



Università di Roma Tor Vergata

## INTERNATIONAL CBRNe MASTER COURSES

Chemical, Biological, Radiological, Nuclear and explosive

Department of Industrial Engineering and School of Medicine and Surgery

# 2<sup>nd</sup> International CBRNe Workshop "IW CBRNe 2015"

*"CBRNe: new technologies, new strategies,  
new approaches to reduce the risk"*

*The workshop addresses current CBRNe risk scenarios, focusing on:*

- *How the European countries are facing DAESH threats during the economic crisis;*
- *The use of chemical agents to offend and threaten;*
- *New civil and military tools to face CBRNe risk;*
- *The influence of the global political situation on the evolution of non-conventional events;*
- *Medicine and Biology to support a prompt CBRNe response;*
- *Research, didactic and training: the real solutions to reduce risks*

**University of Rome Tor Vergata**

**Villa Mondragone**

Via Frascati 51 (Monteporzio Catone, Rome)

**For registration please contact:**

**[info@mastercbrn.it](mailto:info@mastercbrn.it)**

**[www.mastercbrn.com](http://www.mastercbrn.com)**

***20 November 2015***

# **Workshop Venue**

## ***“Villa Mondragone”***



*Villa Mondragone (municipality of Monte Porzio Catone) is part of the Complex of “Ville Tuscolane” that includes twelve monumental Fabrics from the Renaissance period, that were built on the heights of the Vulcano Laziale to the south-east of Rome. It is located on a hill at 416 m on the sea level between the municipalities of Frascati and Monte Porzio Catone.*

***More information***

***How to get to Villa Mondragone Congress Center***

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# Agenda

- 08.30 - 08.50      Registration
- 08.50 - 09.00      Welcome greetings from Rector of University of Rome Tor Vergata  
**Prof. Giuseppe Novelli** – *University of Rome Tor Vergata, Italy*
- 09.00 - 09.30      Presentation of CBRNe courses results **(O1)**  
**Dr. Andrea Malizia, PhD** – *On behalf of the Directive Board of CBRNe Master Courses, University of Rome Tor Vergata, Italy*
- 09.30 - 10.00      Welcome session  
**Prof. Leonardo Palombi** – *Director of the Department of Biomedicine and Prevention, University of Rome Tor Vergata, Italy*  
**Prof. Francesco Romanelli** – *On behalf of the Department of Industrial Engineering, University of Rome Tor Vergata, Italy*  
**Dr. Pasqualino Gaudio** – *International CBRNe Master Courses Coordinator, University of Rome Tor Vergata, Italy*
- 10.00 - 10.20      The role of OSCE **(O2)**  
**Dr. Mathew Geertsen** – *OSCE, Austria*
- 10.20 - 10.40      The correlations between Migrations and Epidemiology **(O3)**  
**Prof. Leonardo Palombi** – *International CBRNe Master Courses Director, University of Rome Tor Vergata, Italy*
- 10.40 - 11.10      **Coffee Break & Industrial exhibition**
- 11.10 - 11.30      Ebola in West Africa 2014/15: Implications for European biopreparedness **(O4)**  
**Dr. Cornelius Bartels** – *ECDC, Sweden*

- 11.30 - 11.50 Enhance Functionality in Chemical Biological Environments **(O5)**  
**Dr. Giovanni Longo** – *W.L. Gore & Associates, Inc., Europe*
- 11.50 - 12.10 Teach them how to fish **(O6)**  
**Dr. Michael Thornton** – *JRC-ISPRA, Italy*
- 12.10 - 12.30 Training methodologies for Safety & Security Culture continuous improvement **(O7)**  
**Dr. Eng. Carlo Rusconi** – *SOGIN, Italy*
- 12.30 - 14.00 **Lunch & Poster Session & Industrial Exhibition**
- 14.00 - 14.20 CBRNe Islamic State - Hoax or reality? **(O8)**  
**BrigGen (ret'd) Ioannis Galatas, MD, MA, MC** – *(Army) Greece*
- 14.20 - 14.40 Proposal of an innovative International Training Curriculum for Advisors in Emergencies and CBRNe Events **(O9)**  
**Maj. Andrea Gloria** – *NATO School, Germany*
- 14.40 - 15.00 Selex ES CBRNe experience: the European project EDEN **(O10)**  
**Dr. Eng. Massimo Piva** – *SELEX Land & Battlefield LoB, Italy*
- 15.00 - 15.20 Use of Toxic Industrial Chemicals as Chemical Weapons - a Threat? Case Study and investigative challenges – Syria **(O11)**  
**Dr. Boban Cekovic** – *HZS, The Netherlands*
- 15.20 - 15.40 OSINT to fight Terrorism **(O12)**  
**Dr. Federico Sesler** – *CISINT, Italian Centre for Strategy and Intelligence, Italy*
- 15.40 - 16.00 CBRN Defence within the Framework Nations Concept **(O13)**  
**Lt. Col. Bernd Allert** – *German Armed Forces, Germany*

- 16.00 - 16.30 Press conference on the CBRNe book series  
***Book series authors – ARACNE, Italy***
- 16.30-16.50 Final Greetings  
***Scientific Committee of CBRNe Master Courses***
- 16.50 **Attendance Certification Assignment**

**Chairman: Dieter Rothbacher, MSc, HZS, *The Netherlands***

*Responsible for the International Training activities at the International CBRNe Master Courses*



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**Dieter Rothbacher**, born 1966, a graduate from the Austrian Military Academy, is the co-owner and Director Operations of Hotzone Solutions Group BV, located in The Netherlands, a company specialized in CBRNE training and consulting services. Furthermore, he is the President of the International CBRNE Institute (ICI, Belgium), an international non-profit organization founded in 2013.

His professional background includes more than 25 years of experience in the area of Chemical, Biological, Radiological and Nuclear Materials (CBRN) and Weapons of Mass Destruction (WMD): - more than 15 years as a CBRN Defence Officer of the Austrian Armed Forces; - 10-year employment with the Organization for the Prohibition of Chemical Weapons (OPCW) as an Inspection Team Leader and as lead trainer for Chemical Weapons Inspectors of the OPCW Inspectorate; - WMD destruction and inspection assignments with the United Nations Special Commission (UNSCOM) and the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) in Iraq.

# Industrial Exhibition



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DECONTAMINATION SYSTEMS**



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INFORMATION AND COMMUNICATION TECHNOLOGY



**THALES**



Università di Roma Tor Vergata

**INTERNATIONAL CBRNe MASTER COURSES**

Chemical, Biological, Radiological, Nuclear and explosive  
Department of Industrial Engineering and School of Medicine and Surgery



# Oral Contributions

## 01

### Presentation of CBRNe courses results

***Dr. Eng. Andrea Malizia, PhD - On behalf of the Directive Board of CBRNe Master Courses, University of Rome Tor Vergata, Italy***

#### Abstract

The global crisis related to the reduction of energy fossil resources, the reduction of potable water resources and the war for the control of energy sources are part of the causes which can lead to an intentional CBRNe (Chemical, Biological, Radiological, Nuclear, and explosive) event. These kind of events could also be the consequence of an unintentional release of substances (i.e., an accident of a truck containing a Toxic Industrial Chemical), or of natural events like a tsunami or an earthquake. Thus the high percentage of risk connected to their occurrence is clear. The proper way to face these emergencies is to build a team of highly prepared Tech Advisors and First Responders to support Top Decision Makers, not only to deal with the agents released, but mainly to manage the consequences on the territory of occurrence, immediately and in the medium and long term. At the present moment, experts of the kind are really few and usually concentrated in the central administrative bodies. 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) together with the main private, public, military and academic entities involved in this sector. 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 results obtained will be presented and discussed.

#### Short CV

Andrea Malizia is a Researcher in Experimental and Applied Physics at the Department of Industrial Engineering, University of Rome Tor Vergata. He achieved his Bc.S. in 2003 and the Ms.S. in 2005 (cum laude) in Environmental Engineering both at the University of Rome Tor Vergata. Dr. Malizia defended his Ph.D. in Quantum Electronics and Plasma Physics in 2010 (Rank 4/4); he later achieved in 2010 the postgraduate title in Protection against CBRNe events (cum laude) at the University of Rome Tor Vergata. His research interests center on improving the understanding, design, and performance experimental set-up to analyze the mobilization of toxic dust in case of accident in the energy plants. Currently, he studies the mechanism of mobilization in case of accident like Loss Of Vacuum Accident (LOVA), Loss Of Coolant Accident (LOCA) by the mean of experimental and numerical characterization. In addition, Dr. Malizia has contributed to the development of LIDAR/DIAL systems for environmental control and military application. He cooperates with international entities (public, military, academics and private) involved in CBRNe (Chemical, Biological, Radiological, Nuclear and explosive) safety and security. He is the Didactical Coordinator of the International Master Courses in Protection against CBRNe events since 2008, cooperating with the most important national and international entities involved in the CBRNe events. He is Assistant Professor for the course of Medical Physics at the Faculty of Medicine and Surgery, University of Rome Tor Vergata . He also serves as Tutor Assistant in the courses of Physics, Laser systems, Nuclear Fusion Energy and Measurements. During 2008-2009, he was a Visiting Researcher at the Culham Centre of Science (UK). Dr. Andrea Malizia is author of more than 90 scientific works on international and national Scientific Journal and Conference Proceedings and of 1 National Patent. He received two National Awards for his research activities: “Premio Città e Sicurezza” (2007) and “Premio Sapio” (2011).





# Oral Contributions

## 02

### The role of OSCE

*Dr. Mathew Geertsen - OSCE, Austria*

#### Abstract

Practical implementation of the UN Security Council Resolution 1540 (2004) on non-proliferation of weapons of mass destruction, with a nexus to terrorism

The CBRN proliferation and its potential nexus to terrorism has been recognized by the international community as a grave security challenge in the 21st century. The UNSC resolution 1540 adopted in 2004 under the Chapter VII of the UN Charter, represents a specific response to this threat, and poses obligations on all UN Member States to address the serious non-proliferation concerns.

The OSCE, as the largest regional security organization, therefore adopted a number of political decisions to provide effective assistance to its participating States in countering non-proliferation risks, including through a comprehensive implementation of the resolution 1540. The OSCE's assistance in this field is three-fold: a) Complement the efforts of the 1540 Committee and its Group of Experts, also through close co-operation with the UN Office for Disarmament Affairs; b) Strengthen OSCE's support in facilitating implementation of the resolution 1540, including through assistance with development of National Implementation Action Plans on the Resolution; and c) Promote experience sharing on national progress and lessons learnt, as well as developing effective practices on the implementation of the Resolution.

The OSCE's work with its participating States in this area aims to be practical, strictly upon request from the States, while ensuring synergies and complementarities with other relevant international and national actors.

Role of the civil society, industry and academia cannot be underestimated in this process, in particular in development of analysis of new emerging threats in the field of CBRN.

#### Short CV

Mr Mathew Geertsen is a retired officer of the Royal Netherlands Air force. After finishing the Royal Military Academy he served 10 years with the Air Defence Artillery Command in Germany during which he fulfilled several operational functions, including Squadron Commander. After a two year period as Liaison officer on an international peace keeping assignment in Egypt (Camp David accords), he was stationed at the Air Force Headquarter in The Hague in which he fulfilled several Staff positions mainly in the Operational Plans and Policy area. During the eighties Colonel Geertsen was the project manager of numerous extensive reorganisations programmes in the Netherlands Armed Forces, addressing for instance educational developments and recruitment outcome improvements. After the successful completion of the NATO Defence College in Rome in 2004, Col Geertsen became the Military Attaché of the Kingdom of the Netherlands in Austria and the Senior Military Advisor of the Netherlands to the OSCE (4 years). In 2008, Col Geertsen ended his military career and became Head of the FSC Support Section in the Conflict Prevention Centre of the Secretariat of the OSCE. In this position Mr Geertsen is supporting, with his team, the Forum for Security Cooperation in Vienna. Mr Geertsen lives in Vienna, is married and has 5 children.



# Oral Contributions

## 03

### The correlations between Migrations and Epidemiology

**Prof. Leonardo Palombi** - *Department Director, Biomedicine and Prevention, University of Rome Tor Vergata, Italy*

#### Abstract

Epidemiology is a powerful instrument and should be considered as a primary component to respond effectively to disasters because its approach can provide strategic information and scientific knowledge. During a disaster we need to identify and size the magnitude of health problems, and their implications for response activities. Disaster epidemiology is described by CDC as an approach that "...brings together various topic areas of epidemiology including acute and communicable disease, environmental health, occupational health, chronic disease, injury, mental health, and behavioral health. Disaster epidemiology provides situational awareness..." Priorities in disaster epidemiology are related to: 1. set up new automated systems to monitor, screen and size health treats during disasters or emergencies, such as drone networks; 2. set up new models forecasting spatial and temporal dimensions and trends of disasters, integrating different information sources; 3. focus on disasters epidemiologists as a strategic role in management of disasters, before, during and after the occurrence of the disaster. To perform disaster surveillance activities, it is important to predefine the variables and data points that would be of interest during a particular type of disaster. A core set of data points can be used in surveillance in most disaster events. Demographic data as well as simple outcome data for both victims and responders are useful in tracking the impact of the disaster as well as identifying the need for resources. A crucial point in the disaster is to obtain collaboration by the affected population. In this framework the private sector and NGOs, can play an important role in managing the consequences of a disaster, providing services such as shelter, food, and clothing. NGOs also respond to disasters that occur around the world, providing emergency and long-term shelter, health care, food, clothing, and other services. However this activity too should be addressed by timely information about population needs during and after the disaster. To fill the information gap, that is usually experienced in a disaster is a crucial point to mitigate the disaster impact on the population.

#### Short CV

Leonardo Palombi is currently Professor of Hygiene, Epidemiology and Public Health (SSD MED 42) at the Faculty of Medicine of the University "Tor Vergata" in Rome. At this University, also he holds the position of Director of the Department of Biomedicine and Prevention, and is a member of the Academic Senate. Since April 2013 Coordinator of the Doctorate in Nursing and Public Health. Since 1996, Leonardo Palombi has worked as an expert consultant and abroad on behalf of several national and international agencies: DGCO Foreign Ministry, World Bank and UNICEF, many national European cooperation (Catalonia, GTZ - Germany, Ireland, France, etc.). He collaborates with the World Health Organization for the drafting of guidelines and documents in three distinct areas (HIV / AIDS PMTCT), HIV-RESNET and Retention network). In 2012 was in the experts panel for the definition of the Consolidated Guidelines for HIV / AIDS. Coordinates since 2002, as director of scientific activities of DREAM (Drug Resource Enhancement against AIDS and Malnutrition). Prof. Palombi holds the position of Courses Director at the International Master Courses in Protection against CBRNe events.



