Costruire dei team di *Advisors* e *First Responders* a supporto dei vertici decisionali per far fronte a situazioni di emergenza dovute ad eventi chimici, biologici, nucleari ed esplosivi

Il Dipartimento di Ingegneria Industriale e la Facoltà di Medicina e Chirurgia dell'Università di Roma Tor Vergata si sono occupati della necessità, da parte degli esperti del settore, di far fronte a eventi di natura Chimica, Biologica, Radiologica, Nucleare, esplosiva (CBRNe), creando nel 2009 il primo corso universitario finalizzato alla formazione di CBRNe Advisors a supporto dei vertici decisionali. Tale corso si è evoluto nel tempo, entrando ufficialmente in convenzione con la Presidenza del Consiglio dei Ministri, il Ministero dell'Interno, il Ministero della Difesa, l'INGV e l'ENEA, ed ottenendo il riconoscimento dello status di NATO SELECTED, oltre al primo accordo di collaborazione di questo tipo con l'Organization for the Prohibition of Chemical Weapons (OPCW). Il bisogno della comunità internazionale di rafforzare le misure di safety e security è stato il motivo principale per cui il Direttivo del Master ha deciso di suddividere il corso italiano in due Master Courses internazionali: un corso di primo livello, 1st-Level Master Course in Protection against CBRNe events, dedicato alla formazione di CBRNe First Responders altamente qualificati, e un corso di secondo livello, 2nd-Level Master Course in Protection against CBRNe events, dedicato alla preparazione di CBRNe Advisors a supporto dei vertici decisionali (le iscrizioni per l'anno 2014/2015 sono già aperte). Il presente articolo illustra le minacce attuali, nonché gli obiettivi e l'ottica di questo Progetto Internazionale.

Building a team of Chemical, Biological, Radiological, Nuclear, explosive events Tech Advisors and First Responders to support top decision makers during emergencies

The Department of Industrial Engineering and the Faculty of Medicine of the Rome University of Tor Vergata took up the expert needs to face Chemical, Biological, Radiological, Nuclear, explosive (CBRNe) events and created, in 2009, the first Academic Course aimed at training CBRNe Tech Advisors for Decision Makers. The course has grown during these years getting the Official Cooperation of the Italian Presidency of Ministry, Ministry of Interior, Ministry of Defence, INGV, ENEA and the status of NATO SELECTED and, the first agreement of this kind, with the Organization for the Prohibition of Chemical Weapons (OPCW). The International safety and security needs have been the principal reasons that convinced the Directive Board of the Master to split the Italian Course into two separate International Master Courses in "Protection against CBRNe events" – a First Level course to prepare CBRNe First Responders – and a Second Level course to prepare CBRNe Tech Advisors (the enrollment for 2014/2015 is already open). The current threats, the Mission and the Vision of this International Project are presented in this paper.

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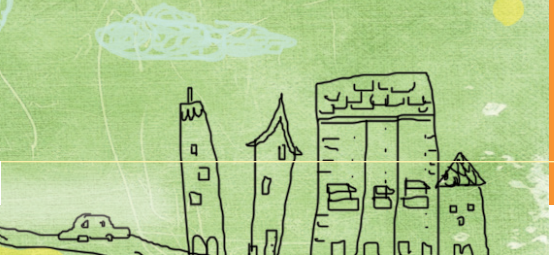

Introduction

The Department of Industrial Engineering and the School of Medicine and Surgery of the Rome University of Tor Vergata organize two international Master courses in "Protection against CBRNe events", aimed at creating a community of experts, each one with its own specific competence, and supported by a common knowledge of the subject. The courses are divided into two degrees, the first level and second level, dedicated to First Responders and Tech Advisors for Top Decision Makers, respectively. The main purpose of these courses is to integrate the skills and expertise by means of training and by conducing didactical and research activities in the areas of Safety and Security through a project. This is the mission of the International Master Courses in Protection against CBRNe events (Fig. 1):

