CREATIF

Network of Testing Facilities for CBRNE detection equipment

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Report on the Second CREATIF Workshop:

"European Certification System for CBRNE Sensor Systems and Devices"

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at the Federal Institute for Materials Research and Testing - BAM

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Summary

This report gives a summary on the presentations and discussions of the Second CREATIF workshop dedicated to the topic “European Certification System for CBRNE Sensor Systems and Devices.

The workshop has been organized by the Federal Institute for Materials Research and Testing (BAM) in its historic premises in Berlin, Fabeckstraße.

Seventy participants (54 experts from Germany, Austria, Belgium, Croatia, France, Italy, Switzerland, The Netherlands, United Kingdom, UNO/OPCW; 16 colleagues from BAM) joined this 2-day event. A broad range of different stakeholder was represented, including testing experts, end-users of governmental and non-governmental organisations, manufacturers, decision makers and also high-ranking experts of the Armed Forces. Discussions highly profited from this diverse expertise, bringing in a lot of different viewpoints and aspects on the topic of certification of CBRNE detection devices.

On the first day, the workshop has been focussed on detection, identification and monitoring of chemical and nuclear materials to exchange information on existing situations. On the second day technical conditions, requirements and demands for the development and establishment of a European certification system on CBRNE detection equipment and the role of CREATIF within the future system have been discussed by workshop participants.

Although the numerous questions around standardization of testing and certification are far from being finally answered, some important conclusions can be drawn from the CEATIF Certification workshop:

- A differentiated view and representation of end-user needs is necessary to produce good standards. Influence of single stakeholders has to be avoided. Inclusion of all relevant stakeholders has to take place before the finalization of standards, to achieve full acceptance of the final product.
- Accreditation is a prerequisite for independent testing centres to be successful on the market in selling testing services. For in-house testing facilities of the big governmental organisations (like Armed Forces, Police etc.) accreditation is not important, as the customer/owner is trusting in the results of the own facilities based on long experience.
- Already now there are good models for the development of a certification system (presented by TÜV). There are procedures in place to solve the problem of non-availability of testing standards, or issues of confidentiality of auditing results.
- The discussion around a CBRNE – Security Label" showed that this concept has to be much more elaborated, before a decision can be taken whether it is needed and accepted by the CBRNE community or not.
- Certification of products and services meets the interests of the participants because this offers a mechanism of quality evaluation by an independent third party.
- There is agreement that
    - testing of detection systems is needed,
    - that comparability of testing results is desired and should be achieved by appropriate means (e.g. accreditation; certification of products)
    - but the need for a specific label is still in question.

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Content

1 Introduction

Public safety and security is one of the European countries' top priorities. Security issues became to mean a lot to almost everyone and in response to the existing situation governments of European countries started dedicating a higher part of budget for security issues. Developments for technologies were initiated by the European Commission to improve future response capabilities and strategies to prevent terrorist attacks, to reduce the vulnerability to terrorism and to minimize the extent of damage from terroristic attacks by fast emergency response and recovery. CBRN civil protection faces a growing significance in this concept since terrorists increasingly try to get access to chemical, biological radiological and nuclear materials for the purpose of initiating a CBRN incident to cause mass civilian casualties and catastrophic disasters.

An appropriate response before, during, and after a CBRN incident includes monitoring, warning, identification of the hazardous materials, the estimation of their precise nature of occurrence and their extent of release. Subsequently, modern detectors and detection systems play the key role for a future reliable functioning counter terrorism in Europe.

First steps towards the application of European wide accepted detector systems for safety issues are the initiation of the development of minimum detection standards valid across the entire EU, the design of trialling and testing centres, the establishment of certification schemes for CBRN detection systems and not least a platform for an improved exchange of good practices on the detection of CBRN materials.

The European Union supported project CREATIF is dedicated to provide a communication platform for technology users and decision makers, providers and testers to discuss the future development of detection systems for future security applications as well as to support user decisions and industry product / service developments. A network of testing facilities for security-related products and services focused to CBRNE detection has been proposed and established at this project to initiate the development of a European accepted certification system for CBRNE detectors. Workshops are organized to invite stakeholders to become members of the network and to give a platform for exchanging their views, knowledge and expectations on a future CBRNE detection system. The second workshop of CREATIF has been held on October the 5th and 6th at BAM Federal Institute for Materials Research and Testing in Berlin.