# Oral Contributions

## 04

### Ebola in West Africa 2014/15: Implications for European biopreparedness

*Dr. Cornelius Bartels - ECDC, Sweden*

#### Abstract

The recent Ebola outbreak in W-Africa turned into an unprecedented humanitarian catastrophe caused by infectious disease.

Unexpectedly the regional crisis in W-Africa also had strong effects in European countries and other countries with comparable standards in health care systems. Ebola as a wakening call pointed out gaps in preparedness and response for infectious diseases of high consequence e.g. in hospital capacities, staff protection or MedEvac procedures.

Furthermore Ebola demonstrated the characteristics of an emerging health threat at the health-security interface of our days, strongly shaped by non-biological drivers.

#### Short CV

Cornelius Bartels is working for the European Centre for Disease Prevention and Control in Stockholm since 2011. There he is leading the centre's activities in the field of biopreparedness and biosecurity. During the Ebola outbreak in 2014 he was assigned as crisis manager to coordinate ECDC's support to health authorities in European countries and EU-institutions as well. Before moving to Sweden, he worked for the Centre for Biological Security at Germany's federal public health agency, the Robert Koch Institute. One of his responsibilities was the implementation of a national training concept for first responders from clinical, pre-clinical and public health side when facing biological incidents. Furthermore he acted as scientific advisor for joint interagency biopreparedness and response at national level. Before transitioning to public health in the early 2000s, Cornelius worked over many years as a specialist for anaesthesiology and intensive care at Berlin University's Medical School. In these periods he also became heavily involved as an emergency physician for ground and airborne rescue services. Today, he sometimes misses that dynamic and direct way of working of a time.





# Oral Contributions

## 05

### Enhance Functionality in Chemical Biological Environments

*Dr. Giovanni Longo - W.L. Gore & Associates, Inc., Europe*

#### Abstract

Nowadays chembio threats possible risky scenarios have become more complex then 20 years ago with regards to:

- Type of enemy
- Type and form of ChemBio threat agent
- Type of attack and/or incident
- Type geographical location

Products made with GORE® CHEMPAK® Selectively Permeable Fabrics and GORE® CHEMPAK® Ultra Barrier Fabrics are certified to NFPA and/or ASTM standards for outstanding protection against a wide range of CWA, TICs and Bio threats in vapour, aerosol and liquid form.

Thus products made with GORE® CHEMPAK® Protective Fabrics allow to run warm and hot zone operations in almost every environmental condition (climate, terrain, dry & wet).

Some of the benefits that products made with GORE® CHEMPAK® Protective Fabrics includes:

- Improved comfort • Increased mobility • Additional protection against petroleum, oils and lubricants
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- Wet decontamination

Typical applications of products made with GORE® CHEMPAK® Protective Fabrics are:

- Search & Rescue
- SWAT and high-risk entry
- Tactical force operations
- Hazardous material emergency
- Terrorist incident and counter-terrorism security
- Containment and Decontamination
- Emergency response to terrorist attack victims

#### Short CV

Business Development Manager Europe. Post Graduate Studies in International Relations Italian Society for the International Organisation (SIOI), Rome, Italy; Honours Degree in Political Science (summa cum laude) Bari University. Professional Development Training: Leadership Development; Situational Leadership; Sponsorship; Coaching EU Competition Law; Foreign Corrupt Practices Act (FCPA); UK Bribery Act Procurement Procedures; EU Public Sector Procurement; Public Contracts Business Relations with Public Administrators; Value Selling; Value Pricing; Strategic Selling Chemical Biological & Radiological Awareness; Time Management; Project Management Communication; Negotiation; Problem Solving; Leader Effectiveness Training (LET) Technical Advisory. Professional Experience: W.L. GORE & ASSOCIATES, Italy and Germany from 1999 to the Present. Business Development Manager GORE Military Fabrics (2007-Present). Promoted to drive sales and performance of the military fabrics line of business. Collaborate closely with cross-functional product, engineering, R&D, manufacturing, marketing, and support colleagues to ensure the superior achievement of customer needs. Ran all Italy sales for the Gore military fabrics and GORE CHEMPAK ChemBio Protective fabrics product lines, strategically aligning global and European business objectives with the market-specific sales approach.



# Oral Contributions

## 06

Teach them how to fish

*Dr. Michael Thornton - JRC-ISPRA, Italy*

### Abstract

Over the last 5 years the EU CBRN Centres of Excellence Initiative has grown and today we have network of experts, both political and technical in 52 partner countries in 8 regions. The setting up of regional secretariats and the formation of National Teams has encouraged local ownership and coordination. Building capacity to mitigate CBRN risks is key to long-term sustainability in these countries. With this objective in mind, the EU has approved and is delivering 49 tailored projects in 74 countries and to date has trained over 2000 experts and more are trained each day. The presentation will highlight the diversity of approach necessary to build capacity in such varied environments.

### Short CV

Michael Thornton is the team leader at the European Commission's Joint Research Centre (JRC) implementing the EU CBRN Centre of Excellence Initiative. He has carried out missions to more than 30 countries worldwide, meeting with Ministers, senior government representatives and CBRN experts. In parallel to this, he designed and delivers training courses on the identification of nuclear installations to image analysts at EUSC. Prior to working at the JRC, he worked at the UK Atomic Weapons Establishment.



# Oral Contributions

## 07

Training methodologies for Safety & Security Culture continuous improvement

*Dr. Eng. Carlo Rusconi - SOGIN, Italy*

### Abstract

The Human Factor is one of the most important and complex elements that Nuclear Safety and Security Analysis has to deal with. The Radwaste Management School of Sogin group continuously updates education and training programs on Safety & Security, fostering the best innovation standards and participating to specific meetings organized by the International Atomic Energy Agency (IAEA). With this aim, new methodologies have been developed in order to give workers and managers the chance to increase their capabilities and contribute to continuous improvement of Safety & Security Culture. These methodologies are based on an interactive approach characterized by tests, simulations and brainstorming sessions aimed at making participants aware of safety & security issues deriving from complex dynamics and recognize potentialities and criticalities related to human and organizational factors.

### Short CV

PhD in Energy Studies, Master in Safety & Security and Master's degree in Nuclear Engineering achieved at University "La Sapienza" of Rome. Safety expert, Practice Leader and Professor of Safety Culture training courses at Radwaste Management School of Sogin group. Speaker and author of publications on Safety Analysis and Safety Culture in national and international meetings.





# Oral Contributions

## 08

CBRNe Islamic State - Hoax or reality?

*BrigGen (ret'd) Ioannis Galatas, MD, MA, MC (Army) - Greece*

### Abstract

In the past two decades over 50 reported attempts to acquire, produce or deploy CBRN weapons have been recorded by al-Qaeda and its affiliates. On 29 June 2014, a new terrorist organization proclaimed itself to be a worldwide caliphate, with Abu Bakr al-Baghdadi being named its Caliph, and renamed itself as ad-Dawlah al-Islāmiyah ("Islamic State" - IS). Currently there is an ongoing global debate regarding CBRNe capabilities of IS: "Hoax or reality?" There are three tenants to IS terror: (1) The "active shooter" Charlie Hebdo type attack (which includes suicide bombers, executions, conventional explosives, etc); (2) Cyber-attack against all things electronic; and (3) Irregular or asymmetric attack, predominantly CBRNe - but also anything we haven't thought about which will enhance IS's psychological campaign of terror. There are 6 reasons why CBRNe IS is a reality: (1) Religious terrorist organizations tend to regard WMD usage as not only morally justified but expedient for the attainment of their goals; (2) Access to financial resources - IS possess assets of more than US\$2 trillion - mainly from oil/gas trade; (3) Increased number of safe havens in both Syria and Iraq; (4) Accessibility of CBRN arsenal (Syria, Iraq, Libya); (5) University educated foreign jihadists potentially provide with the requisite scientific expertise to develop and use CBRN weapons; (6) Overall mentality and incredible disrespect of human life already displayed in various ugly ways. The main conclusion is that the threat is real and need to be addressed seriously in order to avoid (the usual) future surprises!

### Short CV

BG (ret'd) Ioannis Galatas, MD, is a retired military physician with 35 years of military industry experience (Army Medical Corps). He is specialized in Allergy and Clinical Immunology (Board certified) and for more than two decades he served as Head of the Department of Allergy & Clinical Immunology at Army General Hospital of Athens, Greece. Since 2001 he has been involved in CBRNE operations as planner and instructor trained (including live agent training) in a number of countries abroad. During the 2004 Athens' Olympic Games, he served as Commandant of the Olympic Hospital CBRN Response Unit - the only hospital-based specialized unit (70 people) deployed for the Olympic & Paralympic Games. He holds a MA degree on "International Terrorism, Organized Crime and Global Security" from Coventry University, UK (2010) and he is a PhD candidate (Athens Medical School/Dept of Forensics & Toxicology). His last



(as of August 2010), was as Head of the Department of Asymmetric Threats at the Intelligence Analysis Branch, Joint Military Intelligence Service of the Hellenic National Defense General Staff. After retirement he conducted CBRNE classes for Abu Dhabi Police Authority and continues to participate as invited speaker in many CBRNE/security conferences, congresses and workshops around the globe. Currently he is the Editor-in-Chief of the monthly on-line "CBRNE Terrorism Newsletter" (<http://www.cbrne-terrorism-newsletter.com>) initiated in November 2005 and delivered freely to CBRNE-CT First Responders of more than 80 countries around the globe. He is also a CBRNE Research Associate at "Center for Security Studies" (KEMEA), Athens, Greece (under the Ministry of Public Order & Civil Protection) and a Research Associate at "National Nuclear Research Center Demokritos". As of January 2015, he is the Director of Courses at the University of Rome "Tor Vergata" for its "International CBRNE Masters" programs.

## Oral Contributions

# 09

### Proposal of an innovative International Training Curriculum for Advisors in Emergencies and CBRNe Events

*Maj. Andrea Gloria - NATO School, Germany*

#### Abstract

Complex emergencies are usually associated with extensive destruction of property and massive displacements of people; they are also accompanying with increases in morbidity, mortality and the potential for disease outbreaks is usually high. Furthermore, release of Toxic Industrial Materials (TIM) is a recurrent consequence of disasters. Emergencies and disasters can be associated with CBRNe events and it is extremely difficult to identify a complete list of all possible scenarios. An all hazard approach, that includes all types of threat irrespective of its origination, is the most effective. This proposal is aimed at creating an international training curriculum for advisors to increase the effectiveness for a prompt response to emergencies and disasters.

#### Short CV

Major Gloria's career is based on international exercises and activities and includes attendance at several international military courses focused on CBRN Defence. He took part in military operations in Iraq, Kosovo, Lebanon and Afghanistan. Major Gloria was appointed in September 2013 to the NATO School of Oberammergau (Germany) as CBRN Defence Course Director and Instructor.



# Oral Contributions

## 010

Selex ES CBRNe experience: the European project EDEN

*Dr. Eng. Massimo Piva - SELEX Land & Battlefield LoB, Italy*

### Abstract

CBRNe security has gained in the last years a high level of priority in the European Union. There has been a rise in accidental or deliberate CBRNe events, previously considered as low probability events, that might have a significant impact on citizens and society. The EDEN (End-user driven DEmo for cbrNe) Project is an EU collaborative project with the primary objective to provide solutions able to improve CBRNe resilience's capacity of the EU society. Selex ES, part of the EDEN consortium composed of end-users, researchers and industrial experts, brings to the EDEN project its long and successful history in applied R&D as well as its experience in design and implementation of highly innovative products, systems and solutions for security, defense and information technology.

### Short CV

Massimo PIVA received the doctor degree in electronic engineering from the University of Rome (I), Italy, in 1985. In 1986, he joined Selenia, now SELEX ES. Manager since 2003, today he is Senior Vice President of the Land and Battlefield Systems Line of Business of the Land and Naval Systems Division. The Unit has in charge the Italian contracts for the Army Digitalization of the Battlefield (Forza NEC), the Italian Coastal Surveillance Network, the Italian Forward Operating Base Protection, the Strategic C4I for Italian MoD and EU EEAS.





# Oral Contributions

## 011

Use of Toxic Industrial Chemicals as Chemical Weapons - a Threat? Case Study and investigative challenges - Syria

*Dr. Boban Cekovic - HZS, The Netherlands*

### Abstract

Quick outlines.

- 1) Overview of CW/TIC investigations in SAR and neighboring countries
- 2) TIC related threats
- 3) Lessons Learned from ongoing and recent investigations

### Short CV

Boban Cekovic, born 02 September 1972, is a graduate from the Serbian Military Academy (1st in generation), specialized in NBC Defense. He obtained Master of Technical Science Degree (2001) on Faculty of Technology and Metallurgy, Belgrade University, Serbia, on chemistry of organophosphorus compounds. He served as a NBC Defense decontamination platoon leader (from 1995); continuing research career (from 1999), working first as NBC Defense researcher, and then as Head of the Department for Decontamination and Detection Phenomena in Serbian Military Technical Institute, working also as Serbian National Authority Escort Team leader for receipt of Inspections from the Organization for Prohibition of Chemical Weapons (OPCW). Had about 25 domestic scientific reports on NBC decontamination and on CW Agents detection and water analysis, 10 scientific articles and several invited lectures on domestic/

international seminars, three scientific articles in international scientific publications, numerous SOPs, WIs and scientific/field trial standards and reports. Since 2006) he completed various postings with international organization - OPCW as Inspector (2006 - 2011) and Inspection Team Leader (ITL, 2011-2015), leading the Inspection Teams in Verification of Chemical Weapons (CW) Disarmament and control throughout the world. He also performed as OPCW Instructor for inspectors and OPCW Lead instructor (Level II Certified) for Non Destructive Evaluation (NDE) Specialists (since 2009); participated in development of standards in the area of CBRN Decontamination, NDE and Radiation Safety and he was Instructor in Live Agent Trainings for the OPCW (from 2008). Since December 2009 he was also performing the duties of Radiation Protection Supervisor (Level 4a) of the OPCW. As an ITL he got promoted (start of 2012) to a position of Head of Demilitarization Inspections, being responsible for coordination of all inspection teams performing CW disarmament verification activities. He continued providing training and occasionally led inspection teams on critical missions.

From November 2015, B. Cekovic started as full time System Integration Manager in Hotzone Solutions Group.