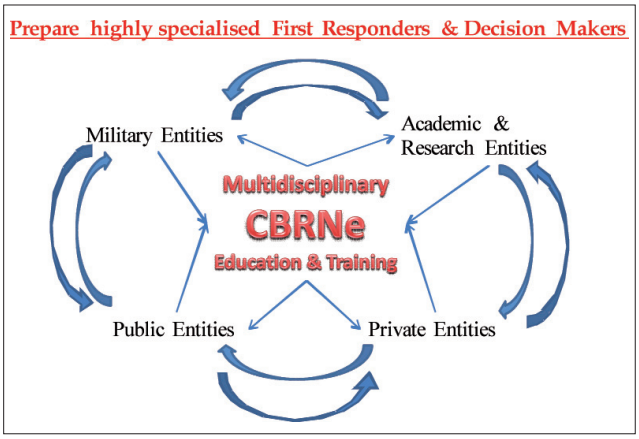

FIGURE 1 Mission of International Master Courses
Source: www.mastercbrn.com

Civilian, military and industrial experts together at university

Several extreme events require high-qualified experts to intervene quickly, directly as first responders, or indirectly as advisors to decision makers. The assessment of individual risk is a correct approach for an analytical examination of the scenario, but the possibility of mixed scenarios cannot be ruled out. CBRNe agents can cause damage by harming people, flora and fauna either by themselves or as a combination, making it extremely difficult to identify a complete list of possible scenarios. In the effort of giving an answer to all these complex aspects, during the academic year 2009-2010 at the Rome University of Tor Vergata, the Department of Industrial Engineering, together with the School of Medicine and Surgery, decided to start a Second Level Master Course in Protection against CBRNe events. This course focused on the training (both theoretical and practical) of highly specialized experts in the field of CBRNe safety and security. During the first four years, the vision of the Master course has continuously developed (Fig. 2):
The course mission and vision led to create a new prospective of collaboration, allowing experts from the Civilian, Military and Research environment, to have a direct and constructive debate in the framework of the Master Courses in Protection against CBRNe events. During these years, collaborations are growing constantly, reaching the present level of excellence by signing official collaboration agreements with:

- Presidenza del Consiglio dei Ministri (Prime Minister's Office);
- Ministero della Difesa (Ministry of Defence);
- Ministero dell'Interno (Ministry of The Interior) [On July 18th, 2013, the Rome University of Tor Vergata and the Ministry of the Interior, signed a cooperation agreement under which the Public Security Department and the Fire Fighters Department will support the University's Master Courses in protection against Chemical, Biological, Radiological, Nuclear and explosive (CBRNe) events. This cooperation agreement has enhanced the technical skills sectors of the Public Security Department and the Fire Fighters Department. This strong institutional footprint refers to the interoperability between the Departments of the Interior Ministry, called to ensure everyone for their expertise, aspects of Security (Public Security Department) and Safety (Fire Fighters Department).

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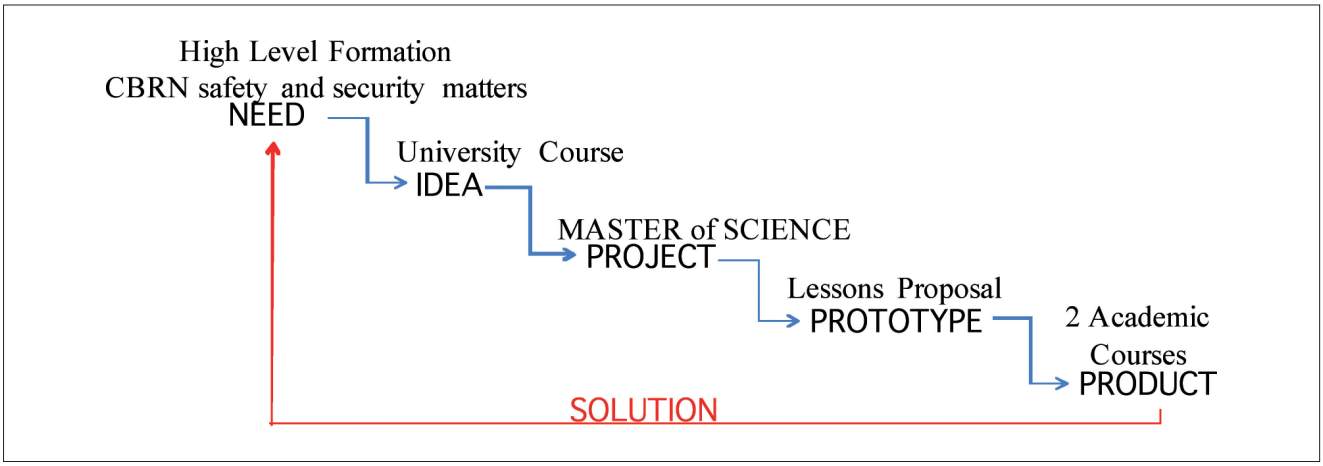