On the first day, the workshop has focussed on detection, identification and monitoring of chemical and nuclear materials to exchange information on existing situations. On the second day technical conditions, requirements and demands for the development and establishment of a European certification system on CBRNE detection equipment and the role of CREATIF within the future system have been discussed by testing experts and stakeholders.

Experts, providers, decision makers and CBRNE related stakeholders have been invited to participate in the workshop and to discuss the road map of the development of a future certification system for CBRNE sensor systems and devices.

2 Presentations and Discussions

2.1 Session 1: State of Art on CBRNE & Toxic Industrial Materials Detection - Identification - Monitoring, Practical Scenarios

Organisation for the Prohibition of Chemical Weapons (OPCW), M. Kazi

"Chemical weapons and the threat of their use: assistance and protection against chemical weapons"

The Organisation for the Prohibition of Chemical Weapons (OPCW) is the implementing body of the Chemical Weapons Convention (CWC or Convention). It has the mandate to achieve the object and purpose of the Convention of Chemical Weapons and to ensure the implementation of its provisions. The goal of the organization is the ban on all chemical weapons: prohibition of the development, production, acquisition, stockpiling, retention, transfer or banning of chemical weapons. The Chemical Weapons Convention treaty holds 170 pages.

Mr. Muhammad Kazi, gave on the first part of his introducing lecture a comprehensive overview on the CBRN threats classification, history of Chemical Weapons (CW) use, and mentioned steps towards chemical disarmaments. In the second part, the chemical weapon convention was described in more detail. OPCW has the task to perform verification of the Chemical Weapon Convention, which is undertaken by means of comprehensive declarations, data monitoring and on-site monitoring and inspections. The verification regime is implemented to verify the destruction of chemical weapons and non–proliferation of toxic chemicals and precursors. The OPCW is allowed to inspect chemical weapons production facilities, chemical weapon destruction facilities, chemical weapon storage facilities and industrial facilities producing chemicals above specified thresholds. OPCW applies three different types of inspections, routine inspections, challenge inspections and investigations of alleged use. The OPCW maintains preparedness to response to a request for assistance in case of a use or a serious threat of use of CWs. A 24 hours response system is available for coordination and delivery of equipment, medical treatment, and advice on protection against the use, or serious threat of use, of chemical weapons to the OPCW's Member States. The OPCW provides training courses, seminars, and workshops for experts to respond to attacks with chemical weapons, and to save lives. These courses also show experts how to detect chemical weapons, and offer practical training to deepening knowledge in other means of protection against chemical weapons. At OPCW 1257 first responders have been trained since 2004. The Member States are obligated to support protection and assistance, either to a voluntary fund for assistance or a

donation of equipment and materials for the OPCW. The OPCW runs international cooperation programs to promote technological and economical development in the field of chemistry. It organized Analytical Skills Development Courses and supported Laboratory assistance, to name a few. The end of the presentation gave insight to the role of the OPCW to international security and counter terrorism. Today the OPCW has the ability to provide assistance and protection under the Article X of the Chemical Weapons Convention.

DB Security Ltd. (Security Organisation of Deutsche Bahn - DB Sicherheit) G. Neubeck

"Protection of the Critical Infrastructure"

The Deutsche Bahn (DB) faces today an increasing responsibility for security and safety in Public Transport Systems and the requirement of an improved protection of its transportation infrastructure. Today DB is a modern leading mobility and logistics company and has excellent skills in the development and operation of integrated transport networks reaching from urban transport up to air /ocean freight logistics. The DB Group is aware of the security issues and developed a Corporate Security Concept to show responsibility for all security issues at the DB Group

The DB has well trained and qualified staff, integrated innovative technical solutions and cooperates additionally close and continuously with the German Federal Police to reach a high objective level of security for its customers and employees. The DB wants to react in a qualified way to specific situations, and ensure protection of the transported freight goods, of vehicles, infrastructure, facilities and buildings.

DB realized an increasing inclination towards violence, against customers and staff but had higher costs due to vandalism in the last years. It faced risks and higher expectations in the security field and demands towards the security. DB sees different potential risks such as technical failures or human errors, criminal acts, dangerous tampering, acts of sabotage, terrorist attacks, natural catastrophes and epidemics as well as pandemics. The DB considers cooperative responsibility between security operators and passengers themselves as an approach to secure the public transportation. It is considered to be an effective approach because the transport system was conceptually constructed as an open system, which must be transformed for safety and security reasons „virtually" into a closed system, without affecting its ease of use. The DB railway is defined as an open access transport system; prerequisites which cannot entirely rule out risks and dangers but the aim is to reduce risk potentials, master the residual risks and mitigate the possible consequences of adverse events.