# Oral Contributions

## 012

OSINT to fight Terrorism

*Dr. Federico Sesler - CISINT, Italian Centre for Strategy and Intelligence, Italy*

### Abstract

Terrorism cannot be fought only by conventional means. Nowadays Open Source Intelligence operations have become a strategic asset in the process of sensitive information gathering. In fact, The Intelligence Community is more and more relying on what can be obtained by searching and collecting useful data from the Web. Still, a more scientific and effective approach to the procedure of information gathering is needed as Terrorism is a very complex phenomenon to understand and each of its categories requires specific approaches and methodologies of analysis. Moreover, awareness, precision and curiosity are three mandatory characteristics that any Intelligence Analyst should have in order to pursue effective assessments based on Open Source Intelligence Analysis.

### Short CV

President of CISINT, Italian Centre for Strategy and Intelligence. Senior OSINT Analyst and Researcher, graduated in Economics, holds a Second Level Master in "Intelligence and National Security" along with multiple specializations in Cyber Security, Open Source Intelligence, Terrorism and Counterterrorism. He worked Washington DC and Connecticut. He is coauthor of the book "Intelligence Problems e Perspectives in the 21st Century", published in 2011. He also published numerous articles related to National Security matters.



# Oral Contributions

## 013

CBRN Defence within the Framework Nations Concept  
*Lt. Col. Bernd Allert - German Armed Forces, Germany*

### Abstract

At 2014 NATO WALES SUMMIT NATO's HOSG have endorsed the NATO Framework Nations Concept. It focuses on groups of Allies coming together to work multi-nationally for the joint development of forces and capabilities required by the Alliance, facilitated by a framework nation. Its implementation will contribute to providing the Alliance with coherent sets of forces and capabilities, particularly in Europe. To implement this concept, a group of sixteen Nations, facilitated by Germany as a framework nation and focusing on capability development, have committed to working systematically together, deepening and intensifying their cooperation in the long term, to create, in various configurations, a number of multinational projects to address Alliance priority areas across a broad spectrum of capabilities. They will initially concentrate on creating coherent sets of capabilities among others in the area of chemical, biological, radiological and nuclear (CBRN) protection.

### Short CV

Bernd Allert joined the German CBRN Defence Corps in 1977. Since 2013, he has been working for the newly established Bundeswehr CBRN Defence Command within the Policy and Forces Development Division. He is responsible for standardisation and international cooperation. In addition, Allert works currently as the Acting Chairperson of NATO's Doctrine & Terminology Panel (DTP).

From 2008 to 2013, Allert had been assigned to NATO's Weapons of Mass Destruction Non-Proliferation Centre (WMDC). His areas of expertise covered CBRN defence training, civil-military cooperation and international outreach.

Prior to the NATO HQ assignment, he worked as a Deputy Force Protection Officer / Staff Officer CBRN Defence for Allied Component Command Headquarters Heidelberg (ALCC HQ). A seven-month tour as HQ ISAF's Deputy Theatre Force Protection Officer was included.





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# Abstract Poster Session

## P1

**Image computing techniques to extrapolate data for dust tracking in case of an experimental accident simulation in a nuclear fusion plant**

**M. Camplani<sup>1</sup>, A. Malizia<sup>2</sup>, M. Gelfusa<sup>2</sup>, F. Barbato<sup>2</sup>, L. Antonelli<sup>2,3</sup>, L.A. Poggi<sup>2</sup>, J.F. Ciparisse<sup>2</sup>, L. Salgado<sup>1,4</sup>, M. Richetta<sup>2</sup> and P. Gaudio<sup>2</sup>**

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<sup>3</sup>*Université Bordeaux 1, CNRS, CEA, CELIA (Centre Lasers Intenses et Applications), UMR 5107, F-33405 Talence, France*

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In this paper, a preliminary shadowgraph-based analysis of dust particles re-suspension due to loss of vacuum accident (LOVA) in ITER-like nuclear fusion reactors has been presented. Dust particles are produced through different mechanism in nuclear fusions devices, one of the main issues is that dust particles are capable of being re-suspended in case of events such as LOVA. Shadowgraph is based on an expanded collimated beam of light emitted by a laser or a lamp that emits light transversely compared to the flow field direction. In the STARDUST facility the dust moves in the flow and it causes variations of refractive index that can be detected by using a CCD camera. The STARDUST fast camera setup allows to detect and track dust particles moving in the vessel and then to obtain information about the velocity field of dust mobilized. In particular, the acquired images are processed such that per each frame the moving dust particles are detected by applying a background subtraction technique based on the Mixture of Gaussian algorithm. The obtained foreground masks are eventually filtered with morphological operations. Finally, a multi-object tracking algorithm is used to track the detected particles along the experiment. For each particle a Kalman filter-based tracker is applied; the particles dynamic is described by taking into account position, velocity and acceleration as state variable. The results demonstrate that it is possible to obtain dust particles velocity field during LOVA by automatically processing the data obtained with the shadowgraph approach.

# Abstract Poster Session

## P2

**SAFETY BOX: Design and prototyping of electronic device, that have a radio system for data "Remoting" and integrating sensors of different nature such as: - Position-Temperature- respirator pressure- radiological.**

**P.C. Aspetti<sup>1</sup>, R. Moscatelli<sup>2</sup> and R. Carcano<sup>1</sup>**

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<sup>2</sup>*DPI, Italy*

The Poster will describe the design and the features of a device, that will support First-responder or emergency operators that will be working in areas of risk, called SAFETY BOX. Scenarios can be various. It can be a CBRNe incident or a fire/environmental disaster. The device is a sensor platform that transmit data to a remote central unit. It is modular and easy to program. There is an unique operator identification via RF antenna. The versatile platform allows implementation of Wireless Sensor Network, from Smart environmental detection to Smart evacuation solutions. The system will be designed so as to be small in size and easy to use. Depending on the demands of the end user can be "tailed " in different ways. The device will be able to handle various sensors such as: Pressure air, temperature and radiological, operator location, physiological parameters, thermal flash and movement sensor. The main advantages are: 1. Versatility, it can be used in many emergency scenarios. 2. Small size / Ergonomics, it is very robust (military application) 3. Ultra-low power consumption, the components used are optimized to reduce the power consumption and there are special algorithms that optimize the consumptions. 4. Automatic operation via pressure sensor, the device is thought to allow the operator to use both hands. 5. State of the art communication systems. The protocols used are very robust, adaptable, scaling, energy saving, reliable, and safe. ATEX complied. The system can be used in a very harsh environment. The system is provider of a GUI (Graphic User Interface). The software is interactive, easy understood and very friendly for the operator.

# Abstract Poster Session

## P3

### Testing the accuracy ratio of the Spatio-Temporal Epidemiological Modeler (STEM) through Ebola Hemorrhagic Fever (EHF) outbreaks

**F. Baldassi<sup>1,2</sup>, F. D'Amico<sup>1,2</sup>, M. Carestia<sup>2,3</sup>, O. Cenciarelli<sup>2</sup>, S. Mancinelli<sup>2,4</sup>, F. Gilardi<sup>2,4</sup>, A. Malizia<sup>2,3</sup>, D. Di Giovanni<sup>2,3</sup>, P. M. Soave<sup>2,5</sup>, C. Bellecci<sup>2,3</sup>, P. Gaudio<sup>2,3</sup> and L. Palombi<sup>2,4</sup>**

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Mathematical modeling is an important tool for understanding the dynamics of the spread of infectious diseases, which could be the result of a natural outbreak or of the intentional release of pathogenic biological agents (BAs). Decision makers and policymakers responsible for strategies to contain disease, prevent epidemics and fight possible bioterrorism attacks, need accurate computational tools, based on mathematical modeling, for preventing or even managing these complex situations. In this work, the authors tested the validity, and demonstrate the reliability, of an open-source software, the Spatio-Temporal Epidemiological Modeler (STEM), designed to help scientists and public health officials to evaluate and create models of emerging infectious diseases, analyzing three real cases of Ebola Hemorrhagic Fever (EHF) outbreaks. The authors will discuss the cases analyzed through the simulations results obtained with STEM in order to demonstrate the capability of this software to be a proper suite in case of biological emergencies helping the decision makers to plan the interventions. In particular, the authors' approach consisted in the initial assessment of the validity of the software through a benchmark between simulations and epidemiological data from the past Uganda EHF outbreak (2000, Ebola-Sudan SEBOV strain). After that, the authors applied the epidemiological data from another well known EHF outbreak occurred in Zaire in 1995 (Ebola-Zaire ZEBOV strain), and they further evaluated the software as tool to simulate the development and evolution of two real EHF outbreak due to ZEBOV strain, Gabon (2001) and the recent Guinea (2014).

# Abstract Poster Session

## P4

### CRN effects on human beings: developing a tool for first responders

**R. Brancaleoni<sup>1</sup>, P.M. Soave<sup>2</sup>, L. Marchesi<sup>1</sup>, D. Gui<sup>1</sup>, S. Magalini<sup>1</sup>, M. Bernassola<sup>1</sup>**

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The rescuers deployed in the red zone during a CRN event are non-medical personnel. First responders have several problems in the recognition of the toxidromes, triaging casualties, understanding English language. The background led the authors to do a research among the first responders to understand which are their needs. Rescuers from various groups such as firefighters, soldiers, international security agencies, emergency health workers, and countries were interviewed during EDEN project demos. We created a website, with an adjustable view for smartphone and tablet. Its database came from a multiple sources and the information are validated by a toxicologist. This website [hazmat-eden.eu](http://hazmat-eden.eu) was thought as a flexible, simple and light tool useful for everyone who is involved in CRN event. The tool was presented during an EDEN demo and it has been successful. Many partners still contact us to improve this website. In our opinion this tool can be a rapid and reliable way to have information during a CRN event. Now we are still improving the tool, in cooperation with EDEN partners and national rescuers, hopefully it will remain an open repository to address any necessity of first responders.



# Abstract Poster Session

## P5

### Bioterrorism or natural outbreak? Validation of a discriminative method applied to a real event

**M.S. Britti**<sup>1,2</sup>, **M. Paziienza**<sup>1,2</sup>, **M. Carestia**<sup>2,3</sup>, **O. Cenciarelli**<sup>2</sup>, **F. D'Amico**<sup>1,2</sup>, **A. Malizia**<sup>2,3</sup>, **R. Fiorito**<sup>2,3</sup>, **C. Bellecci**<sup>2,3</sup> and **P. Gaudio**<sup>2,3</sup>.

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International terrorism at this time, represents a world-wide impact issue. Particular importance in the CBRN terroristic scenario must be given to the biological one, which takes place using biological weapons: i.e. one or more biological warfare agents plus a spreading mean. Moreover, natural outbreaks of re-emergent viral and bacterial strains increased in the last few years, raising suspects on possible terroristic deliberate spreading. The ability of discriminating between natural outbreaks and terroristic deliberate spreading is definitely necessary in order to prepare proper countermeasures according to the different kinds of events. The task of this work is to validate an investigative approach through its application to an epidemical event which really occurred working backwards through some indicators. As case study we chose the *Escherichia coli* outbreak occurred in Germany in 2011 because of a series of particular aspects which may suggest a terroristic nature: i.e. rapid outbreak, rare serotype, antibiotic multiresistence. Our results excluded the terroristic spread but highlighted all the ambiguous aspects which suggested anthropic suspect, defined as doubt the origin of this epidemic. The crucial innovation of this method is to provide clear indication in order to analyze a suspect epidemic. The use of this method in large scale could unify the procedures used to identify bioterroristic attack worldwide, with consequent simplification in communications and quickness in emergency response.

# Abstract Poster Session

## P6

### The Italian CBRN DET ITA 1 Module: an application of a “best practice”

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Each Member State recently has identified, within their civil protection services, intervention teams, now known as "modules", that may be available at very short notice and be sent and coordinated by the European Civil Protection Mechanism under the Commission, to places affected by an emergency. A module is "a combination of human and material resources suitable for the contrast of a determined and precise scenario" In the Decision 2010/481/EU it is described the characteristics and requirements of the modules such as tasks, skills, components, and deployment time, and level of autonomy and interoperability. The civil protection modules are defined on a voluntary basis through the use of national resources from one or more Member States, and must be able to operate autonomously for a determined period of time, which varies depending on the type of intervention or the type the interested module, thus providing the rapid response capability in the occurring emergency. The activation system triggers always from a request for assistance from the stricken country in accordance with the principle of subsidiary. Any Member State having registered modules into the Mechanism must inform and update the Commission on the resources available in an ongoing emergency. The CBRN DET ITA 1 Module presents capabilities and detection equipment tested, at a first stage in 2011, during the “OPCW Assistex 3” (Tunisia) exercise and later, with some adjustments, during two CBRN international exercise. The module is able to perform additional tasks like dangerous liquid transfer from damaged vessels to safe and emergency vessels and chemical and radiological remote monitoring and identification.

# Abstract Poster Session

## P7

### Fluorescence measurements for the identification of Biological Agents

**M. Carestia<sup>1</sup>, R. Pizzoferrato<sup>1</sup>, O. Cenciarelli<sup>1</sup>, F. D' Amico<sup>1</sup>, A. Malizia<sup>1</sup>, M. Gelfusa<sup>1</sup>, D. Scarpellini<sup>1</sup> and P. Gaudio<sup>1</sup>**

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The use of biological weapons represents a great concern both from a military and civilian point of view. The early detection of biological warfare agents (BWAs) in atmosphere is a huge challenge that could be addressed through UV-LIF (Ultra Violet Laser Induced Fluorescence) techniques. Fluorescence measurements of aerosol particles can provide gross discrimination between bio-agents and atmospheric background particles, In this work we intend to investigate the capability of discriminating among different biological warfare agents (BWA) through the analysis of the optical emission spectra. To accomplish this task, a deep knowledge of fluorescence features with different boundary conditions is required, in order to create a database of comparable spectral fingerprints. Preliminary results, obtained through a laboratory setup with a standard UV lamp source, showed that significant differences can be appreciated among BWAs simulants' spectra. This represents a first step towards the implementation of a spectral database and a laser-based biological stand-off identification technique.

# Abstract Poster Session

## P8

Using free license codes to simulate the diffusion of contaminants in case of radiological release

**P. Gaudio<sup>1</sup>, M. Carestia<sup>1</sup>, A. Malizia<sup>1</sup>, M. Gelfusa<sup>1</sup>, I. Lupelli<sup>1</sup>, L. Antonelli<sup>1</sup>, F. Conetta<sup>1</sup>, E. Peluso<sup>1</sup>, O. Barlascini<sup>1</sup>, G. Latini<sup>2</sup>, E. Fiorini<sup>1</sup>, P.M. Soave<sup>3</sup>, C. Bellecci<sup>1</sup> and M. Richetta<sup>1</sup>**

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The radiological risk is inherent to a wide range of activities, beginning with the medical and military ones and including those connected to the industry and research such as nuclear fusion. A valid tool to predict the consequences of accidents and reduce their risk consists in computing systems that allow modeling the evolution of a possible release of radioactive materials. In addition to proprietary codes there are free license codes, such as Hot-Spot, which allow providing a set of tools to simulate diffusion in case of accidents involving radioactive materials and to analyze the safety and security of the facilities in which the radioactive material is manipulated, used or stored. In this paper, the authors simulate an accident of a plant for reprocessing radioactive fuel and compare the numerical data with experimental ones measured in-situ and published by the IAEA in the report "The radiological accident in the reprocessing plant at Tomsk". The code, validated with data measured in situ, has been used to simulate a diffusion of radiological contaminants in a nuclear fusion experiment and the results are presented. The aim of this work is to demonstrate the capability of free license codes to model the radiological diffusion in case of accidents in order to guarantee the safety of people and operators and the security of the plants. Both are critical issues for the development of nuclear fusion plants like ITER.



