

Workshop

Countering Radiological and Nuclear threats

8th of November 2018

Istituto Superiore Antincendi (ISA) - Via del Commercio 13, 00154 Rome (Italy)



CBRNE RISK SCENARIOS

The aim of this workshop is to give a detailed overview current CBRNe risk scenarios, focusing on the following main topics:

- Radiological and Nuclear risk
- Radiological and Nuclear unplanned events;
- Radioprotection
- Security of Radioactive Material
- Nanotechnologies and Nanomaterials for R&N Safety & Security
- Detection and Identification Methods and Techniques
- Radioprevention, Modelling and Simulation, Diffusion and Dispersion of Radiological Agents;
- Cybersecurity in the R&N field

Web-site: <https://sievertacademy.com/iw2018/>

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REGISTRATION
Opening Commander Dr. Ing. Stefano Marsella (Italian Fire Fighters – Director of ISA) Rector Prof. Giuseppe Novelli (University of Rome Tor Vergata, Italy) Major General Paolo Giovannini (Italian Army)
The Role of Research for R/N Risks Prof. Francesco d’Errico <i>(University of Pisa – Moderator and Scientific Coordinator of IWCBRNe2018, Italy)</i>
International Master courses in Protection against CBRNe events Prof. Leonardo Palombi <i>(University of Rome Tor Vergata, Director of the Department of Biomedicine and Prevention, Italy)</i>
SASIR – Safety and Security Institute in Rome Dieter Rothbacher <i>(President and cofounder of SASIR, Italy)</i>
KEYNOTE SPEAKER Disarmament and non-proliferation (North Korea) Prof. Alexander Glaser <i>(Princeton University (USA), Department of Mechanical and Aerospace Engineering and International Affairs, Woodrow Wilson School - Director of Graduate Studies)</i>
COFFEE BREAK/INDUSTRIAL EXHIBITION
WMD Disablement – Developing a new Capability Lt. Col. Bernd Allert <i>(German Army – JCBRNe COE NATO, Czech Republic)</i>
Guidelines for first responders based on results from deploying a mockup dirty bomb Dr. Carlos Rojas Palma <i>(SCK CEN, Belgium)</i>
Developing procedures and actions in R/N improvised devices attacks Dr. Milica Marceta Kaninski <i>(Vinca Institute Belgrade, University of Belgrade)</i>
POSTER SESSION/INDUSTRIAL EXHIBITION
LUNCH/ POSTER SESSION/INDUSTRIAL EXHIBITION

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<p align="center">KEYNOTE SPEAKER</p> <p align="center">Official and "unofficial" dosimetric measurements: the way from Chernobyl to post-Fukushima citizen science</p> <p align="center">Dr. Vadim Chumak <i>(National Academy of Medical Sciences of Ukraine)</i></p>
<p align="center">Fukushima: an experience on the field</p> <p align="center">Dr. Massimo Morichi <i>(CAEN-SYS, Italy)</i></p>
<p align="center">Detection of special nuclear material with a transportable active interrogation System: from the proof of concept to a dedicated design</p> <p align="center">Dr. Giuseppe Felici and Dr. Francesco Zanetti <i>(SIT-SORDINA, Italy)</i></p>
<p>PRESENTATION OF THE NEW COOPERATION AGREEMENTS</p>
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<p align="center">Modelling the economic impact of radiologically dispersed devices on a country</p> <p align="center">Dr. Steve Johnson <i>(Georgetown University, School of Continuing Studies, Washington, D.C., (USA))</i></p>
<p align="center">Active neutron interrogation in nuclear security applications</p> <p align="center">Dr. Bent Pedersen <i>(JRC- European Commission, Denmark)</i></p>
<p align="center">Passive interrogation techniques</p> <p align="center">Dr. Alessandro Dodaro <i>(ENEA, Italy)</i></p>
<p align="center">Airborne and ground-based gamma radiation monitoring for man-made and environmental hazard mitigation purposes</p> <p align="center">Dr. Massimo Chiappini <i>(INGV, Italy)</i></p>
<p align="center">Emergency Preparedness for nuclear powered ships at the Italian Harbors</p> <p align="center">Frigate Captain. Fabio Polidoro <i>(Italian Navy - 2° Ufficio – Capo della 3° Sezione CBRN - STATO MAGGIORE MARINA 4° Reparto Infrastrutture e Logistica)</i></p>
<p>MASTER CBRNE DIPLOMA CEREMONY AND CLOSING REMARKS</p>
<p>A last coffee together</p>