FIGURE 2 Vision of International Master Courses
Source: www.mastercbrn.com

In particular, are invoked, already doctrinally, aspects of preservation and national security, insured as institutionally expected, under the aegis of the Ministry of the Interior, with the involvement of other relevant Agencies and Institutions];

- ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development);
- Istituto Nazionale di Geofisica e Vulcanologia (National Institute for Geophysics and Vulcanology);
- Istituto Superiore di Sanità (National Health Institute);
- Comitato Parlamentare per l'Innovazione Tecnologica (Parliamentary Committee for Technological Innovation);
- University consortia: CRATI scrl; MARIS scarl; SCIRE scarl;
- and with International Entities and Facilities:
- NATO JCBRN Centre Of Excellence – (Czech Republic)
- NATO School of Oberammergau (Germany)
- HotZone Solutions (The Netherlands)
- VVU-026 Sternberk (Czech Republic)
- Seibersdorf Laboratories GmbH (Austria)
- Chernobyl Centre (Ukraine)

The high level of these International Collaborations led the Master Course to accept the challenge of growing need for training in the CBRNe safety and security context, and to split the course in two: one to prepare highly specialized First Responders (1st level course) and the other, to prepare highly specialized Decision Maker (2nd level course). *On 16 April 2013, NATO HQ SACT (Supreme Allied Commander Transformation), located in Norfolk, Virginia, USA, granted the NATO "SELECTED" accreditation to both CBRNe Master Courses [1].* The International CBRNe Master Course (1st level Master Course) and the Executive CBRNe Master Course (2nd level Master Course) will be included in the NATO Education and Training Opportunities Catalogue (ETOC). The assessment by NATO SACT JFT (Joint Force Trainer) of both Master Courses – which include, among others, CBRN live agent training carried out in cooperation with international partners – have been conducted according to the existing NATO policy, doctrine, and directives. The course fulfilled all the requested requirements for the accreditation by NATO. The NATO selected accreditation implies that:

- The Master Courses in Protection against CBRNe events meet NATO's training requirements;
- The Master Courses in Protection against CBRNe events can be delivered outside a NATO training establishment;
- The Rome University of Tor Vergata designed and developed the Master Courses and retains their ownership.

On June 20th, 2013, the University of Tor Vergata and the OPCW signed a cooperation agreement, under

which the OPCW Technical Secretariat will support the University's Master Courses in protection against Chemical, Biological, Radiological, Nuclear and explosive (CBRNe) events. This is the first agreement ever in the world between an University Course and OPCW [2]

From desk to field and back: exchanging experiences in the face of a real emergency

The old Italian Edition of the II Level Master Course has been closed and substituted with:

- **The First Level Master Course** that aims at providing participants with suitable technical and operational skills and knowledge, to become key players in the new area of CBRNe risks. In order to participate in the Master Course and obtain the final degree (which has legal value according to the Italian law), candidates must have a Bachelor's degree (180 point recognized according to the ECTS), or titles certifying the expertise of students coming from their work experience. The course is divided into 12 modules:
  - Module 0 - Introduction to CBRNe risks - the point of view of a first responder - Rome (Italy);
    Students are involved in training activities with Air Force, Navy (Fig. 3) and Fire Brigades (Fig. 4).
  - Module 1 - Biological events - Rome (Italy).
  - Module 2 - Radiological and Nuclear events - Rome (Italy).
  - Module 3 - NBC School of Rieti - Rieti (Italy).
  - Module 4 - Chemical events and explosive events - Rome (Italy).
    In the previous editions students also participated to decontamination tests (Fig. 5).
  - Module 5 - JCBRNE COE - Vyskov (Czech Republic).
  - Module 6 - VVU + Seibersdorf - Vyskov (Czech Republic) + Vienna (Austria).
    A delegation of students from the 3rd and 4th editions of the Master Courses attended the course "Training for First Responders Trainer" at the JCBRN CoE in Vyskov (Figs. 6 and 7).
    Students from the previous edition of the Master also took part in the First Course with Live Training Agents (LAT) at VVU Vyskov, run by Hotzone Solutions Group, and had the chance to exercise with Sarin, Yprite and VX (see Fig. 8). Furthermore Dott. Luca Rotondi, an attendee of the 4th edition of the Master Course, was the first deaf person able to complete a NATO course and a Training with LAT [3].
  - Module 7 - Private factories - Rome (Italy).
  - Module 8 - Medical first aid and emergency planning - Rome (Italy). The students, in previous editions, already participated in training for medical first Aid (see Fig. 9).
  - Module 9 - Software and DSS - Rome (Italy).
  - Module 10 - Investigation and Communication - Rome (Italy).
  - Module 11 - Chernobyl center - Chernobyl (Ukraine).