# Abstract Poster Session

## P9

Italian Joint CBRN School

G. Carminati

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The Italian Joint CBRN School, in Rieti, it's the school for CBRN qualification of Armed Forces personnel, as well as any Corps, Administrations and Agencies involved in CBRN defence. Other duties related to the School concerned CBRN defence are: proficiency evaluation of Military Units; supporting tests of new equipment/materiel; writing directives or operating procedures related to CBRN defence; coordination of CBRN activities (studies, research, etc.); assessments and consultancy on national and international CBRN documents; participation with its personnel at NATO and international Working Groups. This year the School have received NATO certification regarding SIBCRA Course (Sampling Identification Bio, Chem and Rad Agents) and it has also conducted support of OPCW Inspectors training activities conducted in the training area NUBICH.

# Abstract Poster Session

## P10

A novel approach to set up a quasi real-time biological agents detection system

M. Carestia<sup>1</sup>, R. Pizzoferrato<sup>1</sup>, O. Cenciarelli<sup>1</sup>, A. Malizia<sup>1</sup>, M. Gelfusa<sup>1</sup>, E. Peluso<sup>1</sup>,  
M. Lungaroni<sup>1</sup>, A. Murari<sup>2</sup>, D. Di Giovanni<sup>1</sup> and P. Gaudio<sup>1</sup>

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Bio-security and bio-safety are two key concepts in the CBRNe scenarios. Reduce the risks related to the use of biological agents in civil or military or terroristic actions is a must for the expert. The detection and identification of biological agents is a discipline studied trough the years but the challenge today is develop a quasi-real time stand-off detection system able to detect a potential bio contamination at short-middle range. One of the most promising approach to achieve this goal is the use optical apparatus. Biological samples can be analyzed by means of several optical techniques, covering a broad region of the electromagnetic spectrum. Strong evidence proved that the informative content of fluorescence spectra could provide good preliminary discrimination among those agents and it can also be obtained through stand-off measurements. Such a system necessitates a database and a mathematical method for the discrimination of the spectral signatures.

# Abstract Poster Session

## P11

**CBRNe First Responder. The Application in Prevention Activities: The OSCE example. An Opportunity of Personal and Professional Growth**

**A. Ciani<sup>1</sup> and V. Trombadore<sup>1,2</sup>**

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The thesis, which comes at the end of the course, is intended to highlight the possibility that international organizations and other institutions could offer in view of its activities, emphasizing above all that turns around the concept of prevention. In cooperation with the OSCE, partner of the master, I shall produce a link between the rules and bodies dedicated of the organization and the techniques acquired during the master modules and encoded by NATO. The relevance of international character will guide and support the internal context; for the Italian police forces the concept of prevention is already as important in planning as to achieve the goals. The right emphasis on the practical experience conducted by the attending will be told because passage of the training and special characteristic of the master. In conclusion, this paper aims to be a guide to some of the lessons learned and what was experienced under CBRN, in terms of opportunities for personal, cultural and professional growth.

# Abstract Poster Session

## P12

**3D numerical simulations to validate the first experimental measurements during a LOVA reproduction inside the new facility STARDUST-UPGRADE**

**J.-F.Ciparisse<sup>1</sup>, A. Malizia<sup>1</sup>, L.A. Poggi<sup>1</sup>, M. Gelfusa<sup>1</sup>, A. Murari<sup>2</sup>, A. Mancini<sup>1</sup> and P. Gaudio<sup>1</sup>**

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The aim of this work is to simulate a Loss of Vacuum Accident (LOVA) in the STARDUST (Small Tank for Aerosol Removal and DUST)-UPGRADE facility. These events are one of the major safety concerns in Tokamaks, since they can cause the mobilization and the dispersion of radioactive dust contained in a fusion reactor. The first step in the study of a LOVA event is the estimation, by means of numerical simulations, of the pressurization transient in the vacuum chamber. The STARDUST-UPGRADE facility, which has a cylindrical shape, is considered as a case study. An air inlet is located in a radial position with respect to the facility, so the numerical domain is symmetric and, therefore, only a half of it has been considered in the simulation. A time-dependent mass flow rate is imposed at the inlet, in a range consistent with experimental estimates. The simulation takes 20 seconds and the attention is focused on the mean pressure value over time and on the Mach number distribution. The results are presented and discussed in the perspective of simulating LOVAs in ITER (International Thermonuclear Experimental Reactor).

# Abstract Poster Session

## P13

### Psychological health after CBRNe event

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Disasters are characterized by their sudden and unpredictable onset, widespread human, material, economic and/or environmental losses and the inability of the affected community or society to cope with it (United Nations, International Strategy for Disaster Reduction). They affect individuals (e.g. children, parents, first responders), specific organizations that have to respond to the disaster (e.g. medical emergency teams, public health organizations, fire brigades) and the community at large. Disasters are associated with a substantial psychological burden for affected people. Although most people are resilient and recover on their own merit, an important minority suffers from long-term mental health disturbances. Psychosocial care aims to address mental health problems and needs. It covers all the support and care directed at the psychological well-being and health of people affected during and after an event targeted at communities as well as individuals. Psychosocial care interventions are needed in the context of disasters or crises, especially in case of chemical, biological, radiological or nuclear (CBRN) events.



# Abstract Poster Session

## P14

### Biological dual-use research

**A. Cirigliano<sup>1</sup> and T. Rinaldi<sup>1,2</sup>**

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In recent years, the publication of the studies on transmissibility in mammals of H5N1 influenza virus and synthetic genomes, has triggered heated and concerned debate on biological *dual-use* research within the scientific community; these papers have raised the awareness that in some cases fundamental research could be diverted to harmful experiments with bioterrorism purposes. We presented an overview of the *dual-use* concept and related international agreements, underlining the work of the *Export Control Regimes* on preventing proliferation of chemical, biological, radiological, nuclear (CBRN) weapons of mass destruction and destabilizing accumulations of conventional arms. In particular, it is hoped that the principles and activities of the *Australia Group* (AG), which focuses on chemical and biological *dual-use* materials export control, reach and become well known to the academic researchers from different countries, since they exchange biological materials (i.e. plasmids, strains, antibodies, nucleic acids) and scientific papers. To this extent and with the aim to draw the attention of the yeast scientific community on the so called *Dual-Use Research of Concern* (DURC), this work reports also the case studies on biological *dual-use* research on the first eukaryotic yeast synthetic chromosome and use of yeast cells as a factory to produce opiates from the common and harmless yeast *Saccharomyces cerevisiae*.

# Abstract Poster Session

## P15

### **CBRN Defense: Specialist and Technical Units and their Task and Capabilities**

**M. Colombi, L. Dell'Orco and F. Benigni**

*Italian Army*

*International CBNRe Master Courses*

In accordance with NATO CBRN defense principles, fundamentals and components, the “7th CBRN Defense regiment” is a high readiness unit capable of supporting national, NATO, European union or other coalition of the willing operations. The level of readiness and the structure also depend on assigned missions. Hence the principle of tailored mission-specific forces, the regiment is able to deploy and conduct operations from team to regiment level. In addition Italian army has the “Joint Technical Logistic CBRN Center” specialized in the CBRN field, in particular in studies and experimentations to support the Army Logistic Command.

# Abstract Poster Session

## P16

### The International Response System in case of CBRN emergencies: EU and NATO between deployable capacities and new developments

**S. Corrao and F. Priori**

*Ministry of Home Affairs, National Fire and Rescue Service*

This paper, starting introducing the features of the European Civil Protection Mechanism through the ERCC and the NATO response system to natural and technological disasters through the EADRCC, aims to analyze the current state of the Italian protection and defense system and highlight what opportunities are needed to process a coordinated and comprehensive planning of a "Smart Response". Unavoidable premises confirm that, nowadays, the evolution of international relations between States and supranational organizations fully involves also the field of management of major disasters also in case of CBRN events. Moreover, a joint and coordinated action both in Italy and abroad must be considered representing a necessary method to operate in a global context. In fact, from one side new "modus operandi" where concepts like "capacities cooperation" and "remote support" (Reach Back, Advisory Group, etc...), typically in use in NATO and from the other, the "modules" approach of the Mechanism and the RRC - Rapid Response Capability, may, however, be a valuable resource in situations of austerity that currently involves some NATO and EU countries. All these resources, in conclusion, are processed and facilitated in close contact with the Office for the Coordination of Humanitarian Affairs (UN OCHA), establishing an OSOCC, this representing an useful operational and coordination tool for both these systems.

# Abstract Poster Session

## P17

### LiDAR technology

M.C. D'Auria

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One of the most challenging issue during a CBRNe event is the detection of the agent involved in the incident, independently if the dispersion is caused by the human hand or is the tragic consequence of a natural disaster. Being able to detect an agent in the atmosphere mean a quicker response to the crisis and allow the operator on the field to be better prepared to face the menace and to evacuate the area where the contamination happened. Especially in case of a terroristic attack or warfare use, CBRNe agents are more commonly delivered in the air, using systems that have four major components: payload (the chemical agent, often with a solvent or carrier chemical depending on the agent), ammunition (container that keeps payload intact during delivery), delivery system (missile, artillery shell, aircraft, UAV, etc.), dispersal mechanism (an explosive force or spray generator to dispense the agent into the air, where it can reach the target population). LiDAR can be use with proficiency for the detection of accidental o intentional release of chemical (C) and biologic (B) agents dispersed in the atmosphere.

Focus of this work will be about the LiDAR technology explanation and how it is used to scan the atmosphere. LiDAR technology is based on the transmission of laser pulses and on the analysis of the return signal. The light emitted by the laser interacts with the particles present on various layers of the atmosphere, or can be absorbed or scattered according to the variation of Physical Characteristics of particles, which can be molecules or aerosols.

LiDAR is a highly sensitive tool to detect the low concentration of various C and B agents present in the form of thin clouds in the low Atmosphere.

# Abstract Poster Session

## P18

Free license codes to determine radiological contamination: 2 case studies

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This work has been developed to determine proper analytical support instruments in order to improve emergency operation systems in case of radiological contamination. The case studies analyzed are in reference to: An experimental nuclear fission power plant in Italy (the information about the name and location of this plant has been omitted for safety reasons); A generic deposit of radiological materials. The accidental event's consequences has been simulated using a free licensed software, HotSpot and a software for the radiological diffusion developed by the authors in collaboration with Italian Fire Brigades. The simulation results (for areas classified with respect to limits on effective dose) has been used as input in the development, through the use of the GeoMedia GIS software, of a vulnerability model that takes into account the spatial distribution of the population in the area affected by the event. In the context of emergency management, such instruments should be integrated with the systems of command & control centers for crisis management and the emergency operation centre (EOC), and made available to the entire chain of emergency management, including the field teams with handheld terminals. The authors will present the software developed, all the results obtained and the possible applications.



# Abstract Poster Session

## P19

### Food safety and biological risk: potential use of food for dissemination or biological threat

**M. Di Giacinto<sup>1</sup>, A. Malizia<sup>1,2</sup>, O. Cenciarelli<sup>1,2</sup>**

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Can be correlated CBRNe events and food? In particular the study addresses issues related to biological risk as a hazard to food and then for the people who every day have the opportunity to find increasingly international dishes and products. Traditions but with raw materials more and more exposed to the risk because they are more subject to processing, a raw material that even though traditional, is produced and imported, or exported to other countries with more requests. We tried to understand if food production increasingly important, in terms of quantity, quality and thus may face if it can create danger and how; if today is possible compare and control the current productions. Population in the world is increasing, but there are people belonging to underdeveloped states and people belonging to industrialized countries; in both cases these are exposed to the same biohazard from food, but the problems to solve are different and obviously much more serious in countries where there are serious deficiencies in the hygiene and public health, and we can't longer think a state that is not our should not be in the public interest. Doing a review of food-borne diseases through the United States, comparing the incidence of the late 90's with the years 2011 and coming years in our Europe, 2010-2013, we will also analyze specific case studies to understand how, through monitoring systems, preventive measures, approved bodies and good organization, be able at least to limit the cases: Hepatitis A with berries, Salmonella contaminating eggs and meat, BSE and meat, Sprouts and STEC. The work focuses on the controls performed on the Italian territory throughout the food chain. We discuss the legislative references and the related European and essential European System of Allert, RASFF, authorities and offices involved in the controls and their management.

# Abstract Poster Session

## P20

### Controlling Growth of Zn/Al-Double Layered Hydroxide Nanosheets by Combining Physical and Chemical Techniques

**L. Di Gianberardino<sup>1</sup>, D. Scarpellini<sup>1</sup>, L. Antonelli<sup>1</sup>, F. Conetta<sup>1</sup>, A. Ermini<sup>1</sup>, C. Falconi<sup>2</sup>, P. Gaudio<sup>1</sup>, M. Gelfusa<sup>1</sup>, A. Malizia<sup>1</sup>, A. Mattoccia<sup>1</sup>, A. Orsini<sup>2</sup>, E. Peluso<sup>1</sup>, M. Richetta<sup>1</sup>, C. Bellecci<sup>1</sup> and P.G. Medaglia<sup>1</sup>**

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Layered double hydroxides (LDHs), also known as hydrotalcite-like compounds or anionic clays, are a class of important lamellar materials. They are described by the general formula  $[M^{II}_{1-x}M^{III}_x(OH)_2]^{x+}[A^{m-}]_{x/m} \cdot nH_2O$  where  $M^{II}$  and  $M^{III}$  represent metallic cations and  $A^{m-}$  the interlayer anion. The layered structure of the LDH can be engineered by the periodic stacking of positively charged  $(M^{II}, M^{III})(OH)_2$  octahedral layers related to brucite, balanced by interlayer anions and water molecules that bind the sheets together. LDHs have gained much attention because of their wide applications as catalysts, acid absorbents, anion exchangers, electrochemical biosensors, carriers for cellular drug/gene delivery, and so on. In our laboratory, Zn/Al LDH have been manufactured combining thin film metal deposition and successive hydrothermal growth. In particular, by depositing patterned aluminum films on silicon substrates and, subsequently, exposing the substrates to zinc-nitrate nutrient solutions, we have demonstrated a sub-metric controlled growth of LDH nanosheets. Moreover, the lateral thickness of LDH nanosheets and their nanostructure are correlated both to the thickness of the pre-patterned Aluminum-coated thin film and the growth temperature. Zn/Al LDH thin films have been structurally and morphologically characterized by X-Ray diffraction (XRD), Energy Dispersive X-ray Spectroscopy (EDS), Photoluminescence measurements (PL) and electrical transport properties measurements. Imaging and morphological investigations were performed by Scanning Electron Microscope (SEM).