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Oral contribution

Opening session

Commander Dr. Ing. Stefano Marsella

Italian Fire Fighters – Director of ISA

Curriculum Vitae: Commander Ing. Marsella has an MD in Civil Engineering and actually he is the Director of the National Fire Academy (Istituto Superiore Antincendi), Italian Ministry of Interior. In the past he has been:

- Manager at the Fire Brigades of Milano (Italy), Italian Ministry of Interior
- Manager at the Fire Brigades of Arezzo (Italy), Italian Ministry of Interior
- Manager at the automatic informative systems of the Fire Brigades, Italian Ministry of Interior.



Oral contribution

Opening session

Rector Prof. Giuseppe Novelli

University of Rome Tor Vergata, Italy

Curriculum Vitae: Since November 2013 he is Rector of the University of Rome "Tor Vergata".

Since 2001 he has been Director of the U.O.C. Laboratory of Medical Genetics of the University "Policlinico di Tor Vergata". He is Adjunct Professor at the University of Arkansas for Medical Sciences, Little Rock (USA) since 2003. Since January 2011 he is Scientific Director of the "Fatebenefratelli" Research Center, Rome "S. Pietro" Hospital. Since 2012 he is the scientific director of the Center for Molecular Genetics of the IRCCS Neuromed Institute. Since 2013 he has been a member of the CRUI "Research Evaluation" Working Group and a member of the Superior Health Council.



Academic career: From 1981 to 1987 he carried out teaching and research activities at the Faculty of Pharmacy in the University of Urbino, first as a scholar and then as an assistant and then university researcher. In 1992 he won the national competition for an associate professor in Human Genetics and was called to hold the chair of Human Genetics at the Faculty of Medicine and Surgery of the Catholic University of Milan, Rome (Policlinico Gemelli). From 1995 to 1999 he was Associate Professor of Human Genetics at the University of Rome "Tor Vergata".

In 1999 he obtained the suitability of Professor of Medical Genetics at the University of Trieste and was called by the Faculty of Medicine and Surgery of Rome "Tor Vergata". He was Dean of the Faculty of Medicine and Surgery of the University of Rome "Tor Vergata" from 2008 to 2011. He was Director of the School of Specialization in Medical Genetics of the University of Rome "Tor Vergata" and of the Aggregate Schools Sapienza, Chieti and Bari.

Oral contribution

The Role of Research for R/N Risks

Prof. Francesco d'Errico

University of Pisa – Moderator and Scientific Coordinator of
IWCBRNe2018, Italy

Curriculum Vitae: Francesco d'Errico is an Associate Professor of Nuclear and Biomedical Engineering and of Medical Physics. He has performed and led multiple projects on advanced methods for radiation detection, dosimetry and imaging, and on image-guided radiological procedures supported by Italian, European and US agencies. FE has been Editor in Chief of the journal Radiation Measurements and is the Director of the Advanced Radiation Protection School “C. Polvani”.



