

INTERNATIONAL CBRNE MASTER COURSES SERIES

COLLANA DI SICUREZZA CHIMICA, BIOLOGICA, RADIOLOGICA E NUCLEARE

II

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Peace cannot be kept by force; it can only be achieved by understanding.

Albert EINSTEIN

The CBRNe Book Series was born as an initiative of the Directive Board and of the Scientific Committee of “International Master Courses in Protection Against CBRNe events” (www.mastercbrn.com) at the University of Rome Tor Vergata. The evolution and increase in Security and Safety threats at an international level place remarkable focus on the improvement of the emergency systems to deal with crisis, including those connected to ordinary and non-conventional events (Chemical, Biological, Radiological, Nuclear, and explosives). In every industrial Country there are multiple entities with specialized teams in very specific fields, but the complexity of the events requires professionals that not only have specific know-how, but also expertise in the entire relevant areas. Given the global interest in these issues, the Department of Industrial Engineering and the Faculty of Medicine and Surgery of the Tor Vergata University organize the international Master Courses in “Protection against CBRNe events”: I Level Master Course in “Protection against CBRNe events” (120 ECTS) and II Level Master Course in “Protection against CBRNe events” (60 ECTS). These courses aim at providing attendees with comprehensive competences in the field of CBRNe Safety and Security, through teaching and training specifically focused on real needs. Both Master Courses are designed according to the spirit of the Bologna Process for Higher Education, the Italian law and educational system. The Master Courses are organized also in cooperation with the following Italian Public Entities:

- Presidenza del Consiglio dei Ministri (Prime Minister’s Office);
- Ministero della Difesa (Ministry of Defence);
- Ministero dell’Interno (Ministry of The Interior);
- Istituto Superiore di Sanità (National Health Institute);
- Istituto Nazionale di Geofisica e Vulcanologia (National Institute for Geophysics and Vulcanology);
- ENEA (Italian National Agency for New Technology, Energy and Sustainable Economic Development);

- University Consortia CRATI, MARIS and SCIRE;
- Comitato Parlamentare per l’Innovazione Tecnologica (Parliamentary Committee for Technological Innovation).

And together with the following International Entities:

- OPCW (Organization for the Prohibition of Chemical Weapons)
- NATO Joint Centre Of Excellence (Czech Republic);
- NATO SCHOOL of Oberammergau (Germany);
- HotZone Solutions Group (The Netherlands);
- VVU–026 Sternberk (Czech Republic);
- Seibersdorf Laboratories GmbH (Austria);
- Chernobyl Centre (Ukraine).

All the above–mentioned organizations have signed official cooperation agreements with the University of Rome Tor Vergata in the aim of Master course activities. The Master have also cooperation with OSCE, IAEA, ECDC, KEMEA in the aim of the didactical activities and we are working to formalize this collaboration with a formal cooperation agreement.

Both Master Courses have been officially granted the “NATO selected” status and have been included in the NATO Education and Training Opportunities Catalogue (ETOC) and also they are supported by OPCW.

The purpose of the CBRNe book series is to give a new perspective of the safety and security risks from both a civil and military point of view, touching all the aspects of the risks from the technological to the medical ones, talking about agents and effects, protection, decontamination, training, emergency management, didactic, investigation, communication and policy.

The authors will be experts of the sector coming from civil, military, academic/ research and private realities. A special thanks for the realization of this series goes to Prof. Carlo Bellecci for his initial encouragement, continuous support and help.

Nel mese di Agosto 2016 il Ministero dell’Istruzione, dell’Università e della Ricerca (MIUR) ha inserito la collana nella lista di quelle ufficialmente riconosciute con i seguenti riferimenti:

- codice di classificazione: E237557;
- titolo: CBRNE BOOK SERIES.

During the month of August, 2016, the Italian Minister for Instruction, University and Research (MIUR) has officially added this book series in the list of the official publications recognized by the Minister itself with the following references:

- classification code: E237557;
- title: CBRNE BOOK SERIES.