# Abstract Poster Session

## P21

### GAp Tool for Evaluation (G.A.T.E) of CBRNe Drills, Table Top Exercises and Full Scale Exercises

**D. Di Giovanni<sup>3</sup>, I. Cacciotti<sup>1,2</sup>, A. Pergolini<sup>3</sup>, A. Malizia<sup>3</sup>, M. Carestia<sup>3</sup>, O. Cenciarelli<sup>3</sup>, L. Palombi<sup>4</sup>, C. Bellecci<sup>3</sup> and P. Gaudio<sup>3</sup>**

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A tool for gap analysis ("GATE", Gap Analysis for TTX Evaluation) was developed to provide a complete, systematic and objective evaluation of several types of exercises organized in CBRNe fields but applicable to different scientific, economic, legal, medical, industrial, political and social activities. In this work the authors will present the application of GATE to a Table Top Exercise (TTX). TTX consist in discussion-based emergency management exercises, organized in a simulated emergency scenario, involving groups of players who are subjected to a set of solicitations ('injects'), in order to evaluate their emergency response abilities. This kind of exercise aim is at identifying strengths and shortfalls and to identify and propose potential and promising changes in the approach to a particular situation. This tool, "GATE", support the management and the analysis of TTX's outputs, and it allows to identify the 'gap' in term o preparedness and specific areas and actions to improve. The results coming from "GATE" will be discussed and analyzed by the authors.

# Abstract Poster Session

## P22

### The role of communication

L. Di Persio

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Transferring information from one place to another is simple acts that represent the “communication”, this is a simple definition but when we think about how we communicate the subject become more complex. There are various types of communication and more than one may occur at any time. In a general view, categories of communication are: Verbal communication (or spoken) - Non-verbal communication - Written communication - Visualizations.

It’s difficult to imagine a profession that doesn’t require you to interact with other people. Interpersonal communication is a process that cannot be observed as something that simply “happens”, but should be seen as a process which involves participants negotiating (consciously or unconsciously) their role in this process.

We can talk about interpersonal communication in a presence of a senders and receivers, for example in a face-to-face communications the roles of the sender receiver are not distinct as both parties communicate with each other, even if in very subtle ways such a through eye-contact (or lack of) and general body language. There are many other subtle ways that we communicate (even unintentionally) with others, for example the tone of our voice can give evidence of our mood or emotional state, as well hand signals or gestures can add to a spoken message.

The Communication Process: The sender, send a message or communication through a communication channel to a receiver, or to multiple receivers. The sender must encode the message (the information being conveyed) into a form that is appropriate to the communication channel, and the receiver(s) then decodes the message to understand its meaning and significance. Misunderstanding can occur at any stage of the communication process in a particular way during the decoding process (asymmetry of decoding).

# Abstract Poster Session

## P23

### Improving the CBRN resilience by developing the interoperability and the human dimension of security

ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic, A. Rizzo<sup>1</sup>, P. Parente<sup>2</sup>, R. Pergreffi<sup>1</sup>, R. Lorenzelli<sup>2</sup>, S. Salvi<sup>2</sup>, P. Bartolomei<sup>1</sup>, F. Padoani<sup>1</sup>

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The accidental or deliberate release of CBRNE materials are low probability events that can have a significant impact on citizens and society. Successful CBRNE resilience requires a global System-of-Systems approach. The development of innovative technologies to detect and deter malevolent use of chemicals agents and the understanding of the human dimension of the safety and security of chemicals has been addressed by focused R&D activities at ENEA, which commitment in chemical safety and security will be presented through two target projects: FP7 EU Collaborative project EDEN - “End-user driven DEmo for cbrNe” and the project IfS-31 - “Network of Universities and Institutes for Raising Awareness on Dual-use Concerns of Chemical Materials”. The EDEN project objective is to improve CBRNE resilience through the adaptation and integration of existing and developing systems, providing a “toolbox of toolboxes” to give stakeholders access to interoperable capabilities. Within EDEN project ENEA has developed an innovative system for the detection of explosives in suspected objects by coupling neutron activation techniques and gamma spectrometry, that has been demonstrated at ENEA premises in Frascati to the interested stakeholders. As the origin of any security event, whether malicious or not, can ultimately be tracked down to the human factor, security culture and human resource development are essential components of an effective security regime and its sustainability. ENEA has coordinated an European project, “Network of Universities and Institutes for Raising Awareness on Dual-use Concerns of Chemical Materials”, within the EU CBRN Centre of Excellence initiative, to enhance awareness and education concerning the misuse of Chemicals of Concern, knowledge, technologies and information. As the human dimension is essential to create a first barrier against the misuse of technologies and agents, a wide international network has been created and specific training modules have been developed and delivered to target groups in several non EU countries, to contribute to an effective and sustainable security regimes.



# Abstract Poster Session

## P24

### Environmental effects after flooding in Italy: analysis and proposal of action

M.G. Farrace and F. Galeotti

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Chemical, biological, radiological and nuclear defense is a protective measure taken in situations in which any of these four hazards are present.

It can be an hazard also a natural disaster, as a flooding, that causes widespread destruction, lots of collateral damages or loss of life, brought about by forces other than the acts of human beings. The main objective of this research was to gain an overview of the environmental consequences that a flood might bring to society and nature, looking at analysis, gaps and proposal to solve flooding. The study was deepened studying literature references and bibliography as well as looking at real emergency experiences occurred in some Italian regions. Starting from true events, flood event in Piemonte, Liguria, Emilia, Toscana in November 2014, will be made an environmental action strategy for assessment and characterization method for flood waste. It has been reported guideline given by the National Research Council - Institute for Water Research Institute (IRSA) for the emergency management of waste water plans, with a case study on waste water plants of Cesena. Finally, it was mentioned on the management of human remains in emergency for which are under study and drafting guidelines and ad hoc legislation.

# Abstract Poster Session

## P25

### Viral bioterrorism: Learning the lesson of Ebola virus in West Africa 2013-2015

**V. Gabbarini<sup>1,2</sup>, O. Cenciarelli<sup>1,2</sup>, S. Pietropaoli<sup>3</sup>, A. Malizia<sup>1,2</sup>, A. Tamburrini<sup>2</sup>, G.M. Ludovici<sup>2</sup>, M. Carestia<sup>1,2</sup>, D. Di Giovanni<sup>1,2</sup>, A. Sassolini<sup>1,2</sup>, L. Palombi<sup>2,4</sup>, C. Bellecci<sup>1,2</sup> and P. Gaudio<sup>1,2</sup>**

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Among the potential biological agents suitable as a weapon, Ebola virus represents a major concern. Classified as Biological Level 4 (BSL4) agent by Health and Safety Executive (HSE) and as Category A biological warfare agent by the Centers for Disease Control and Prevention (CDC), Ebola virus causes severe hemorrhagic fever, characterized by high case-fatality rate: to date, no vaccine or approved therapy is available. The EVD epidemic, which broke out in West Africa since the late 2013, has got the issue of the possible use of Ebola virus as BWA to come to the fore once again. The involvement of urban areas has made the risk of uncontrolled spread a real trouble. Its use as biological agent by terrorist groups with offensive purpose could have serious repercussions from a psychosocial point of view as well as on closely sanitary level, with a destructive impact that goes beyond health issues, affecting the stability of one or more nations. The real threat of a large-scale bioterrorist attack makes the defense against bioweapons a priority in terms of security. The study of EVD outbreak in West Africa 2013-2015 can provide essential information to design security protocols and possible infection scenarios in order to react properly to a possible intentional release of weaponized virus form in non-endemic areas during a bioterrorist attack.

# Abstract Poster Session

## P26

### Use of Non-Pathogenic Biological agents as Biological Weapons simulants for the development of a stand-off detection system

O. Cenciarelli<sup>1,2</sup>, S. Pietropaoli<sup>3</sup>, V. Gabbarini<sup>2</sup>, M. Carestia<sup>1,2</sup>, F. D'Amico<sup>1,2</sup>, A. Malizia<sup>1,2</sup>, R. Pizzoferrato<sup>1</sup>, A. Sassolini<sup>1,2</sup>, D. Di Giovanni<sup>1,2</sup>, F.M. Orecchio<sup>2</sup>, and L. Palombi<sup>2,4</sup>, C. Bellecci<sup>1,2</sup>, P. Gaudio<sup>1,2</sup>

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Development of new technologies for Biological Warfare Agents (BWA) stand-off detection implies several safeties, logistic and economic drawbacks that involve production of different highly virulent bacteria and viruses, their isolation and characterization under adequate bio-containment and sample preparation for each agent to evaluate the testing method. In order to overcome these difficulties most of the research activities and tests reported so far, are performed using simulants: Biological Agents (BA) which are phylogenetically or structurally related to BWA. Stand-off detection and warning of BWA release represent the main goal to be achieved in order to reduce the biological threat and the risk for population. These detection systems allows to analyze samples remotely, thus making possible an early identification of the contamination source. Preliminary studies carried out using UV-LIF technique show promising results for the detection and discrimination of biological particles, thanks to the presence of endogenous fluorophores, which are able to emit fluorescence when excited at specific wavelengths in the UV range. The use of the simulants (BWA-S) show, however, some limitations: they can share some of the properties of the biological warfare agents but have different antigens, proteome and genome. In this work, different BWA-S was evaluated for the application in the development and training of stand-off detection systems. This study is the basis for the use of simulants in the development of an Ultraviolet Laser Induced Fluorescence (UV-LIF) based detection systems.

Contact author: Jessica Gabriele

# Abstract Poster Session

## P27

**Radioattività: Un manuale per i First Responder**

**R. Gallo**

*Funzionario del Comando Provinciale VVF di Matera*

A nessun livello si può pensare di poter affrontare il rischio “CBRN” senza avere una adeguata conoscenza della materia. Pensato per i “first responder” il volume, facente parte della collana “CBRNe Book Series” della Aracne Editrice, affronta in particolare il pericolo radiologico. Si tratta di un rischio che può manifestarsi tanto nell’ambito della difesa civile, in caso di attentato terroristico, che in quello più tipicamente di protezione civile, nel caso di incidente coinvolgente sorgenti radioattive.

Se in quest’ultimo caso è plausibile che chi interviene abbia notizia in anticipo della presenza di tale sostanze, lo stesso non è possibile nel caso di utilizzo in un attacco terroristico. Questo, data la “invisibilità” ai sensi umani delle radiazioni, potrebbe portare ad una non corretta valutazione dell’evento, con conseguente assunzione di dosi da parte dei soccorritori e della popolazione. Solo un’accurata analisi dell’evento terroristico e il corretto uso di idonea strumentazione può permettere di escludere o confermare la presenza di sorgenti radioattive. La conoscenza delle misure di radioprotezione potrà poi garantire la sicurezza tanto dei soccorritori che della popolazione.

Con l’obiettivo di essere un utile strumento per la preparazione dei “first responder”, il testo affronta tanto aspetti più teorici, quali la definizione delle principali grandezze radiologiche (di sorgente, di campo, di dose) e l’interazione delle radiazioni con la materia, che altri più pratici quali la radioprotezione, la dosimetria, i rilevatori attivi e passivi, la contaminazione ed il trasporto delle materie radioattive.

Il percorso di apprendimento è sostenuto dalla presenza di oltre 60 esercizi svolti e di oltre 120 immagini.

## Abstract Poster Session

### P28

The world of research working on CBRNe problems: laser remote sensing systems for CWA, TICs and TIMs detection and identification

**P. Gaudio**<sup>1,2</sup>, **A. Malizia**<sup>1,2</sup>, **M. Gelfusa**<sup>1,2</sup>, **S. Parracino**<sup>1,2</sup>, **D. Di Giovanni**<sup>1,2</sup>, **M. Carestia**<sup>1,2</sup>, **P. Ventura**<sup>2</sup>, **E. Peluso**<sup>1,2</sup>, **M. Lungaroni**<sup>1,2</sup>, **L.A. Poggi**<sup>1,2</sup>, **S. Talebzadeh**<sup>1,2</sup>, **O. Cenciarelli**<sup>1,2</sup>, **C. Bellecci**<sup>1,2</sup> and **M. Richetta**<sup>1,2</sup>.

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The long-term experience of Quantum Electronics and Plasma Physics Research group in laser techniques like LIDAR (Light Detection and Ranging) and DIAL (Differential Absorption of Light) is evident by improve of four experimental demonstrator (TAEMS, SAI, COLA and TELEMACO) developed by the group itself. SAI and COLA are two mobile LIDAR systems for detection of pollutants in atmosphere (with detection we mean the capability to see a suspicious presence of a substances in atmosphere without information about the composition of the substances). TAEMS is a mobile DIAL systems able to measure some minor constituents in atmosphere and TELEMACO is a laboratory demonstrator that is improving for identification of chemical agents. The ability to rapidly detect, identify and monitor chemical warfare agents (CWAs) is imperative for the efficient use of both military and civilian defense resources. This knowledge allows the severity and extent of a hazard to be assessed so that areas that are clean or contaminated can be identified (Sferopoulos R., 2009).



## Abstract Poster Session

P29

**Detection of pollutant sources in the atmosphere with Lidar/Dial technique:  
results of an experimental campaign in the south of Italy**

**M. Gelfusa<sup>1</sup>, A. Malizia<sup>1</sup>, S. Parracino<sup>1</sup>, M. Richetta<sup>1</sup>, C. Bellecci<sup>1,2</sup> and P. Gaudio<sup>1</sup>**

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In the last years, surveying large regions of the atmosphere in an automatic way, for early detection of pollutant sources in urban and industrial areas, has become a strategic objective of various public health organizations. The Lidar/Dial technique has become a well-established laser remote sensing method for atmosphere monitoring. It is often used to probe almost any level of the atmosphere and to acquire information necessary to validate theoretical models about different topics of atmospheric physics. It can also be deployed for environment surveying by monitoring particles, aerosols and molecules. For these reasons, an experimental campaign for evaluating the performances of a Lidar/Dial system in detecting pollutants (particulate and/or chemical compounds) has been carried out in an industrial area in the south of Italy. In this work, a homemade Lidar/Dial system (developed and built by the authors) and the results of the experimental campaign will be presented and discussed.