Oral contribution

International Master courses in Protection against CBRNe events

Prof. Leonardo Palombi

University of Rome Tor Vergata, Director of the Department of Biomedicine and Prevention, Italy



Curriculum Vitae: Dr. Leonardo Palombi, MD is a full Professor of Hygiene, Epidemiology and Public Health at University Tor Vergata, Faculty of Medicine. He is the head of the Biomedicine and Prevention Department in the same university. He is also scientific director of the DREAM (Drug Resource Enhancement against AIDS and Malnutrition) Program, a large private/public intervention in 10 African countries with 33 health centers and 20 molecular labs, run by a faith-based organization: the Community of Sant'Egidio. He is the coordinator of a PhD on Nursing sciences and Public Health at University of Tor Vergata, Rome. His main area of research has been HIV infection, infectious/ tropical diseases, global health, health planning and epidemiology of ageing. He has been Co-Principal Investigator in a number of national studies and international interventions. He has been involved as Managing Director for two World Bank Interventions in the Balkan area (1998-2000) and in Mozambique (2004-2007). He was a member of the National Italian Committee for HIV/AIDS (2003-2005) and was involved in the WHO guidelines preparation in Geneva for HIV (PMTCT 2006 -2008, HIVRESnet 2009, Consolidated Guidelines, 2012). Leonardo Palombi authored more than 250 publications (H Index 22), books and oral presentations at international meetings.

Abstract: The evolution of an increase in Safety and Security threats at an international level place remarkable focus on the improvement of the emergency systems to deal with the crisis, including those connected to ordinary and the non-conventional events (Chemical, Biological, Radiological, Nuclear, and explosives). Given the global interest in these issues, the Department of Industrial Engineering and the Faculty of Medicine and Surgery of the Tor Vergata University organize the International Master Courses in “Protection against CBRNe events”. The master courses aim to give a multidisciplinary and integrated education, in order to prepare the students to face a complex event like a CBRNe event. The courses address all the CBRNe fields, from physics to chemistry, from law to communication. In fact, a CBRNe scenario requires a deep collaboration between Firefighters, Army, Public health, Privates, Research Institutes, etc. The CBRNe masters are characterised not only by theoretical studies but also practical activities and visits to public and private entities

Oral contribution

SASIR – Safety and Security Institute in Rome

Dieter Rothbacher

President and cofounder of SASIR, Italy

Curriculum Vitae: Dieter Rothbacher, born 1966, a graduate from the Austrian Military Academy. From 2017 acts as Managing Director CBRN Protection GmbH/Austria.

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).

Mr. Rothbacher has a Master of Science degree (MSc) in Business Development, and a postgraduate Master of Science (MSc) degree in Safety and Security Management. He is currently studying for his PhD at the United Kingdom Defence University in Cranfield (UK), with his Doctorate dealing with CBRN Defence



Oral contribution

Disarmament and non-proliferation

(the case study of North Korea)

Prof. Alexander Glaser

Princeton University (USA), Department of Mechanical and Aerospace Engineering and International Affairs, Woodrow Wilson School - Director of Graduate Studies



Curriculum Vitae: The work of Professor Glaser is focused on the technical aspects of nuclear-fuel-cycle technologies and policy questions related to nuclear energy and nuclear-weapon proliferation. He plans to continue research on these issues and to locate it in two important new contexts that have emerged only recently: 1) Proposals to increase reliance on nuclear energy, as part of the effort to mitigate climate change, and 2) Proposals to cut deeply the numbers of nuclear weapons and perhaps even eliminate them entirely. He intends to work on these issues with my current colleagues at the Program on Science and Global Security and on the International Panel on Fissile Materials. More importantly, He hopes to develop new collaborations with faculty and researchers in the School of Engineering and Applied Science and to contribute to the work on international security and climate change at the Woodrow Wilson School and at the Princeton Environmental Institute.

Oral contribution

WMD Disablement – Developing a new Capability

Lt. Col. Bernd Allert

German Army – JCBRNe COE NATO, Czech Republic

Curriculum Vitae: 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.

Abstract: At the 2009 NATO Summit in STRASBOURG/KEHL NATO's Heads of State and Government endorsed "NATO's Comprehensive, Strategic-Level Policy for Preventing the Proliferation of and Defending Against CBRN Threats". A capability gap on WMD Disablement (WMDD) was identified. Since then NATO's Military Committee endorsed a WMD Disablement Functional Concept. Currently, WMDD is defined as operations, which aim to systematically locate, secure, characterize, eliminate or dispose WMD, CBRN weapons, CBRN devices and materials (...). Along all lines of capability development (DOTMLPFI), the development of a WMDD doctrine has been initiated. Some minor WMDD events were and will be included into NATO's major exercises.