Marco Carbonelli

**Terrorist attacks
and natural/anthropic disasters**

Risk analysis methodologies
for supporting security decision-making actors





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Giacchino Onorati editore S.r.l. – unipersonale

www.gioacchinoonoratieditore.it
info@gioacchinoonoratieditore.it

via Vittorio Veneto, 20
00020 Canterano (RM)
(06) 45551463

ISBN 978-88-255-2565-6

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1st edition: June 2019

*A mia sorella Laura, che non è più qui con noi,
e alla sua splendida famiglia, Gerry, Pablo, Alicia ed Esteban,
che ho il piacere di veder, comunque sia, crescere in modo portentoso.*

*A mia moglie Maria Giovanna, insostituibile,
e ai miei figli Stefano, Daniele e Francesca
che mi hanno spesso sorpreso, lasciandomi meravigliato a guardarli,
e mi hanno supportato nelle scelte più difficili.*

*Ai miei genitori, Anna e Francesco,
per la loro presenza sempre disponibile, affidabile e generosa.*

*A tutti coloro che ho incontrato
nella mia oramai trentennale carriera lavorativa
e che hanno voluto collaborare lealmente con me
mettendo a disposizione le loro conoscenze e le loro energie.*

Contents

- 15 Chapter I
Introduction and fundamental definitions on terrorism and political violence
- 1.1. Political violence, terrorism and CBRNe threat: a systemic view and international definitions, 16 – 1.1.1. *Definitions of Terrorism*, 17 – 1.1.2. *Comparative table for terrorism characteristic elements*, 22 – 1.1.3. *Political Violence, Terrorism and subversion*, 24 – 1.1.4. *WMD and CBRNe weapons: are they the same thing?*, 28.
- 31 Chapter II
Terrorist events and natural/anthropic disasters: available worldwide database
- 2.1. Statistics of Terrorist attacks: worldwide database and statistics on CBRNe threat, 31 – 2.1.1. *RAND database: RDWTI*, 32 – 2.1.2. *Global Terrorism Database GTD*, 33 – 2.2. Natural/anthropic disasters: hazard data and statistical analysis, 42 – 2.2.1. *EM-DAT Database*, 43 – 2.2.2. *ONU Sendai Framework for Disaster Risk Reduction 2015–2030*, 54.
- 59 Chapter III
Risk Management fundamental: from ISO standard to DSS public goals
- 3.1. The standard concept of risk management. ISO 31000 and ISO 31010, 60 – 3.2. Threat, risk, vulnerability, exposure, consequence and impact mathematical relation, 68 – 3.3. Decision Support System, risk assessment and public applications, 73.
- 75 Chapter IV
Critical Infrastructure protection and domino effects
- 4.1. Critical Infrastructure fundamentals, 76 – 4.2. Critical Infrastructures around the world, 79 – 4.3. How to build a representation of society, 82 – 4.4. Domino proposed model, 88 – 4.4.1. *Aggregate vectors*

of direct dependencies, 88 – 4.4.2. Aggregate vectors of the time evolution of the QoS degradation, 88 – 4.4.3. The holistic analysis of dependencies, 90 – 4.4.4. Analysis of the cascading effect, 91 – 4.5. Final considerations on Critical Infrastructures, 94.

95 Chapter V

Risk assessment methods

5.1. USA DHS general risk assessment approaches, 95 – 5.2. RAMCAP (Risk Analysis and Management for Critical Asset Protection), 105 – 5.3. Gratta Carbonelli Risk Assessment Method (GC-RAM), 112 – 5.3.1. *Threat, Vulnerability and Exposure Arrays: modularity and scalability, 117 – 5.3.2. CG-RAM and Vulnerability: Internal Vulnerability, External Vulnerability and Vulnerability Reduction Factor, 122 – 5.3.3. Software applying GC-RAM, 125.*

129 Chapter VI

Conclusions and final remarks

133 *Glossary*

135 *References*

Introduction and fundamental definitions on terrorism and political violence

The possibility to write a final dissertation for my Master Thesis in the field of “Protection against CBRNe events” has provided me the opportunity to gather, reorganize, complete and make coherent a relevant information, ideas, analyses and reflections on the application of risk analysis methodologies for supporting security decision making actors. In fact, in my engineering career, since 2002 when I was thirty years old, I had worked on the theme of risk management and, starting from 2007 I operated for five years in the Task Force of National Civil Protection Department of the Italian Presidency of the Council of Ministers, as one of the advisers of the National Italian Commissioner on *Chemical, Biological, Radiological and Nuclear* (CBRN) terrorist event management.