# Abstract Poster Session

## P30

### EU Host Nation Support Guidelines in case of CBRN Emergency

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The possible threat of an event, especially of malicious nature, held with Chemical, Biological, Radiological or Nuclear (CBRN) materials has led governments and international organizations to adopt far-reaching regulations and programs to defend populations against the associated risks. The basic protective actions are indeed similar across many different hazards, as physical safety, involve sheltering or evacuating, or develop a communications plan and emergency supply kits at family level, or being able to receive emergency alerts. But there are important differences between the typical CP emergency and a CBRNe one, and this impacts on the decisions and action to be (quickly) taken, and as a matter of fact this topics of great concern are well known and broadly discussed, but not specifically planned.

The EU with the CPM (Civil protection Mechanism) has a very reliable system of response and mutual help for disaster relief, but there are remarkable lacks if a CBRNe crisis of conspicuous dimensions breaks out. The mutual assistance system (HNS) needs to be focalized in case of CBRNe crisis, and the best way to grant this result is to apply a dedicated risk management approach.

The methodology set out in ISO 31000 (Risk management - Risk assessment techniques) that defines the risk as the "effect of uncertainty on objectives" fits with a complex system as the HNS (Host Nation Support), and includes the application of logical and systematic methods able of enhance communicating and consulting techniques, identifying, analyzing, evaluating and treating risk as an event- or a potential event- associated with any activity, process, function or "service/product" of HNS process. This approach has been applied to the HNS in the CBRNe field, aiming to face both the HNS and the tools of the European CPM (as the 112 emergency number, ERCC, OSOSCC procedures, communication to population, etc.) with an unified methodology.

# Abstract Poster Session

## P31

### From Waters Project To CATER50S

#### The Future Into The Present

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There is a long history of using water as a political or military target or tool, going back over 2,500 years. Water resources and systems are attractive targets because there is no substitute for water. Water resources are a prime infrastructure target for destruction or compromise by terrorist acts. Water can also be used as a tool or weapon of terrorism. Because it is fluid, water can be used as a delivery vehicle to carry destructive agents throughout the ecosystem, water system, and to human and animal populations. Destructive agents could include microbiological agents or toxic chemicals. Finally, water is a very important logistical support during military operation since water is fundamental for hydration of soldiers, vehicle maintenance, decontamination operations.

WATERS is a system can be used for protection, monitoring and security of water systems. It's architecture allows to check the quality of the water through a sensor system placed in inlet and outlet of the disinfection system based on Advanced Oxidation Process (AOP) technology. The AOP system is based on ozonisation, activated carbon filtration and UV process. The sensor system can provide constant monitoring against a possible contaminations of chemical, biological or radiological agent.

CATER50S is a water purifying mobile system designed to meet the needs of production of drinking water where there is only one source, such as a well, river, lake and sea. The purification system provides continuous supply of water that meets the parameters related to chemical and physical characteristics and the hygienic purity. The water purification system can provide water by exploiting the condensation technology: it does not require the availability of surface water and is suitable to operate in a hostile environment. The system works through the condensation of moisture from the air. The system guarantees a good production of water even with very low percentage of humidity.

## ***Abstract Poster Session***

### **P32**

**The Response of National Fire Corps in Italy**

**M. Lisanti and P. Martino**

*Ministry of Home Affairs, National Fire and Rescue Service*

To analyze “state of the art” advances in the National Body’s first response using an organizational model that includes training, procedures and equipment, as outlined in the n.6 Newsletter and according to what is currently being done in order to affect a successful response in the case of conventional and non-conventional events.

# Abstract Poster Session

## P33

Hospital infection control incurred by *Acinetobacter baumannii*

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This paper reflects the activity of surveillance and control of hospital infections incurred by *Acinetobacter baumannii* contracted into the Intensive Care Unit (ICU) of the Hospital "Umberto I" of Frosinone, where the reporting work of the ICU and the diagnostic of the Pathology Laboratory are coordinated by the department of Infectious Diseases. In particular, this study is designed to evaluate the presence of *A. baumannii* in the ICU, in samples from hospitalized patients and in environmental samples, especially after remediation activities carried out following an increase in the number of isolations of *A. baumannii*. The samples from hospitalized patients, since the main infections are represented by pneumonia and septicemia, mainly concerns samples from the respiratory tract and the bloodstream. As for environmental surveillance, given the importance of the potential role of environmental reservoirs in the transmission of MDR germs, were performed crops from swabs taken on inanimate surfaces, frequently touched by the hands of health care workers in hospital rooms and service spaces. Finally, we show the strategies used in the department for preventing and limiting the transmission of *A. baumannii* in the environment and among patients.



# Abstract Poster Session

## P34

Symbolic regression with robust metrics to investigate scaling laws in Tokamaks

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In the last years, symbolic regression has been successfully deployed in various fields to overcome the limitations of log regression for the study of scaling laws. The main comparative advantages of this new methodology are: a) that it is not limited to power laws but can determine the most appropriate mathematical form of the scaling laws to model the available databases b) that it presents much less stringent requirements in terms of statistics of the errors in the measurements. In this paper, the technique is tested with various robust statistical indicators, to assess the resilience of the approach to both noise and outliers, in the perspective of its deployment in studying scaling laws in Tokamaks. The present investigation allows determining the relative advantages of various robust statistical indicators in the usual Euclidean space.

# Abstract Poster Session

## P35

### Sampling and Analysis -CBRN laboratories at the Venice Firefighters corps

**S. Minghetti, D. Bazzacco, G.B. Bolzon**

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Among the activities of Italian national Firefighters Department, there is the management of natural and not natural CBRNe events, to face up to this necessity, the NBCR regional advanced nuclei have been equipped of mobile laboratories and suitable instrumentation in order to face different and also complex scenes regarding the CBRNe emergencies.

In the present work, you can have an idea of the main characteristics and potentialities of these equipments and shortly visualize the methods of on field sampling and rapid analysis actually used by the three laboratories afferent to the NBCR Nucleus of Venice.

The poster will describe:

- 1) the on field experimentation of equipments and the main chemical sampling procedures, the advantages related to the use of a mobile chemical laboratory;
- 2) the NR detection systems within the wider and well known national NRdetection network, made by Firefighters, consisting of 1237 remote detection stations distributed throughout the national territory, that permitted to acquire a really unique documentation for the Italian territory;
- 3) the years of experience (since 2008) with the biological mobile laboratory and the experimental use of new rapid procedures in biological sampling and detection.

All these and other realizations and new proposals, will be descriptively and concise considered, in order to provide the reader with appropriate insights, as far as providing a fairly comprehensive picture of the actual situation concerning the Italian Firefighters Department's response to c.b.r.n. emergencies.

# Abstract Poster Session

## P36

### First Attempts at Measuring Widespread Smoke with a Mobile LiDAR System

M. Gelfusa<sup>1</sup>, A. Malizia<sup>1</sup>, A. Murari<sup>2</sup>, S. Parracino<sup>1</sup>, M. Lungaroni<sup>1</sup>, J. Vega<sup>3</sup>, L. DeLeo<sup>4</sup>, C. Perrimezzi<sup>4</sup> and P. Gaudio<sup>1</sup>

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In the last years, the LIDAR technique has been successfully applied to the detection of the smoke plume emitted by wild fires. Up to now, the attention has been devoted to early detection of quite concentrated smoke plumes to reveal the first stage of fires as soon as possible. In this paper, it is shown how the LIDAR technique can also cope with the widespread smoke, which can be the consequence of strong wind dispersion or non concentrated sources. To this end, innovative signal processing techniques are required. The proposed approach is able to detect, in a reliable way, the presence of widespread smoke in the backscattered signals of compact LIDAR systems. The first experimental evidence is encouraging and the potential of the proposed method is presented.

# Abstract Poster Session

## P37

### Design of a scenario simulator for interactive training of medical response to major emergencies

E. Pacciani

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The need of simulator for interactive training of the response to major emergencies has been increasingly recognized during recent years. One of the possible advantages with such simulators is that all components of the chain of response can be trained simultaneously. This includes the important communication/coordination between different units, which has been reported as the most common cause of failure. Very few of the presently available simulators have been suitable for the simultaneous training of decision-making on all levels of the response. The aim of the present study was to describe the possibility to train interactively the emergency response performed by medical staff about optimal utilization and relocation of available resources and/or rapid mobilization of additional assets.

# Abstract Poster Session

## P38

### External emergency plan: Exercise with fire of dangerous substances

R. Paoletti

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This poster describes the exercise that took place in the Province of Ascoli Piceno on 22/10/2015 and which has seen the commitment of the Fire Department, the Prefecture, the 118, Asur, the police headquarters, the Province, the City of Offida, Civil Protection and dell'ARPAM.

The exercise was organized by the Prefecture to test the External Emergency Plan PEE of a company to Major Accident Risk according to the Seveso III. Inside one of the storage company has simulated a fire of 1,500 liters of Fastac 50, a highly toxic and flammable substance.

The event required the support of special teams of the Fire Department for CBRN operations and for the installation of decontamination station and primary zoning of the area. The staff of 118 rescued two injuries in the red zone, ARPAM carried out sampling air and water while the police have closed the access roads.

The relief activities were coordinated by the Fire Department, and all activities of the Civil Protection and support to the population have been coordinated by the Prefecture that activated the CCS (Centro di Coordinamento dei Soccorsi).

The work highlights the perfect management of the exercise, but also how this can be different from the actual management of an emergency, in particular with regard to the zoning of the area and the evacuation of people.



# Abstract Poster Session

## P39

### LiDAR Detection of Carbon Dioxide for Early Warning of Volcanic Eruptions

**S. Parracino<sup>1,2</sup>, S. Santoro<sup>2,3</sup>, G. Maio<sup>2,4</sup>, L. Fiorani<sup>5</sup>, M. Nuvoli<sup>5</sup> and A. Aiuppa<sup>3</sup>**

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Volcanic gases give information on magmatic processes. In particular, anomalous releases of carbon dioxide precede volcanic eruptions. Up to now, this gas has been measured in volcanic plumes with conventional measurements that imply the severe risks of local sampling and can last many hours. For these reasons and for the great advantages of laser sensing, the thorough development of volcanic lidar has been undertaken at the Diagnostics and Metrology Laboratory (FSN-TECFIS-DIM) of the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA). In fact, lidar profiling allows one to scan remotely volcanic plumes in a fast and continuous way, and with high spatial and temporal resolution. The system developed at ENEA is named BILLI (BridgE volCanic Lidar). It is a differential absorption lidar instrument, based on injection seeded Nd:YAG laser, double grating dye laser, difference frequency mixing (DFM) and optical parametric amplifier (OPA). BILLI is funded by the ERC (European Research Council) project BRIDGE – Bridging the gap between Gas Emissions and geophysical observations at active volcanoes. The system was successfully tested scanning the gas emitted by Pozzuoli Solfatara (Campi Flegrei volcanic area, Naples, Italy) and by Stromboli Volcano (Eolian Islands, Messina, Italy), during field research campaigns carried out, respectively, from 13 to 17 October 2014 and from 24 to 29 June 2015. Carbon dioxide concentration maps were retrieved remotely in few minutes in the crater area. Lidar measurements were in good agreement with well-established techniques, based on different operating principles. To our knowledge, it is the first time that carbon dioxide in a volcanic plume is retrieved by lidar, representing the first direct measurement of this kind ever performed on an active volcano and showing the high potential of laser remote sensing in geophysical research.

# Abstract Poster Session

## P40

### Application of Real-Time PCR to Identify Residual Bio-Decontamination of Confined Environments after Hydrogen Peroxide Vapor Treatment: Preliminary Results

**M. Paziienza<sup>1,2</sup>, M.S. Britti<sup>1,2</sup>, M. Carestia<sup>2,3</sup>, O. Cenciarelli<sup>2</sup>, F. D'Amico<sup>1,2</sup>, A. Malizia<sup>2,3</sup>, C. Bellecci<sup>2,3</sup>, P. Gaudio<sup>2,3</sup>, A. Gucciardino<sup>2</sup>, M. Bellino<sup>2</sup>, C. Lancia<sup>2</sup>, A. Tamburrini<sup>2</sup> and R. Fiorito<sup>2,3</sup>**

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<sup>5</sup>*Università Cattolica del Sacro Cuore, School of Medicine and Surgery, Rome (Italy).*

This study was conducted to assess the effectiveness of Hydrogen Peroxide Vapor (HPV) to remove biological contamination in a confined environment and to evaluate real-time PCR assay as a technique for the evaluation of the decontamination efficiency. Decontamination after the dispersion of biological aerosol is a main issue from a civilian, public health and military perspective. Despite the effectiveness of aggressive substances, eco-friendly but still efficient methods for decontamination are a relevant demand and Hydrogen Peroxide Vapor (HPV) is among the most recent and promising technologies in this field. Another related issue is: when an environment can be considered fully decontaminated? The answer clearly depends on the objectives of the decontamination and this will affect the choice of the methodology. Furthermore, classical microbiological and molecular biology techniques are commonly used to identify biological contamination and residual contamination, but many of them are time consuming and require advanced training for the operators who perform the analysis. This may represent a bottleneck, especially when a quick response to an emergency is needed (i.e. during an unconventional event like CBRNe ones). In this work, a combination of commercially available equipment for detection, identification and decontamination, was evaluated in partnership between the Italian Army, the Department of Industrial Engineering and the School of Medicine and Surgery of the University of Rome "Tor Vergata". The purpose of this work was to find a setup for equipment and methodologies for detection, identification and decontamination, to implement in case of biological events. Preliminary results show that, despite the death of the microorganisms, nucleic acids are not completely degraded by HPV treatment and, as a consequence, that real-time PCR may be the adequate, quick and easy method to verify the efficiency of bio decontamination when nucleic acid degradation represent the final objective.

# Abstract Poster Session

## P41

### Application of the Symbolic Regression technique via Genetic Programming to derive Empirical Models

**E. Peluso<sup>1</sup>, A. Murari<sup>2</sup>, M. Gelfusa<sup>1</sup>, M. Lungaroni<sup>1</sup>, S. Talebzadeh<sup>1</sup> and P. Gaudio<sup>1</sup>**

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Many processes in plasma physics are inherently complex and highly nonlinear. Typically their behavior is difficult to interpret with theoretical models based on first principles. To perform high-quality inference, these processes have to be modeled starting directly from the experimental data.

Symbolic Regression (SR) via Genetic Programming (GP) searches for the Best Unconstrained Empirical Model Structure (BUEMS). This implies deriving the significant variables, the functional form of the model and its parameters directly from the data. SR via GP takes inspiration from the biological criteria of "natural selection" and "evolution", since the aim of an algorithm implemented is to provide the best "individual" among many for a specific problem.