Oral contribution

Guidelines for first responders based on results from deploying a mockup dirty bomb

Dr. Carlos Rojas Palma

SCK CEN, Belgium

Curriculum Vitae: Carlos Rojas Palma holds a PhD in Physics from the University of Antwerp, Belgium. In the past he has been actively involved in the field of nuclear emergency preparedness and response under the Environment, Health and Safety Institute of SCK•CEN. He coordinated several R&D projects and thematic clusters for the Euratom FPs (SAMEN, MOSES, DAONEM and DETECT), in off-site nuclear emergency management and rehabilitation of contaminated environments, and optimisation of radiological monitoring networks. He also coordinated the project resulting in the handbook for triage, monitoring and treatment of members of the public exposed to ionising radiation after a malevolent act (TMT Handbook). He has been a member of the expert group chair of the Assistance Work Group in charge of the implementation of the new IAEA action plan on notification and assistance in case of a nuclear incident or radiological emergency. He is currently advisor to the Belgian Superior Health Council; to the Counter Terrorism Unit of the European Commission DG Migration and Home Affairs and to the European Commission Research Executive Agency on security related matters



Abstract: One of the most documented scenarios whereby a terrorist organization could cause disruption and mass hysteria is the so-called “dirty bomb”, radiological dispersal device or improvised explosive device with a radiological payload. Many studies include source term characterization and have been conducted in environments with favorable dispersion conditions with little or no turbulent mixing which would occur in urban areas.

During the past 7th Security Framework Program the European Commission (EC) funded a research project called CATO (CBRN Crisis management, Architectures, Technologies and Operational procedures) to develop a prototype decision support system for crisis management in addition to providing a suite of guidelines for first responders and incident commanders when dealing with chemical, biological, radiological or nuclear incidents.

The results and guidance reported in this work originate from a set of field experiments, which were used to assess and evaluate the performance of the prototype decision support system (the CATO Lab) under realistic conditions with on-site support from the UK Counter Terrorism Unit Forensic Management Team. The EC classified the outcome of this research and the CATO security scrutiny group has ensured no sensitive information was released in this report.

Oral contribution

Developing procedures and actions in R/N improvised devices attacks

Dr. Milica Marčeta Kaninski

Vinca Institute Belgrade, University of Belgrade

Curriculum Vitae: Dr Milica Marčeta Kaninski is Research Professor and Head of the Department of Physical Chemistry at VINČA Institute of Nuclear Science in Belgrade, Serbia. Dr Marčeta Kaninski received M.Sc. degree in 2005 and PhD in Physical Chemistry at University of Belgrade in 2009, with thesis Hydrogen Membrane Fuel Cells: Energy, Isotopic and Electrochemical Aspects. She has managed national and international scientific projects and published more than 30 papers in peer - reviewed journals. Dr Marčeta Kaninski is a member of Serbian Chemical Society and International Society of Electrochemistry ISE. She is also the reviewer in many journals, including Energy and Environmental Sciences, Electrochemistry Communications, International Journal of Hydrogen Energy and Journal of Applied Electrochemistry.



Abstract: Nowadays terrorist attacks using improvised explosive devices containing radioactive materials or diversion on nuclear installations causing leakage of radioactivity in environment is very realistic. In that sense everything possible has to be done to prevent that or to minimise the consequences of such attacks. Starting from risk assessment of possible attack and proper planning of security of nuclear installations and radioactive material storages, all necessary procedures of acting in such a cases should be developed. Field trainings of the explosives experts and technicians could serve as a good starting point in preparation of relevant structures in preventing and acting in case of R/N incidents, providing them necessary knowledge through the detection and decontamination scenarios, as well as the R/N waste removal procedures.

