriptive model of both academic and organisational knowledge creation called JAIST Nanatsudaki Model.

Main parts of this book concentrate on diverse issues of knowledge engineering and computational intelligence used for creativity support. Part II, Tools for Supporting Basic Creative Processes, contains chapters on knowledge acquisition by machine learning and data mining; on creativity support in brainstorming; on debating and creativity support; on creativity support in roadmapping; and on integrated support for scientific creativity. Part III, Diverse Tools Supporting Creative Processes, contains chapters on statistics for creativity support; on virtual laboratories; on gaming as a tool of creativity training; on knowledge representation and multiple criteria aggregation for creativity support; and on distance learning and teaching.

The final Part IV of this book, Knowledge Management and Philosophical Issues of Creativity Support, contains chapters on management of technology and knowledge management for academic R&D; on knowledge management and creative holism: systems thinking in the knowledge age; on technology and change: the role of technology in knowledge civilisation; on the emergence of complex concepts in science; and the final chapter on summary and conclusions.

We feel that this book illustrates well enough the technological feasibility of using knowledge engineering and computational intelligence for supporting scientific creativity and industrial innovations. However, the major issues and obstacles identified during this work are not technical; they have much rather epistemic and cross-cultural character. They are not caused by the differences between the Oriental and Occidental cultures; much rather, there are caused by the differences of the cultural spheres of sciences and arts, or, more precisely, by the following two types of differences:

There are essential differences between:
(1) *The models, mechanisms and motivations of knowledge creation* in:
– Academic institutions (universities, research institutes), and in;
– Industrial or other purpose oriented organizations; and
(2) *The episteme (the way of creating and justifying knowledge) of the three cultural spheres*:
– Of natural and basic sciences;
– Of technology; and
– Of social sciences and humanities.
When designing knowledge engineering and computational intelligence tools for supporting scientific creativity, such differences must be taken into account.

In this book, we present also attempts to overcome these differences: the difference (1) by the integrated JAIST Nanatsudaki Model of knowledge creation presented in Chap. 3, and the difference (2) by a proposal of an integrated episteme of *constructive evolutionary objectivism*, necessary for the knowledge civilization age.

We are fully aware that this proposal of an integrated episteme – similarly as many other issues indicated in this book – might be counted only as a starting point for further debates and investigation. However, we hope that this book contributes not only to the development of knowledge engineering and computational intelligence support for scientific creativity, but also to overcoming such differences as listed above.

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