FIGURE 3 Master students on the Italian aircraft carrier "Cavour"
Source: www.mastercbrn.com

FIGURE 4 Master students inside of a Firefighter Brigades mobile laboratory
Source: www.mastercbrn.com

FIGURE 5 Decontamination training activities
Source: www.mastercbrn.com

– Stage.
– Final thesis dissertation.

- **The Second Level Master Course** that aims at providing participants with appropriate technical, cognitive and operational skills in order to train key figures in the field of CBRNe risk, able to coordinate at tactical and strategic levels. To participate in the Master Course and obtain the official title (which has legal value according to the Italian law), candidates must have a 300 ECTS point Master degree, or titles that recognize the expertise of students coming from their work experience.
  The course is divided into 7 modules:
  – Module 0 - CBRNe International Safety and Security Policy - Rome (Italy).
    Students are involved in high level exercise: Figure 10 shows a representative group of students at ISPRA (National Institute for Civil Protection and Environment) during an International Emergency simulation.
  – Module 1 - CBRNe Agents - Rome (Italy).
  – Module 2 - CBRNe Protection and Decontamination - Rome (Italy).
  – Module 3 - DSS for Advisors - Rome (Italy).

FIGURE 6 Master students during a training at COE
Source: www.mastercbrn.com

  – Module 4 - NATO School - Germany – Oberamergau.
  – Module 5- Different ways to manage a CBRNe event in different continents- Rome (Italy).
  – Module 6- Medical management of a CBRNe Maxi-Emergency -Rome (Italy).
  – Module 7 - Investigation and information in case of a CBRNe events - Rome (Italy).
  – Module 8 Private Companies - Rome (Italy).
  – Remedial Session - Rome (Italy).
  – Stage.

FIGURE 7 A master student from Italian Red Cross at JCBRNE COE NATO during the field training activities
Source: www.mastercbrn.com

FIGURE 8 Master student with an operator of Hotzone Solution during a training with Live Sarin at VVU
Source: www.mastercbrn.com

– FINAL ACTIVITY – Along with the final thesis delivery, students will be involved in a 2-3-day Table Top Exercise that will contribute to their final evaluation.
Among its collaborations the Master Course won, together with Scuola Sant'Anna di Pisa and the Italian Fire Brigades, and in collaboration with Polizia di Stato (the Italian State Police), Carabinieri corps, Civil Protection and Italian Army, an International Project to improve the Italian CBRNe system for the 7th European Framework Program [4].
In 2013, the II Level Master Course, in collaboration with Ministry of Interior, Ministry of Defence, Italian Red Cross, INAIL and ARPA, organized the first Table Top Exercise (TTX) to evaluate the preparation of students [5].

FIGURE 9 Master students during a training
Source: www.mastercbrn.com

FIGURE 10 A master student during an International Emergency Simulation
Source: www.mastercbrn.com

Conclusions

The degrees, such as Military, Police, Fire-fighter Academy degrees etc., will be assessed on a case-by-case basis by the University's competent bodies and the Master Course's Steering Committee.
Since 2009, more than 80 students have completed the Master Degree; students come from Academic, Military and Civilian contexts, both experts and people who joined the course to acquire expertise for a new job.

During these years the collaborations between students and the teachers, the contacts with the Public, Private and Military Entities involved in the CBRNe safety and security, together with the training and strategic activities, led to the following results:

- International Collaborations among experts for improving the emergency system;
- International Patents due to ideas born during the Master Course;
- Realization of International CBRNe network;
- Realization of new products from companies to end-users;
- Research activities and Scientific Publications in International peer-to-peer Journals;
- Raising of International Funds;
- New job opportunities (95% of the students attending the Master Course get a job today).

The ultimate goal is to experience the collaboration with Companies, Laboratories and International Organizations and let the courses deliver a preparation that goes into the world of Safety and Security and CBRNe relying on the University of Tor Vergata as a neutral focal point for the coordination of these activities. This is the final purpose of the International Master Courses in Protection Against CBRNe events.

Acknowledgements

Special Acknowledgments to all the Entities and the people that put so much effort to realize this ambitious project, in particular to the Didactical Board and to all the students of the present and former editions. Further information available at: www.mastercbrn.com. Enrollment for A.Y. 2014/2015 OPEN.

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