Oral contribution

Official and "unofficial" dosimetric measurements: the way from Chernobyl to post-Fukushima citizen science

Dr. Vadim Chumak

National Academy of Medical Sciences of Ukraine

Curriculum Vitae: Head of Department - Department of Dosimetry and Radiation Hygiene, National Research Center for Radiation Medicine of National Academy of Medical Sciences of Ukraine. (Ukraine)

Work: beginning from 1986 in Ukrainian Research Centre for Radiation Medicine Academy of Medical Sciences Ukraine, Department of Dosimetry and Radiation Hygiene in position of senior engineer, junior scientist, scientist, senior scientist, since 2017 - head of Department of Dosimetry and Radiation Hygiene.

1994 – 2018: head of Department of Applied Dosimetry, Radiation Protection Institute ATS Ukraine.

2018 – present: head of Department of Advanced Dosimetric Studies, Radiation Protection Institute ATS Ukraine.

2000 – present: member of the Commission of Hygiene Regulation of Radioactive Materials and Radiation Factors, Committee on Hygiene Regulation of Ministry of Health, Ukraine.

2001 – present: member of the Profile Commission 6 “Radiation Hygiene” of the Coordination Commission of the Principal Sanitary and Epidemiological Department of Ministry of Health, Ukraine.



Scientific experience and interests:

- dosimetry of external exposure;
- retrospective dosimetry;
- Monte-Carlo photon transport simulations;
- stochastic approaches in dosimetric models;
- EPR-dosimetry;
- individual dosimetric monitoring.

Abstract: Large scale radiological emergency, in particular nuclear accident, is associated with unexpected outbreak, rapid development and large uncertainty regarding the scale and degree of contamination due to release, particularly at the very beginning (initial or early phase of the event). As a result, specially trained and dedicated radiation surveillance forces and facilities will not be able to come to the scene and promptly collect the data (dose rates, samples, spectrometric characterization of the release vector, air concentrations etc) needed for decision making and countermeasure planning and implementation. The experience of past radiological emergencies show that at this stage the lack of dedicated official (planned in advance and highly professional) measurements may be addressed by the unplanned measurements done in some occasions by non-professionals using, sometimes, improvised measurement instruments. Such measurements, performed after Chernobyl accident by uncoordinated persons served mainly to self-assurance of selected individuals or small groups (i.e. families). In turn, with development of communication technologies and increased role of social media, the ‘unofficial’ measurements after Fukushima accident became a significant phenomenon, providing essential information for filling data gaps and increasing public assurance and building trustful picture of post-accidental contamination and associated hazards. Nowadays the move towards citizen science in the area of radiological monitoring under normal and accidental conditions maintains this impetus. The evolution, current status and future developments will be presented and discussed in the talk.

Oral contribution

Fukushima: an experience on the field

Dr. Massimo Morichi

CAEN-SYS, Italy – GOLDEN SPONSOR



Curriculum Vitae: Upon finishing his technical studies at E. Fermi Institute of Rome in “Nuclear Energy”, he specialized in Reactor Core Physics simulation & modelling participating to ENEA-PEC nuclear reactor studies on reactivity transient analysis. Doctor in Nuclear Physics at University “La Sapienza” of Rome (Italy) and Certified Radiation Protection Expert.

Mr. Morichi start his activity with the Italian National Institute of Nuclear Physics-INFN and the Ministry of Interior for the Chernobyl emergency, and was teacher for the Ministry of Interior on Gamma-Spectrometry and Nuclear Emergency Measurements.

Mr. Morichi worked in Oak-Ridge (US) as Spectroscopy Specialist, lived in Connecticut (US) for many years while he was CTO-VP R&D of CANBERRA Industries Inc. till 2012 launching and coordinating the development of many innovative nuclear measurement products/systems and collaborations with IAEA, DOE National Laboratories: Los Alamos, Sandia, DNDO, CEA.

Group Leader of the AREVA Fukushima Project for the site remediation plan in Japan.