# Abstract Poster Session

## P42

### An analysis of Ebola Virus Disease 2013-2014 Outbreak in West Africa

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The unprecedented diffusion of Ebola virus epidemic in West Africa during the 2013-2014 has been an exceptional occasion to study infectivity, lethality and progression of Ebola virus disease (EVD). Poor data were recorded before 2013 during Ebola virus species outbreaks because of the high case fatality rate and spread limited in rural regions only. The recent dramatic outbreak of EVD, which involved several countries including Guinea, Liberia, Sierra Leone, Senegal and Mali, provided important data to better understand the virus "behavior", improve procedures to contain and cure patients, develop new drugs and vaccines for a virus that not only had no prophylactic therapy but also no approved proper treatment. The new route in the geographical spread of the virus involved large urban areas at an early stage of the epidemic with consequent increase in its diffusion featuring the largest outbreak of EVD of all time, with more than 20 thousands of confirmed cases, becoming a public health emergency of international concern. Thanks to the data provided by various national and international organizations involved in the response to this outbreak, we were able to analyse the numerical and geographical spread of the disease following the sequential appearance of new cases and their location and evaluating the measures implemented by each government and international organizations to contain the epidemic. The global concern about virus spread due to the potential reaching of far countries through air transport took to the development of unprecedented procedures to assure the containment of the disease in the affected regions. The importance to define standard procedures to treat patients and to contain the disease are critical to prevent an even larger future outbreak, and to set efficacious protocols in case of its possible use in a bioterrorist attack.

# Abstract Poster Session

## P43

**Experimental campaign to test the capability of STARDUST-Upgrade diagnostics to investigate LOVA and LOCA conditions**

**L.A. Poggi<sup>1</sup>, A. Malizia<sup>1</sup>, J.F. Ciparisse<sup>1</sup>, M. Gelfusa<sup>1</sup>, A. Murari<sup>2</sup>, S. Pierdiluca<sup>1</sup>, E. Lo Re<sup>1</sup>, and P. Gaudio<sup>1</sup>**

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Given the urgent need to converge on precise guidelines for accident management in nuclear fusion plants, an experimental campaign has been carried out on the "STARDUST-Upgrade" facility for dust mobilization phenomena investigation at the University of Rome "Tor Vergata", in the framework of the activities of the Quantum Electronics and Plasma Physics and Materials (QEPM) Research Group. The main purpose of this preliminary work is to test the "STARDUST-Upgrade" capability to investigate not only Loss of Vacuum Accident (LOVA) but also Loss of Coolant Accident (LOCA) accidents and their consequences. In fact, an upper port of "STARDUST-Upgrade" is used as an inlet port, reproducing coolant loss consequences from the upper ports of the vacuum vessel in ITER. The diagnostics required for these experimental studies and the results of this first experimental campaign are presented.



# Abstract Poster Session

## P44

### Laboratory HPGe detector start up for gamma-ray spectrometry measurements applied to environmental studies

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The gamma ( $\gamma$ ) spectrometry is a method of analysis to qualitatively and quantitatively identify the radionuclides present in a sample of interest, through the analysis of the energy spectrum of emitted gamma photons. There are two types of spectrometers for the detection of gamma rays: the high purity Germanium (HPGe) and the sodium iodide (NaI). The former have an energy peak resolution of few keV, are based on semiconductors and must be cryogenically cooled; the latter have a much lower energy resolution, are based on scintillators and work at room temperature. In the Environmental Monitoring laboratory at INGV (section Roma2) a p-type HPGe detector is installed, with a relative efficiency of 150% and configured in Ultra-Low Background mode. To be able to measure nuclides activities from samples, it is important to perform both energy and efficiency calibration on the instrument. Energy calibration is needed to have the correct association between incident photon energy and MCA (multi-channel analyzer) channel, this is crucial to correctly identify the radionuclides that may be present in the samples. Efficiency calibration is essential for quantitative analysis, and is strongly dependent on the geometry of the entire experimental setup (detector / sample sizes and materials). Efficiency curves for few chosen geometries were calculated using samples of different reference material with certified known activity, procured from IAEA. The final target is to apply gamma spectrometry to the study of radioactivity in environmental samples from the sites of interest.

# Abstract Poster Session

## P45

### Laboratory HPGe detector start up for gamma-ray spectrometry measurements applied to environmental studies

I. Ciancaglioni<sup>1</sup>, R. Consorti<sup>2</sup>, F. De Notaristefani<sup>3</sup>, M. Marinelli<sup>1</sup>, E. Milani<sup>1</sup>, A. Petrucci<sup>2</sup>, G. Prestopino<sup>1</sup>, C. Verona<sup>1</sup>, G. Verona Rinati<sup>1</sup>

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High resolution dosimetry is very important in all areas of radiation therapy and, in particular, whenever narrow photon and electron beams are required for Stereotactic Radiotherapy (SRT) and small field segments are used for Intensity Modulated Radiotherapy (IMRT). The available detectors are often too large with respect to the beam size considered, which is characterized by high dose gradients and lack of charged particle equilibrium. An ideal solution is represented by single crystal diamond detectors, which are solid state devices, radiation hard, tissue equivalent and capable of real time response. In the present work, synthetic CVD single crystal diamonds (SSCD) in a p-type/intrinsic/metal structure were tested as dosimeters for conventional radiotherapy and for IMRT applications. The devices have been analyzed by using 6 and 10 MV bremsstrahlung x ray beams as well as electron in the range 6-18 MeV from a CLINAC DHX Varian accelerator. All measurements have been performed in a water phantom and commercial ionization chambers were used for calibration and comparison. No external bias voltage was applied in normal operating conditions. After a few Gy pre-irradiation procedure, which is needed to stabilize the device sensitivity, fluctuation of less than  $\pm 0.5\%$  were observed in the device output as a function of irradiation time and dose rate over the whole Clinac DHX Varian accelerator range. In addition, a very good linear correlation of the dosimeter output was observed with dose, as demonstrated by the deviation from the linearity plots. Commercial ionization chambers were used as reference in order to evaluate the diamond dosimeter Percentage Depth Dose (PDD) response as well as the irradiation field dependence of diamond dosimeter output down to 0.25 cm<sup>2</sup>. A good agreement was observed in both cases. One of such CVD single crystal diamond dosimeters has been successfully tested as a dosimeter in a prostate cancer IMRT treatment. The dosimeter was operated in a photovoltaic regime, i.e. with no external bias voltage applied. SSCD rise and decay times are comparable with those of the reference ionization chambers independently of the delivered dose, thus demonstrating the fast response time of the device. No evidence of memory effects or persistent photocurrent was observed. The detector sensitivity is 4 nC/Gy. The dose delivered during a prostate cancer IMRT treatment was then measured in nine different positions in a water phantom by the SSCD dosimeter and compared with the ones measured by several commercial dosimeters.

## ***Abstract Poster Session***

### **P46 - P47 - P48 - P49**

**Strategic objectives for the Italian Red Cross till 2020**

*Provincial committee - Frosinone, Italian Red Cross*

Poster n.1) The "Strategy 2020" is our target about the actions of the International Federation of Red Cross and Red Crescent Societies throughout this decade. It defines strategic aims to inspire, encourage, facilitate and promote all forms of humanitarian activities to preventing and alleviating human suffering.

Poster n. 2) Tuteliamo la salute e la vita con attività e progetti di assistenza sanitaria non dimenticando la prevenzione incoraggiando l'adozione di misure sociali. Favoriamo il supporto e l'inclusione sociale per ridurre le vulnerabilità individuali ed ambientali.

Poster n. 3) Prepariamo una risposta attiva alle emergenze e ai disastri. Diffondiamo il DIU (Diritto Internazionale Umanitario).

Poster n 4) Promuoviamo lo sviluppo dei giovani per favorirne l'empowerment. Pianifichiamo e promuoviamo la comunicazione interna e verso il pubblico, per rafforzare la cultura del servizio di volontariato, per ottenere una struttura capillare, efficace e trasparente.

# Abstract Poster Session

## P50

### ECDC approach in biological emergency preparedness to a potential bioterrorist Ebola Viral Disease (EVD) attack

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Today, a whole range of complex challenges and threats to EU security, much different from hostile actions that faced by Allies in the cold war era, requires to be prepared to protect and defend against both State and non-State actor threats. The development of an integrated approach to respond to acts of bioterrorism, needs a legislation on "serious cross-border health threats" as an extension of European long-standing security concept. Since 2005, according to the mission statement, the EU independent agency ECDC works actively in the European health security, establishing a common mechanism of medical countermeasures and preparedness plans among Member States. The approach to preparedness consists mainly, in risk analysis evaluation about bio-safety/bio-security incidents, security level of personnel, capacity levels evaluation of the state and local public health laboratories, National Pharmaceutical Stockpile, surveillance and epidemiology, training & exercises rapid response teams in bioterrorism-specific diseases and unusual epidemiological events, awareness, interagency cooperation and improve information exchange. Ebola Virus Disease (EVD) 2013-2015 epidemic in West Africa as an emerging infectious disease of high consequence (IDHC), poses the greatest biological threat to Allies security in today context: Ebola virus is classified as a biological agent with the maximum level of risk according to the: Centers for Disease Control and Prevention (CDC) Critical Biological classification, Biological Risk Groups classification (EU-Directive 2000/54/EC), World Health Organization (WHO) list. Due to potential characteristic of the Ebola virus to cause infectious diseases and the severity of morbidity and mortality rates, it has been classified as a highly potential agent of bioterrorism. Terrorists may use biological agents because they have extremely difficult of timely detection, diagnosis, first response, high perception in media, politics and society, and specially, the high potential to achieve a cross-border dimension. Also, ECDC efforts to challenge potential bio-threats, evaluate dual use research and technological diffusion, that could be directly applied by terrorists.

# Abstract Poster Session

## P51

**The importance of a high level academic approach to the CBRNe problem to improve the capabilities of prevention, management and evaluation of consequences**

**L. Palombi<sup>1,2</sup>, C. Bellecci<sup>2,3</sup>, S. Mancinelli<sup>1,2</sup>, A. Malizia<sup>2,3</sup>, M. Carestia<sup>2,3</sup>, D. Di Giovanni<sup>2,3</sup>, O. Cenciarelli<sup>2,3</sup>, F. Gilardi<sup>1,2</sup>, F. D'Amico<sup>2,3</sup>, C. Russo<sup>2,3</sup>, D. Rothbacher<sup>3</sup>, V. Gabbarini<sup>2,3</sup> and P. Gaudio<sup>2,3</sup>**

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Nowadays when we talk about security it is essential talk about the CBRNe events because the global crisis related to the reduction of energy fossil resources, the reduction of potable water resources and the war for the control of energy sources are part of the causes which can lead to an intentional CBRNe event. These kinds of events could also be the consequence of an unintentional release of substances (i.e., an accident of a truck containing a Toxic Industrial Chemical), or of natural events like a tsunami or an earthquake. Thus the high percentage of risk connected to their occurrence is clear. The evolution and proliferation of safety and security issues in the National and International framework made it necessary to respond in a competent and professional way to any crisis scenarios resulting from non-conventional events (i.e., CBRNe events). In all industrialized countries there are Institutions and Facilities with highly specialized groups facing up to emergencies (first responders), but only a few persons are sufficiently trained to manage these incidents. The complexity of these events requires experts and DUAL USE innovative technologies. (Malizia et al, 2014). The authors will show how a University like Rome Tor Vergata, working in CBRNe, starting from academic courses is able to create a network able to cooperate in research, industrial developments, didactic and training in an innovative way in order to improve the capabilities of prevention, management and evaluation of consequences.



# Abstract Poster Session

## P52

### SX34 and the decontamination effects on chemical warfare agents (CWA)

L. Palestini<sup>1,2</sup>, G. Binotti<sup>1,2</sup>, A. Sassolini<sup>3</sup>, L. Di Gianberardino<sup>1,3</sup>, F. D'Amico<sup>2,3</sup>, S. Miorotti<sup>5</sup>, A. Malizia<sup>2,3</sup>, A. Costagliola di Fiore<sup>5</sup>, D. Di Giovanni<sup>2,3</sup>, M. Carestia<sup>2,3</sup>, R. Bonora<sup>4</sup>, F.M. Orecchio<sup>2</sup>, J.F. Ciparise<sup>3</sup>, L. Palombi<sup>2,6</sup>, C. Belelcci<sup>2,3</sup> and P. Gaudio<sup>2,3</sup>

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The decontamination of sensible surfaces contaminated by chemical agents is a key issue for the safety of population and security of structures. SX34 is an innovative decontamination product developed for sensible surfaces decontamination from biological and chemical agents. In this work the authors present the effects of SX34 on contaminated surfaces and its effectiveness compared to classic decontaminants. The electrical insulation on sensitive equipments is analyzed as innovative possible application of this product about virus spread due to the potential reaching of far countries through air transport took to the development of unprecedented procedures to assure the containment of the disease in the affected regions.

The importance to define standard procedures to treat patients and to contain the disease are critical to prevent an even larger future outbreak, and to set efficacious protocols in case of its possible use in a bioterrorist attack.

# Abstract Poster Session

## P53

### Comparing three quick and easy methods for sample preparation of CWA simulants in water

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Analytical chemistry in CBRNe (Chemical Biological Radiological Nuclear explosive) context requires not only high quality data; quickness, ruggedness and robustness are also mandatory. In this work, three samples preparation methods were compared using several organophosphorus pesticides as test compounds, used as simulants of nerve CWA (Chemical Warfare Agents) to choose the one with best characteristics. Result was obtained better with the Dispersive Liquid-Liquid Micro Extraction (DLLME), relatively new in CBRNe field, obtaining uncertainty for different simulants between 8 and 15% while a quantification limit between 0.01 and 0.08 µg/l. To optimize this extraction method, different organochlorinated solvents also tested but not relevant difference in these tests was obtained. In this work, all samples were analyzed by using a gas chromatography coupled with mass spectrometer (GC-MS) and also with Gas Chromatograph coupled with Nitrogen Phosphorous Detector (NPD) for DLLME samples to evaluate a low cost and rugged instrument adapt to field analytical methods with good performance in terms of uncertainty and sensibility even if poorer respect to the mass spectrometry.

# Abstract Poster Session

## P54

### Techniques for the detection of Biological Agents

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Biohazards represent an important issue in the field of security, both for the destructive potential and the psychological, economic and social impact that the use of biological agents for bio-warfare could have on populations. Early identification of an intentional biological event is essential to ensure correct management and response to the emergency. Much effort for the development of innovative equipment that permit prompt and remote detection of biological warfare agents are needed to achieve this goal. In this work, the different detection systems suitable in the CBRN context for biological agents will be analyzed, focusing on non-specific and specific point-detection systems, and stand-off detection systems, evaluating the pros and cons of each technology.