German Armed Forces (Bundeswehr) Joint Support Command; G. Gnan

"Equipments for nuclear, biological and chemical reconnaissance; testing devices, evaluation of the equipment, performance tests"

Since ten years, the Joint Support Command (JSC) conducts Development, Training and Missions of the Joint Services of the Bundeswehr. Every mission of the Bundeswehr within

Germany is conducted by the acting and commanding General of the JSC. JSC includes several branches which are responsible for Development and Training, the CBRN Defense and Protection tasks. CBRN Defence plays an important role in the protection and defence strategy. CBRN Defence has been changed since the East-West-Conflict disappeared from the map and regional conflicts occurred. Nowadays, the requirements for detecting systems and methods changed from the proof of a lethal dose of pure warfare agents to any material considered to be hazardous according to existing health and safety regulations.

The mission for the Bundeswehr became global and its responsibility changed from war-zones to mission areas which can be as small as locations, where criminal acts are known to take place, like small and hidden terror labs or chemical factories, depots and storage facilities of toxic industrial materials. The CBRN Defence System of the Bundeswehr consists of seven elements: individual protection, collective protection, medical CBRN protection, CBRN evaluation and advisory, CBRN reconnaissance, decontamination and hardening of military equipment. CBRN agents and hazardous materials are detected and identified in the context of the CBRN reconnaissance task. CBRN reconnaissance includes qualified work done by Chemical Corps and CBRN defence teams. The chemical Recon Corps are highly specialized to fulfil mainly the three categories of reconnaissance, warning-, detection- und first identification purposes, support of the scientific based CBRN advisory and high level CBRN field laboratory reconnaissance. The presentation demonstrated examples of technical equipments for ensuring the recon tasks.

At the end of the presentation, capability gaps which occurred during last missions of the Bundeswehr were discussed such as the need of an improved detection capability for toxic industrial chemicals, the functioning of the detectors in hot climate zones and the missing data transmission facilities.

Federal Office for Civil Protection and Disaster Assistance (BBK), M. Drobig

"The test procedure of the Federal Office for Civil Protection and Disaster Assistance (BBK) for chemical measuring equipment for use in civil defence at fire brigades"

The Federal Office of Civil Protection and Disaster Assistance is in particular responsible for preparing tasks for the technical-scientific research upon agreement with the federal states, the evaluation of research results as well as the collection and evaluation of publications in the field of civil defence, testing devices and means, exclusively or mainly intended for civil protection. It must also participate in approval, standardization and quality assurance of the above mentioned items. On the other side, Federal Government supplements the equipment of disaster control in the fields of fire protection, CBRN protection, sanitary affairs and care.

At the moment, in Germany there are seven Analytical Task Forces, equipped with CBRN reconnaissance vehicles. One focus of the task forces is the detection of toxic industrial materials and chemical weapons agents. The BBK set up a system for the evaluation of chemical detectors and defined parameters which they considered to be relevant for comparing evaluations of different detection systems. Such testing parameters are the lowest detection limit, linearity of the sensor signal according to the chemical concentration, influence of relative humidity, the signal indication during increasing and decreasing

concentrations and the delay time of the detector response on fast changing gas concentrations. These parameters are important for the performance strength of the detector due to the existing variance of the physical and chemical detection principles of the selected chemical sensor type.

The BKK developed special test equipment to vary the test parameters during the detection procedure in a defined way. In addition to the detection performance test more critical evaluation parameters for the full assessment of the detection device were added. These are the battery capacity, running costs, consumables, maintenance, easy replacement of parts and additional accessories. Additionally a software evaluation was performed in relation to certain properties such as the ability for internal data acquisition, internal processing and the ability on quality control during field operations. Important issues for the further evaluation of chemical detectors are also the usability under stress and in a CBRN environment, the level of usability of the device menus, the batteries changing ability, the consumables in the field and the suitability for an easy and fast decontamination.

The presentation documented first ideas for the evaluation of detection systems for C-detection. The parameters used for the performance evaluation were defined according to known application scenarios in the civil protection area and C-WMD.