In 2012 joint the AREVA-Group in Paris as SVP-Director of R&D Innovation where he contributes to establish the Nuclear Light Water Reactor Institute (EDF-CEA-AREVA) developing Technology Roadmaps and many new projects.

He was visiting member of the Scientific Committee of IRSN (Institute for Nuclear Radiation Safety) and has been Board member of the Nuclear Experimental Reactor J. Horowitz (CEA Cadarache).

He’s panellist, chairman and invited speaker at IAEA Safeguard Conference, STS-Kyoto Forum on “Nuclear Technology Trends and Future Prospective”, ANIMMA Conference, IEEE-NSS.

Mr. Morichi supervised and tutor many Master and PhDs Thesis of international universities and has more than 40 International Scientific Publications.

AWARDS: Three International Patents related to innovative Nuclear Measurement Technologies

Abstract: Fukushima accident imposed a stretch to nuclear measurement operational approach requiring in such emergency: fast concept development, fast system integration, deployment and start-up in a very short time frame.

This paper is describing the Nuclear Measurement realized and foresight at Fukushima accident site by Dr. Morichi and his staff while he was Group Leader of Site Remediation describing the technical solution conceived, developed and deployed at Fukushima.

A detailed description of post-accident situation, action taken and all intervention and design choices, from detection technologies to system architecture is offered in the paper. This paper describes also the technical choices executed and put in place to overcome the challenges related to the high radiological contamination on site.

Oral contribution

Detection of special nuclear material with a transportable active interrogation System: from the proof of concept to a dedicated design

Dr. Giuseppe Felici and Dr. Francesco Zanetti

SIT-SORDINA, Italy -- [GOLDEN SPONSOR](#)

Curriculum Vitae: Giuseppe Felici is an Experienced Scientific Director with a demonstrated history of working in the medical practice industry, particularly in radiation therapy. Skilled in Medical Devices, Patent Law, Dosimetry, Management, and Nuclear Physics

Abstract: Rapid detection and identification of biological and chemical agents represent one of the major challenges today. Active Interrogation are considered the only viable option to detect the presence of Special Nuclear Material (SNM) such as Pu-239, Np-237 and highly-enriched U- 235 (HEU).

Our group created a complete active interrogation system based on detectors developed by the universities of Pisa and Yale and on an ultra-compact linear accelerator (LINAC) based on technology previously used in medical field. Initial test has proven the efficacy of the strategy adopted, and on such basis, a complete design of the system has been carried out.



Giuseppe Felici

Oral contribution

Global security and safeguards

Dr. Massimo Aparo

IAEA, Italy

Curriculum Vitae: Massimo Aparo is Deputy Director General and Head of the Department of Safeguards. Prior to this, Mr Aparo was Acting Director, Office for Verification in Iran, since 1 March 2016. Mr Aparo has been working at the IAEA's Department of Safeguards since 1997. He served as Section Head in the Division of Technical and Scientific Services, as Head of the Tokyo Regional Office in the Division of Operations A, and as Head of the Iran Task Force. Before joining the IAEA Mr Aparo worked as Director General of an Italian company in the area of radiation detection and monitoring, in the European Space Agency and at Italy's former National Committee for Nuclear Energy. Mr Aparo is a nuclear engineer.



Oral contribution

Modelling the economic impact of radiologically dispersed devices on a country

Prof. Steve Johnson

Georgetown University, School of Continuing Studies, Washington, D.C., (USA)

Cranfield University, Cranfield Defence & Security, Defence Academy of the UK, Shrivenham, Oxfordshire, (UK)



