

# Preface

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## Abstract

We summarize the CITRisk-2021 Workshop on Computational & Information Technologies for Risk-Informed Systems co-located with XXI International Conference on Information Technologies in Education and Management (ITEM 2021) and held online on September 16-17, 2021.

## Introduction

Risk is an important concept for any person who needs to make a decision or at least to do something. In [1], risk is defined as “the possibility of something bad happening”. Everyone hopes that everything gets better and take some risk. Thus, risk is closely related to uncertainty about both the conditions and the consequences of activity. People vary greatly in how much risk they might take, and which risk they consider acceptable or unacceptable. Regardless of whether one's attitude is risk-averse, risk-neutral, or risk-seeking [2], people take risks every day, and since ancient times, risk surrounds their activities almost always and everywhere. The results of many millennia of the risky human activity are not only masterpieces of art, architecture, technology, etc., but at the same time a lot of bad things.

The new millennium has brought the world a significant acceleration of climate change, population growth, increased urbanization, industrialization, and many other negative consequences of human activities. The more intense and destructive the development of human civilization is for nature, the more nature responds to it by sufficient changes. Currently, the world is overloaded with natural disasters, from large-scale floods and forest fires to sudden earthquakes, tsunamis, tornadoes, and other natural incidents, which are often lined up in chains and accompanied by man-made disasters because of anthropogenic factors, human inattention, negligence, etc. [3]

Not only nature, but also people suffer themselves from various unintentional, deliberate and even malicious risky activities. Thus, conflicts and wars that have been going on for many hundreds and thousands of years have claimed the lives of many millions of people and crippled the lives of other millions of people, but people continue to create new and more destructive types of weapons, accumulate them, and use them. Gradually, wars were transferred to near-Earth space and cyberspace. Technological incidents, traffic accidents, crime, terrorism, and other challenges

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have become our daily routine. Therefore, risk that has become a statistically significant, mass phenomenon requires deeper study.

People have always wanted to assess correctly the level and acceptability of risk. That is why researchers have long begun to study such aspects as risk finding, recognizing, identification, analysis, evaluation, etc. [4]. However, the main obstacles have always been uncertainty [5], which people were not able to overcome, unpredictability and complexity. Therefore, researchers had rather limited opportunities to study and model risk, while even more difficult tasks appeared, such as multi-hazard and multi-risk analysis [6].

Fortunately, the new era has brought humanity not only new challenges, but also new opportunities related to the technology revolutions. Explosive development in such areas as computers, information technologies, unmanned vehicles, remote sensing, image processing, machine learning, artificial intelligence (AI), and other modern technologies enabled people to partially overcome the uncertainty, unpredictability, low observability, but many problems are still not fully understood.

Today, computational models and information technologies are the reliable basis in the field of risk modeling, analysis, and assessment [7]. Using such modern tools, researchers began to create early warning and forecasting systems, diagnostic and monitoring systems, decision support systems, advising and recommending systems in many fields of activity, including those based on artificial intelligence technologies. The kind of above systems, which tasks are risk identification, modeling, and analysis based on computer models, algorithms, and information technologies, are usually called Risk-Informed Systems [8]. In this context, the ever-changing scope and rapid development of Risk-Informed Systems create new problems and questions, resulting in the real needs for sharing brilliant ideas and stimulating good awareness of this important research field. That is why the scope of the International Workshop on Computational & Information Technologies for Risk-Informed Systems includes various computational models and methods, modern AI-based methods and information technologies that can be used for Risk-Informed Systems including those solving diagnostic, modeling, and monitoring tasks [9] in crisis and disaster situations, where we seek to explore new ideas.

Since risk manifests itself in any human activity, risk is multidisciplinary [10]. The understanding of risk, the methods of risk assessment, and even the definitions of risk differ in many areas of activity (environment, business, finance, economics, health, safety, security, etc.).

This explains why the papers of our authors cover the wide range of domains, including natural disasters, aviation, information security, engineering, etc. We concluded that the same set of computer methods and information technologies can be used to analyze and modeling risk in all these areas, so bridging computer science, intelligent information technology, and risk field research can be highlighted as a focus of the CITRisk workshops.

## **CITRisk Workshop Series**

CITRisk is a series of workshops, which is a part and co-located with the International Conference on Information Technologies in Education and Management (ITEM). The first International Workshop on Computational & Information Technologies for Risk-Informed Systems (CITRisk-2020) was held online (because of the COVID-19 situation) on October 15-16, 2020, within the XX International Conference ITEM-2020. The second International Workshop on Computational & Information Technologies for Risk-Informed Systems (CITRisk-2021) was also held online (due to the current COVID-19 situation) on September 16-17, 2021.

The purpose of the CITRisk workshop series is to provide a platform for dissemination of current research progress, innovative approaches, and original research results on application of computational and information technologies for Risk-Informed Systems.

The Proceedings contain the papers presented at the 2nd International Workshop on Computational & Information Technologies for Risk-Informed Systems (CITRisk-2021).

## **CITRisk-2021 Workshop**

The Workshop CITRisk-2021 was jointly organized by the University of Bundeswehr (Munich, Germany) and Kherson National Technical University (Kherson, Ukraine) and held online on September 16-17, 2021.

IT Hub Kherson Public Organization was the main partner organization in preparing and sponsoring the CITRisk-2021 Workshop as well as the previous CITRisk-2020 Workshop.

We called for papers on Risk Analysis and Risk-Informed Systems, including but not limited to the following topics:

- Computational Models and Methods for Risk-Informed Systems.
- Intelligent Information Technologies for Risk-Informed Systems.
- Diagnostic, Modeling, and Monitoring of Crisis and Disaster Situations.

All CITRisk-2021 topics are related to Computer Science.

120 reports were submitted to the International Program Committee.

At the first turn, all reports were peer-reviewed by the International Program Committee (IPC) members and external reviewers. All submitted papers were rigorously reviewed by 3 reviewers.

After the first turn, 34 reports were conditionally pre-accepted for presentation at the CITRisk-2021 workshop. At the second turn, all selected reports were again peer-reviewed by 2 or 3 reviewers and checked for plagiarism.

Finally, the IPC decide to accept 32 submitted reports for the presentation after the peer-reviewing based on their quality and relevance to the scope of the CITRisk-2021 Workshop. The final acceptance rate is 26.6%.

All 32 papers were prepared to publish as regular and short papers in this Volume of CITRisk-2021 Proceedings based on their presentations made at the Workshop. Out of them, 26 were accepted to publish as regular papers and 6 as short papers.

The workshop took place in the form of oral presentations by presenters of the accepted reports.

The CITRisk-2021 program was organized in three thematic sessions corresponding to the workshop topics. The thematic sessions followed an interactive format. The sessions were structured into talks, each of which includes 4-5 reports and a debate time slot to discuss reports, their contributions and other topic issues.

All presenters had a 10-minute time slot for presentation and a 5-minute time slot for queries and answers. Moderators introduced presenters and their reports during each talk and moderated presentations, questions, and discussions from the audience. All attendees were given the opportunity to ask questions and participate in discussions.

## **Workshop Chairs and Committees**

The international scope of the CITRisk-2021 Workshop was confirmed by the International Program Committee, which members represented 12 countries: United Kingdom, Canada, Germany, Austria, Spain, Slovakia, Poland, Czech Republic, China, Moldova, Kazakhstan, and

Ukraine. The IPC consists of 35 scholars, which are well-known scientists contributed valuable in the field of computer science.

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Beside those, the IPC additionally involved 104 external reviewers in the peer-review process.

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We recognize the commitment of all speakers who shared their knowledge and experience.

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