# Abstract Poster Session

## P55

Islamic State and CBRNe, the new threat

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We are about to enter 2016 and one of the most dangerous terrorist organization ever seems to be more brutal and strong than the past. The Islamic State now controls big bunches of Iraqi and Syrian territory, hundreds of millions of dollars, and thousands of armed troops. Moreover it is now clear that its ambitions are global and its statement, declaring itself the caliphate promised by Allah, is an explicit invitation to violent Islamic extremists from all over the world to join them.

Latest attacks depict a terrorist organization seeking any possible mean useful to conquer the world, even Weapons of Mass Destruction. The issue hereby discussed is to assess the NCT coming up from IS through an analysis which consider not only if those materials have been really acquired, but if terrorists have the intention, financial capability, skill, knowhow, equipment and specialized personnel who could transform a simple dangerous material in a Weapon of Mass Destruction.

# Abstract Poster Session

## P56

### The Bio-containment response to the management of migration flows in biological emergency

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The Italian Red Cross Military Corps (IRC MC), auxiliary units of the Italian Armed Forces, owns bio-containment and decontamination capabilities, some of which are used by the Italian Navy to strengthen the health surveillance, as well as requested the Ministry of Health, in order to cope with potential biological threats related to immigration.

Since June 21, 2014 the IRC MC operates with bio-containment continuously units, at some bases located in Sicily and Apulia regions, coordinating a response team and equipment for CBRN decontamination and bio-containment.

In particular, The Italian Navy's helicopter base in Sicily has a complex unit called AMET-BIO (Aero-Medical Evacuation Team with capacity of Bio-containment) able to provide high effective care to patients affected by potential infectious disease of high consequence (IDHC) with helicopter dale ships transfer to the helicopter base, keeping them in a safe environment before to be transferred on the next vector with fixed-wing aircraft or land-transfer to the referral hospitals.

The unit AMET - BIO includes different facilities (isolation room, decontamination area, primary area of undressing, thorough decontamination area, dressing area and service area) made in shelters and it is managed by a staff of 6 operators including a doctor, a nurse, two operators in charge of bio-containment and two operators on the decontamination.



# Abstract Poster Session

## P57

**Use of radiations in Non Destructive Evaluation tests for the determination of old chemical weapons filling**

**P. Ventura and F. D'Amico**

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Demilitarization process is a main issue in order to be compliance with the Chemical Weapons Convention (Paris, 1993).

Old Chemical Weapons (OCWs) made by State Parties before 1946 have still recovered on the National territory but they are in very bad conditions and original marks and signs are not more visible.

In order to exclude from the demilitarization process the conventional ammunitions and distinguish the different chemical fillings among the OCWs, two different Non Destructive Evaluation (NDE) tests are performed. The first one is an x-ray examination using a 3 keV linear accelerator: this approach is not always satisfactory because in certain cases it doesn't permit to discriminate the exact nature of the chemical agent contained in the shell. This is particularly true for those munitions filled with mustard (HD) and white phosphorous (WP): HD, which is a oily liquid at RT when has an high degree of purity, is normally in a polymerized form inside the shells. This means that it could be confused with WP which, at RT is a solid. In order to avoid misunderstandings, a new system based on gamma spectroscopy induced by a neutron source (Portable Isotopic Neutron Spectroscopy) has been acquired. The technology permits to identify the different atoms that make the molecule and, basing on this information and on the isotopic ratio, the algorithm is able to recognize with an extremely high confidence the chemical contained in the shell. The combination between the two above mentioned approaches gives to Engineer Corps personnel of Italian Army the instruments to contribute to the total ban of chemical weapons, as auspicated by the Chemical Weapons Convention.

# Abstract Poster Session

## P58

### Synthetic single crystal diamond diodes for radiotherapy application

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In this work the dosimetric properties are investigated of novel synthetic single crystal diamond Schottky diodes fabricated at Rome "Tor Vergata" University laboratories, for radiotherapy applications. The dosimeter was developed in conjunction with PTW-Freiburg. A detailed characterization of such devices will be presented under photon and electron beam irradiations. Particular care was devoted to the device response in small field sizes, in view of its application in advanced radiation therapy techniques. Dosimetric measurements include investigation of pre-irradiation dose, dose and dose rate dependence, measurements of depth dose distributions, beam profiles, output factors, temperature and angular dependence of the device response. The measurements were performed under 6MV and 10 MV photon beams and 6, 8, 10, 12, 15 MeV electron beams by a LINAC accelerator. Photon beams with field sizes ranging from 1×1 to 40×40 cm<sup>2</sup> were used. In the case of electron beam irradiation, both 6×6 to 20×20 cm<sup>2</sup> standard applicators and 2, 3, 4 and 5 cm cones were used for small field size studies.

Measurement results from the diamond detector were analyzed in comparison with those from reference detectors: PTW type 31014 PinPoint for photon irradiation and PTW type 34045 Advanced Markus, PTW type 31010 Semiflex and PTW Diode E p-type silicon detector for electron irradiation. A maximum signal variation of about 0.7% was observed during the SSCD pre-irradiation with a final stability of 0.1% (1 $\sigma$ ). A good linearity and dose rate dependence of the device response was found, with deviation from linearity below  $\pm 0.5$  %. Beam profile measurements showed that the diamond dosimeter exhibits a very high resolution, better than the PinPoint ionization chamber and comparable to the ones obtained by the Si-diode, both under photon and electron beam irradiation.

The observed dosimetric properties indicate that the tested diamond detectors, are suitable for relative and absolute dosimetry for advanced radiotherapy applications. Their commercialization is foreseen during 2013 by PTW-Freiburg.

# Abstract Poster Session

## P59

**CBRNe Threat Detection and Monitoring System: Advanced prototype**

**V. Volpetti, V. Ricci, F.F. Monai and F. Barcio**

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Thales Italia has developed an advanced prototype of a CBRNe (Chemical, Biological, Radiological, Nuclear and explosives) Threat Detection & Monitoring System that features beacons embedding innovative smart sensors, integrating CMOS chip microsensors and exploiting Wideband Electrical Impedance Spectroscopy technology. Each beacon is in the form of lab-on-a-chip already inclusive of electronic acquisition and pre-processing of the signal coming from the sensors with high sensitivity and selectivity, high miniaturization and low unit costs. Through a Wireless Sensor Network (WSN) of beacons there will be significant reduction of false alarms while using the sensors on-the-field, with synchronous detection of CBRNe threats and with minimal training requirements. Automatic data transfer to a Command Centre equipped with ESTHER software will eventually lead to data fusion and real-time visualization of geo-referenced alarms for interactive decision.

## Abstract Poster Session

### P60

Police Grand-Ducale Aéroportuaire Luxembourg Service de Garde, Dep. CBRN

P. Wengler

*Luxembourg Police*

The Luxembourg Airport Police deals with normal day to day police operations at the International Airport of Luxemburg. The police is responsible for the supervision of the security personal, who screens the passengers. At the same time the Police responds to any kind of incidents occurring in the Cargo Fret Center (Cargolux). We have to deal on a regular basis with work accidents involving chemicals. At the Luxembourg Cargo Center we have all chemical categories stocked from cat. 01-09 (explosive-, corrosive-, toxic-, dangerous when wet-,materials and radioactive isotopes etc..). We have also stocked, around 62 biological infectious agents, due to the Mark Planck Institute in Germany and a Pharmaceutical department. The Luxemburg Police has basically no operational or investigative possibilities during a HAZMAT / CBRN Incident and needs to wait out, until the problem is solved by the local Fire Department or the Specialized Civil Protection Unit. We are responsible for putting in place the safety barrier, and communicate the information we have to, to the responsible fire department.

# Abstract Poster Session

## P61

### A printed and disposable electrochemical biosensor based on cholinesterase inhibition for nerve agent detection

**Z. Zahid, S.Cinti, F. Arduini, D. Moscone, G. Palleschi**

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The nerve agents are chemical warfare agents known to be used during terrorist attacks, potent nerve agents are Sarin (GB), Soman (GD), Tabun (GA), and VX. The extreme toxicity of these compounds is due to their ability to irreversibly inhibit Acetylcholinesterase (AChE) enzyme in the neuromuscular junction of the central nervous system. The nerve agents also have the ability to irreversibly inhibit Butyrylcholinesterase (BChE) in blood. The vapor pressures of these agents (especially in case of Sarin) and their rapid effect on the central nervous system (CNS), combined with the low cost and unsophisticated technology required for production, make these compounds or agents among the preferred choices for terrorists. For this reason an inexpensive, sensitive, miniaturized, and portable system to be used by first responder and military personnel is of interest owing to the continuing threat of possible terrorist attacks. Amperometric biosensors based on cholinesterase inhibition shows such potentialities. In this work butyrylcholinesterase was immobilized onto screen-printed electrodes modified with Prussian blue and the nerve agent detection was performed by measuring the degree of enzyme inhibition.



# Abstract Poster Session

## P62

### International First Responder University Course

L. Zelinotti

*International CBRNe Master Courses, University of Rome Tor Vergata, Rome, Italy*

The scenario rescue is evolving every day, with both the evolution and the industrial Toxic Industrial Materials, both the globalization of infectious diseases favored by the current need for people to travel to other states, and the import of foreign products. The need for training for rescue operations increases exponentially in response to natural events that interact with human activities, and especially in response to man-made events, including terrorist attack that come every day more in the field of CBRNe events. Currently in Italy the rescue system is fragmented into various territorial entities, and there is no coordination capillary unified and standardized nationwide. Every European country has a different system response. An international course may be the answer to unify the rescue in Europe.

## Directive Board of the International CBRNe Master Courses



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# Welcome to Villa Mondragone



## How to get to Villa Mondragone Congress Center

**We strongly suggest you to come by car or by train.**

**However, we also include the indications to get to Villa Mondragone by bus.**

### **FROM FIUMICINO (Leonardo Da Vinci) AIRPORT**

#### **Express Train (Leonardo Express)**

1. Express train for the train station ROMA TERMINI; departure every 30 minutes (the travel is about 31 min.),
2. Once in ROMA TERMINI take the Regional train line to FRASCATI train station (the travel is about 30 min.)

For more information on the train timetable and costs please visit [www.trenitalia.com](http://www.trenitalia.com)

3. From FRASCATI train station take a taxi to VILLA MONDRAGONE



## **FROM THE TRAIN STATION “ROMA TERMINI”**

### **Regional Train Line**

1. Take the Regional train line to FRASCATI train station (the travel is about 30 min.) For more information on the train timetable and costs please visit [www.trenitalia.com](http://www.trenitalia.com)
2. From FRASCATI train station take a taxi to VILLA MONDRAGONE

### **BY CAR**

#### **From the motorway A1 MILANO/NAPOLI or from the motorway A24 ROMA-L'AQUILA/PESCARA**

Follow the indications to ROMA SUD and take the exit MONTE PORZIO CATONE.

From the motorway take the exit MONTE PORZIO CATONE and then turn RIGHT. Travel through Via Fontana Candida and then continue on Via Pilozzo until the crossing with Via Frascati (the second large road on the RIGHT). Take Via Frascati and continue until the street number 51. Cross the gate that you will find on the left immediately after HOTEL VILLA VECCHIA and follow the tree-lined road until the T crossing. Take the road to the left until the entrance of the Congress Center.

**PLEASE NOTE** that from the motorway exit you can find some road signs for Villa Mondragone and Hotel Villa Vecchia.

#### **From ROME CITY CENTER**

Take the G.R.A. (Grande Raccordo Anulare) motorway - direction A1 ROMA-NAPOLI - take the exit A1 ROMA/NAPOLI. From the motorway, take the exit MONTE PORZIO CATONE and the turn RIGHT. Take Via Fontana Candida and then continue on Via Pilozzo until the crossing with Via Frascati (the second large road on the RIGHT). Take Via Frascati and continue until the street number 51. Cross the gate that you will find on the left immediately after HOTEL VILLA VECCHIA and follow the tree-lined road until the T crossing. Take the road to the left until the entrance of the Congress Center.

#### **Metro (Subway)**

1. take Metro A line - direction ANAGNINA - Get off at ANAGNINA Metro station.
2. follow the indications “from ANAGNINA METRO STATION” (see below)

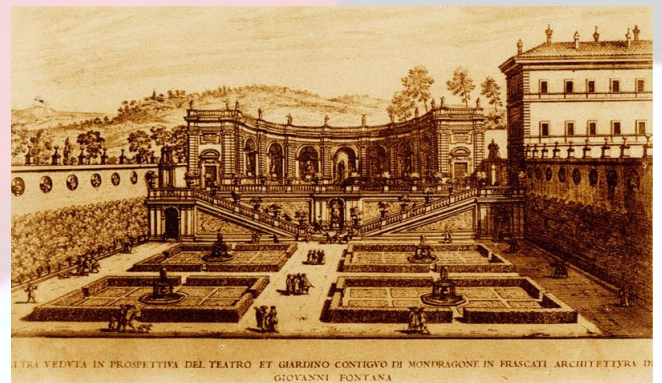
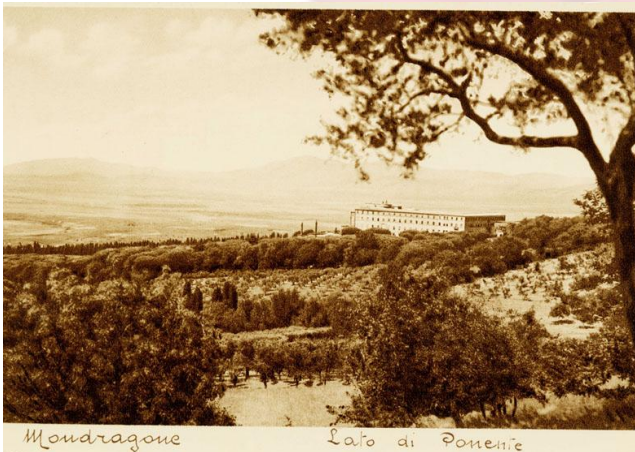


## FROM ANAGNINA METRO STATION

### Bus

Take COTRAL BUS (the “Blue bus” - direction ROCCA PRIORA (usually from platform 6 - ask the personnel to confirm the platform) through MONTEPORZIO CATONE. Get off at the bus stop: HOTEL VILLA VECCHIA (the fifth after Frascati central square).

**PLEASE NOTE:** we strongly recommend to ask the bus driver to advise you when you are at HOTEL VILLA VECCHIA bus stop because the bus stops upon request.



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