Curriculum Vitae: Steve Johnson is an academic and consultant, with a distinguished track record in providing strategic advice, training and education to government, armed forces, academia and industry on CBRNE and forensics. Educated at Cambridge University and Cranfield University, he has received broad training across policing and counter terrorism. He is Adjunct Professor at Georgetown University where he teaches on Terrorism, CBRN, International Disaster response and Emergency and Disaster Management policy and law. At Cranfield University he is Course Director for the MSc Forensic Explosive and Explosion Investigation and runs courses and research on CBRN, Explosives and Terrorism. He was recently appointed to a number of committees at the University of Tor Vergata, on their CBRNE Protection Master of Engineering program, where he has also taught on explosives, CBRN and crisis communication. He advises the Insurance industry on CBRNE and other terrorist attacks. His calculations and models have been used by a wide range of insurers and reinsurers and his PhD research focuses on numerical methods to forecast frequency and severity of political violence using historical data sources. He has been Cranfield University's lead on the Pool Re research prg developing enhanced modelling and scenarios. Previously he worked for the security journal CBRNe World as the Deputy Editor and director of technical consulting and continues to be a contribute articles. He is also on the editorial panel of the Crisis Response Journal and is the Head of Man Made Risk for Fractal Industries.

Positions of responsibility:

- Chair of the Forensic Science in Security and Defence Symposium
- Member of the ASTM standards committed for Forensic Science and Homeland Security
- Accredited CT adviser with the UN Centre for Counter Terrorism
- EU & JRC Accredited Security expert.

Abstract: The impact of radiological dispersal devices (RDD) or ‘dirty bombs’ as they have become known, is extremely complex to assess. This talk presents some research that was commissioned at Cranfield University to examine some of the key parameters in determining the economic impact. Using principles applied within Insurance, a stakeholder industry which also wants to understand the impact of RDDs, the research has identified the types of economic harm and key areas of research that are required in order to better be able to assess the risk of these devices. The research finds that human behaviour with regard to contamination can be inconsistent and not always as negative as presumed. In addition to presenting the parameters and some examples of the modelling, the talk will also explore the applications of such impact models. Specifically the ability to use such tools to explore security measures around certain isotopes, policy decisions, and prioritisation of certain capabilities and research questions.

Oral contribution

Active neutron interrogation in nuclear security applications

Dr. Bent Pedersen

JRC- European Commission, Denmark

Curriculum Vitae: Dr Bent Pedersen has worked more than 25 years at the Joint Research Centre in Ispra in Italy with non-destructive assay methods and instrumentation for applications in nuclear safeguards, nuclear security and waste characterisation. He specialises in passive and active neutron detection systems for the development of characterisation, or detection, methods for fissile materials. In the lab he operates a pulsed neutron interrogation facility for R&D in active neutron methods concentrating mainly on fissile materials both for safeguards and security applications. He also teaches neutron correlation techniques in both passive and active neutron counting to nuclear safeguards inspectors from Euratom and IAEA.



Abstract: Among the non-destructive assay (NDA) methods for the detection or characterisation of radioactive and nuclear materials, the passive methods are intrinsically more accurate than active methods due to the additional uncertainty introduced by an external interrogation source. However in many cases the only way to achieve a usable radiation signature, in terms of signal to background ratio, from a sample is through stimulation of a characteristic radioactive decay by means of an external radiation source. In the Nuclear Security Unit of JRC we develop methods and instrumentation for the assay of fissile materials in applications in nuclear safeguards and nuclear security. Active methods typically use a neutron source, either based on radioactive decay or a pulsed neutron generator, to induce fission with subsequent detection of the so-called fission signatures. The fission prompt and delayed neutron and gamma-ray emissions are powerful signatures each with their characteristics that can be exploited in the development of NDA analysis methods. The choice of signature depends on many factors related to the detection system and the requirements to the method. The presentation will discuss in general some of the active NDA methods applied in nuclear security and give as an example further details about an ongoing project at JRC on the detection of Special Nuclear Materials in air cargo by means of a pulsed neutron generator.

Oral contribution

Passive interrogation techniques

Dr. Alessandro Dodaro

ENEA, Italy

Curriculum Vitae: Alessandro Dodaro, born on December 25th 1969, is an Italian nuclear engineer who works in the nuclear field since his Master degree on 1993. He works at ENEA since 1999 in the field of radioactive waste management with particular focus on waste treatment and radiological characterization.