I have taken this opportunity of the Level II International Master course at University of Tor Vergata as a challenge to measure, on one side, and renew, on the other side, my knowledge on this very interesting task to “advise” high level political stakeholders of public care about a nation and its population under non-conventional attack.

In this first section of the introduction, fundamental definitions of the terms *terrorism*, *political violence* and, finally, *CBRN* are presented. In particular, starting from an historical perspective, different study results reported in the literature are analyzed. The vision is successively enlarged on contemporary definitions used in very important institutions.

In section 2 the international databases publicly available on terrorist events and natural/anthropic disasters are thoroughly investigated, focusing the attention on the two most important databases that are the Global Terrorism Database (GTD) and the Emergency Events Database (EM-DAT).

In section 3 the concept of risk management as described in the standard ISO 31000 and ISO 31010 is analyzed, introducing the risk assessment and risk analysis characteristics. Furthermore, threat, risk, vulnerability, exposure, consequence and impact definitions and general mathematical relations in the risk management field are described. Finally, the definition and the general characteristics of Decision Support Systems (DSS) are faced, with special attention on risk assessment applications for governmental/public goals.

In section 4 the crucial concept of Critical Infrastructure is analyzed, presenting the definitions adopted around the world, showing the differences in the most important Western Countries. Furthermore, an original model for defining Critical Infrastructures and managing the *domino effect* is proposed in detail.

In section 5 the attention is paid to different methods that can be applied to implement risk assessment activities in the fields of natural/anthropic disasters and terrorist attacks. Firstly, the general risk assessment approach of the USA Department of Homeland Security (DHS) is investigated, highlighting the evolution of the concepts and some contradictions of the adopted definitions after September 11th 2001. Secondly, the Risk Analysis and Management for Critical Asset Protection (RAMCAP) methods is discussed, introducing the fundamental technical concepts of one of the most important methods applied by the USA DHS since 2005. Finally, the Gratta Carbonelli Risk Assessment Method (GC-RAM), designed originally in 2011 for application in the Italian Administration, is presented in detail, showing specific application areas, possible improvement and one example of software (SW) implementation of the method for Decision Support System goals.

1.1. Political violence, terrorism and CBRNe threat: a systemic view and international definitions

In this introductory sub-section, fundamental definitions of the terms *Terrorism*, *Political violence* and, finally, *CBRNe* are presented. In particular, starting from an historical perspective, different study results reported in the literature on the term *Terrorism* are analyzed. The vision is successively enlarged on contemporary definitions used in

very important institutions. The NATO definition, the USA DHS and CIA positions are analyzed and compared in the work, taking into account even the United Nations and European Union statements. Moreover, to focalize the Italian viewpoint, an analysis of Italian Penal Code regarding terrorism is presented. The aim of the analysis carried out is to identify the main characteristic elements defining the contemporary concept of terrorism.

Furthermore, the analysis of the concept of *Subversion* is faced. To complete the scenario of the concepts often used for discussion about the terrorism issue, a technical taxonomy of “violent conflict” adopted in NATO documents is presented.

In the final part of the section it is shown the modern evolution of the terrorist means of actions, introducing the *Weapons of Mass Destruction* (WMD) and *Chemical, Biological, Radiological, Nuclear and explosive* (CBRNe) issues, their contemporary definitions and international use in different areas of the world.

1.1.1. Definitions of Terrorism

As a first item of our analysis it seems appropriate to define the term *terrorism* starting from its original root [Mat1]. Within terrorism lies the word *terror* and the word *terror* comes from the Latin *terrere*, which means “frighten” or “tremble”. So *terrorim* could be referred to as in “causing the frightening” or “practicing the trembling”. It is useful to stress that *trembling* and *frightening* in this context could be synonyms for *fear*, *panic* and *anxiety* – what we would typically call *terror*. Even though the word *terror* is over two thousand years old and it was used by ancient Rome, (i. e. the *terror cimbricus* was a state of panic and emergency in response to the coming of the Cimbri – North European – tribe killers in 105 BC [Mat1]), for the first time in the history the word *terrorism* was coined during the French Revolution’s Reign of Terror (1793–1794). The Reign of Terror was a campaign of large-scale violence by the French state; between 16 000 and 40 000 people were killed in a little over a year. The English version of the word *terrorism* is attributed to a British man’s depiction of the bloodshed he had witnessed: Sir Edmund Burke commented on the French Revolution and warned about *thousands of those hell hounds called terrorists*.