Conclusion

In this collective scientific monograph, we have presented several important aspects of Intelligent Data Processing in Global Monitoring for Environment and Security. The book was structured in fifteen chapters collected in three parts, regarding practical, theoretical, and technological aspects.

The Part I, "Practical aspects", was devoted to describe main features of the disasters and corresponded risk management as well as several approaches for possible solutions. In particular, we have discussed:

- examples of different disasters and approaches to manage corresponded risk (Chapter 1. Managing Risk and Safety);
- different approaches to multi-source data integration for the solution of complex applied problems using Grid computing technologies for, in particular flood mapping, and vegetation state estimation using satellite, modeling and in-situ data. (Chapter 2. High-performance Intelligent Computations for Environmental and Disaster Monitoring);
- results from the investigations accomplished by the CERGOP-2 project, based on GNSS (Global Navigation Satellite Systems) campaigns. (Chapter 3. Investigation of Geodynamics of Central and Eastern Europe, Balkan Peninsula and Bulgaria);
- Bulgarian and Ukrainian experience in development of measurement devices and an organization of express and continuous field electronic measurements for evaluation of main environment parameters. (Chapter 4. Intelligent Tools for Environment Monitoring: Features and Applications);
- machine learning techniques for intelligent data processing in environmental and security-related monitoring employing gamma spectroscopy. (Chapter 5. Intelligent Gamma-Ray Data Processing for Environmental Monitoring);
- automation in the field of the risk management, based on data processing of remote space monitoring of the spatially-distributed natural and technogenic objects for timely detection maintenance, diagnostics and the development predicate of the dangerous phenomena and emergencies. (Chapter 6. Acquisition, Processing and Analysis of Space Images at Risks Management of Natural and Technogenic Emergencies).

The Part II, "Theoretical aspects" has presented several important theoretical results, which are received by the authors:

- using of effective methods and algorithms of estimation, comparison, generalization and decision making under uncertainty; using of contemporary methods of basic earth and water parameters measuring, specifically aerospace microwave radiometry; combining these effective means in the big Regional Monitoring System. (Chapter 7. Elaboration of Geoinformation Regional Monitoring Environmental System ("GERMES-I") Enriched by Artificial Intelligence Instruments);
- situational modeling for decision making in emergency microsituation as a base part of risks management. (Chapter 8. Microsituation Concept in GMES Decision Support Systems);

- analysis of different file objects, information attacks, and protection methods most frequently used in Software Critical Infrastructures is made on the base of available information of National Laboratory of Computer Virology at the Bulgarian Academy of Sciences for accomplished attacks in Bulgaria, Balkan Peninsula, and southeast Europe. (Chapter 9. Methods and Means for Protection of Software Critical Infrastructures);
- application of the heterogeneous variables system prediction method to solving the time series analysis problem with respect to the sample size. (Chapter 10. The MLRP-method for Analysis of Some Problems in Climate and Seismology);
- results of the PCRM theory, consider applications to decision making support in conditions of risk, and develop numerical methods for searching optimal decisions. (Chapter 11. Polyhedral Coherent Risk Measures and their Application to Investment Decisions Support under Catastrophic Flood Risks);
- models for searching the upper and lower bounds for Bayesian estimates which can be derived for any prior distribution satisfying the given partial prior information. The chapter considers. (Chapter 12. Techniques for Robust Bayesian Estimation);
- quantitative measures of information content and value; completeness, accuracy, and clarity as attributes of information acquired by the receiver; suggestions on how to use interpretations and mathematical tools developed within the information theories to maintain and improve safety of nuclear power plants. (Chapter 13. Application of Information Theories to Safety of Nuclear Power Plants).

The Part III, "Technological aspects" was aimed to pay attention to technological approaches, which have shown very good results in the practice:

- an universal approach to analysis of attributive risk management and disaster emergencies: growing hieratical network structures for memory organization called Growing Pyramidal Neural Networks (GPN) and Program complex CONFOR (abbreviation of CONcept FORmation) to be used in problems solving in GMES. (Chapter 14. Growing Pyramidal Networks);
- intelligent support of decision making in GMES based on “Multi-dimensional Numbered Information Spaces” and "class association rules" (CAR) algorithms implemented in the Data mining analysis environment "PaGaNe" and especially in MPGN classifier aimed to be used in the field of disaster prediction. (Chapter 15. Multi-dimensional Information Spaces as Memory Structures for Intelligent Data Processing in GMES).

Now, it is clear, the Intelligent Data Processing in the Global Monitoring for Environment and Security is very important for humanity to survive in the variety of disasters and technogenic collapses. All aspects (practical, theoretical, and technological) need to be intensively investigated. Let remember the example from introduction about "the local" and "the total" time. The Global Monitoring means "the total" monitoring of the world around us. It is impossible without intelligent systems.

We hope the presented ideas will cause interest and further collaboration in the area of intelligent data processing in GMES. For us, this monograph was nice possibility to integrate our potential, independently of real or intellectual boundaries. Finishing this book we do not finish our collaboration – several international projects have started, other are at the preparing stage. In addition, uniting a team of sixty authors, working two years together, and using modern electronic communication systems, gave us new skills and knowledge to manage natural and artificial risk, to work for security of our world.