Hot Zones Solutions, D. Rothbacher

"Protection against chemical weapons- comparative studies on chemical detectors during live agent training and inspections"

D. Rothbacher is the managing director of a recently found company and has long standing experience in NBC defence and training. The presentation documented the approach on testing of chemical hand held detectors by means of chemical warfare samples VX, Sarin (or GB which is an organophosphorus compound with the formula [(CH3)2CHO]CH3P(O)F) and Mustard (HD Blister Agent, which is a cytotoxic alkylating compound that includes nitrogen sulfur mustards (H, HD, HT)) during Live Agent Training in the field. The comparative studies were performed according to the following parameters: agent, amount of agent, surface, weather, and technical specifications of the equipment, the described procedures for handheld devices and the aspect of safety.

Netherlands Organization for Applied Scientific Research (TNO) C. Degenhardt-Langelaan

"Experience with the OPCW proficiency testing at TNO facilities"

The OPCW conducts Proficiency Test (PT) in accordance with ILAC-G13 to certify laboratories for the analysis of authentic samples under the provision of Chemical Weapons Convention. Laboratories which apply for the certification must successfully complete three consecutive tests, to be designated by the Director General of the OPCW for analysis of authentic samples. In addition, the laboratory must have a national accreditation. A laboratory must participate in and pass at least one of the two proficiency tests offered per calendar year to maintain the "Designated Laboratory" status.

The OPCW proficiency test is qualitative. The laboratories must determine in this case if any of a very large set of chemicals relevant to the Convention is present in the samples. Two of the designated laboratories perform either sample preparation or evaluation of the test results. Eighteen laboratories from 16 Member States are designated for the OPCW in 2010.

The presentation gave an inside on how TNO is practicing PT participation. The performance of a PT test is very hard because there are only 15 days available for the analysis of the unknown chemicals inclusive reporting of the results. The criteria for the laboratory evaluation were described in more detail. Five performance ratings exist for the measure of the gathered results. TNO has been participating on OPCW PT tests since 1996.

The needed preconditions for the work with chemical warfare agents at TNO were described; reaching from the specially equipped laboratories to the need of comprehensive emergency medical countermeasures.

TNO also participates in OPCW analytical skills courses to enhance national capacities in the Member States by offering training in analytical chemistry to personnel from the industry, academic institutions, and government laboratories. TNO was active in Luanda and Vietnam.

TNO supports the Netherlands government (Ministry of Interior) by maintaining a permanent identification team to give response to possible C-terrorism incidents. Expertise to do this is obtained through a long lasting support by the Netherlands Ministry of Defence in the project ‘Sampling and identification of B/C-agents’.

The first session was closed with a demonstration of the facility for packaging of dangerous goods testing at the BAM area. The falling experiment was very impressive, nevertheless our participants did not get wet.

Summary of the Discussion

The first session of the workshop demonstrated the State of Art on CBRNE and Toxic Industrial Material Detection, Identification and Monitoring. The presentations documented the problems of detection performance strength evaluations. Each expert offered a different approach for the device tests according to its existing task and background, respectively.

Nevertheless the different ways of device evaluations show partially an overlap, which should be used for initiating agreements on relevant testing parameters for future test standards.

The OPCW is an international organization which provides a high level of expertise in the field of identification of toxic chemicals and C- WMD's. It created an internationally excepted network of test laboratories which reliably sample and identify C agents today. It has not only long standing experience in evaluation of chemical laboratories but also in detection and identification of chemicals. The self-defined rules have been accepted internationally. The leading role of OPCW in chemical detection and evaluation of test procedures and C-detectors might not be used comprehensively for the European standardization process because of its defined tasks and political situation and international integration status. Nevertheless the experiences of former officers living and working in Europe might help to set up a future efficient certification system on C-detection devices and facilities.

The session documented also the problem of counter measurements on terrorism in open transport infrastructure systems and highlighted the existing trade-off between security and personal freedom in the modern society. Today efficient open systems are present in the society which cannot entirely rule out risks and dangers. They must be modified in such a way that risk potentials can be reduced.

2.2 Session 2: Application of Standards and Test Procedures for the Technical Evaluation of CBRNE Devices and Sensors and Quality Assurance of Detector Systems and Sensors

Netherlands Organization for Applied Scientific Research (TNO), R. Olivier "*Daily practice of laboratory testing of C-detectors"*

Mr. Olivier started with a short overview on the organisational structure and mission of TNO, and described tasks of the Department of CB Threat, namely protection and detection. For chemical and biological detection TNO performs R & D, trialling, calibration, testing, evaluation and consultancy. They maintain a designated OPCW laboratory.