Since July 2015, is Head of the ENEA Division “Technologies, Facilities and Materials for Nuclear Fission” in the frame of the “Nuclear Fusion and Safety Technologies” Department; as head of division he:



- operates the two main Italian nuclear research reactors (TRIGA and TAPIRO);
- is responsible of the ENEA Integrate national service of Low and Intermediate level radioactive waste and orphan radiation sources collection, treatment, conditioning and disposal;
- operates the nuclear laboratory of characterization of nuclear materials and radiochemistry.

Since 2013 is also Chairman of the Board of Nucleco S.p.A. (private company, controlled by SOGIN and participated by ENEA, for Low and Intermediate Level Radioactive Waste management).

Abstract: The current threat for international terrorism is set to a severe level, demanding for worldwide enhanced security. As a direct consequence, the scientific community is strongly requested for both preventive foiling of illicit traffic of dangerous substances, and managing hazardous events. The main concern is about attacks to people in crowded places by means of explosives, radioactive, or bio-hazardous weapons. This led to the blooming of research programs oriented in conceiving, and prototyping, devices able to early detection of such kind of offences. This research field is relatively young, and technical solutions seem to be currently at a first-of-a-kind level. In the last few years, detection of Special Nuclear Materials (SNMs) in freight has been one of the most critical security issues for the European countries. An effective work of prevention and contrast to this threat cannot ignore the use of the most advanced technologies by the authorities responsible for surveillance, seen in this case as end users of the technologies themselves.

This keynote speech is mainly focused on the state-of-the-art passive measuring techniques aiming to detect suspicious materials to prevent Nuclear threats. The most promising research activities and some ready-to-use technologies will be described to give a picture of where we are and what is still needed.

Oral contribution

Airborne and ground-based gamma radiation monitoring for man-made and environmental hazard mitigation purposes

Dr. Massimo Chiappini

INGV - Italian National Institute for Geophysics & Volcanology,
Italy

Curriculum Vitae: Author of about 100 scientific papers in peer-reviewed international journals. Principal Investigator of several international research projects aimed at crustal studies, potential fields research and environmental security. Author of national and international Industrial Patents.

Contract Professor at national and foreign Universities, and Lecturer of geophysical techniques for On-site inspectors at CTBTO and at international CBRNe Masters courses.

Dr. Chiappini has broadly applied ground-based and airborne geophysical techniques to crustal exploration, environmental hazard mitigation and security. He has collected wide experience in field activity in extreme environmental conditions, participating to 9 Antarctic research expeditions, measurements campaigns for CBRN risk mitigation in various continents.

M. Chiappini has acted for many years as national Delegate at the Working Group of experts of the Preparatory Commission for the Comprehensive nuclear Test-Ban Treaty (CTBT).

Abstract: Environmental hazards can be caused by man-made activities or associated to natural events. The areal distribution of a potential contamination as well as the specific radionuclide agents present on site are detected by means of aerial or ground-based vehicles equipped with detectors, acquisition systems and position finding devices. The surveying strategy depends on various parameters, as a function of terrain, meteorological conditions, type of vehicles, equipment, etc. Case studies are shown using different approaches and platforms



Oral contribution

Emergency Preparedness for nuclear powered ships at the Italian Harbors

Frigate Captain Fabio Polidoro

Italian Navy - 2° Ufficio – Capo della 3° Sezione CBRN -
STATO MAGGIORE MARINA 4° Reparto Infrastrutture e
Logistica - Italy

Curriculum Vitae: Commander Fabio Polidoro is a Marine Engineer officer with +25 years of military experience, twelve of them spent on board. He is specialized in Damage Control and for more than one decade he served as Branches Chief in Italian Navy Maritime Warfare Training Centre. Since 2000 he has involved in CBRN operations as planner and instructor. At present he is a CBRN Section Chief in Naval General Staff (Rome).



Abstract: International agreements have established that nuclear propulsion vessels can be hosted in 11 Italian ports. In order to ensure the protection of the population and goods from the damaging effects of a nuclear emergency in port areas interested by the presence of nuclear powered ships, Emergency Plans have been developed

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