A wide range of technologies is used for C-detectors to cover different operational tasks like: warning, monitoring survey, confirmation, identification. Examples of technologies are: Ion Mobility Spectrometry (IMS, FAIMS, DIMS), Colorimetric technology (gas detection tubes, tickets, etc.), Micro-sensors (SAW, MOS-FET, semi-conductor), Photo Ionisation (PID), Electrochemical cell technology, Laser / Spectroscopy (FTIR, UV/IR absorption, Raman), Gas Chromatography –Mass spectrometry (GC, GC-MS). This huge variety has consequences for the definition of testing protocols and suitable test beds.

Both laboratory testing and co-called operational testing (under outdoor conditions) provide relevant test data and are somehow complementary. Testing under controlled (laboratory) conditions (e.g.) provides information on calibration, results are predictable, artificial, comparable, yield critical detector specifications, allow live agent testing and the use of complex mixtures. Especially testing of interferences with restrains e.g. smokes is interesting but very time-consuming (because the list of possible substances is endless!). On the other hand, operational testing is performed under variable conditions, so results are less predictable but simulate real situations. Comparability is difficult to achieve, as the whole system is under test. Mostly testing is done with simulants, due to restrictions in use of live agents; common interferences have to be taken into account. Next, critical parameters for lab testing and operational testing are discussed. Agents used in lab testing include preferably live agents (classical chemical warfare agents), but also interferences (common and natural interferences to test for false positives, e.g. air humidity, decon and cleaning agents, exhaust fumes, perfumes, smokes, plant aromas, etc.) and complex mixtures of agents and interferents to test for false negatives. To take into account the sensitivity detectors against impurities (→ false alarm rate), agents of high purity are produced in a special laboratory facility, specially trained staff is needed.

Conditions of testing try to mimic operational use conditions in a controlled environment, stability of target concentration of all relevant agents is critical; measurement of all relevant concentration levels (low ppb to ppm and higher) and reproducibility of detection results needs to be tested. The TNO gas generation system is a highly sophisticated device able to produce a flexible dynamic range of producible concentrations – to adapt to the measurement conditions necessary for a specific detector. For high temperature measurement (+ 50°C to -25°C), enclosed chambers are available. Reference materials can be analysed and quantified by GC-MS system online and off-line.

Questions: How do you ensure that the detector only samples the vapour? A:

A “T”-connector is used to connect it without back-pressure to the generator.

Q.: How do you pick your interference?

A.: Long experience in laboratory testing has lead to a list of candidates.

Fraunhofer Institute for Technological Trend Analysis, W. Rosenstock

“Identification of unknown CBRNE materials. (Dirty bomb) - reliability of the test devices , uncertainty of the measurements; Standards and test procedures”

Fraunhofer-INT is a rather small institute, two groups deal with theoretical work & support, two groups deal with electromagnetic effects (NEMP) and radiological effects and threats. Nuclear security policy and detection technologies is one of the core research topics. FH-INT holds different devices for detection, a car with equipment built in; an unmanned vehicle for exploration. For reliable detection it is necessary to differentiate between medical RN, occurring in daily life and other – real threat substances. Terrorists can use medical RN to mask dangerous nuclear materials. These and many other issues are addressed in the existing testing standards for RN detection equipment.

As an example, ANSI N42 is outlined. It contains mechanical tests, environmental tests, electromagnetic tests, and radiological tests to prove detection capabilities. Other testing standards have been developed by IEC, CEN/CENELEC, NCRP (radiation protection) and IAEA.

Running or starting in the near future, there are two big testing programmes, namely the “Grader programme” (Graduated Rad/Nuc Detector Evaluation and Reporting; USA) and ITRAP+10 (Illicit Trafficking Radiation Monitor Assessment ; EU).

In case of a supposed threat, fast direct measurement in the field is necessary. Warning and monitoring, localization of the threat and finally confirmation & identification of threat are typical tasks. → correct interpretation of the measurement results is difficult, often support of experts in needed, FR cannot do the evaluation themselves. For FRs often an instrument is only one more gadget to carry – the reading of the instrument must be as informative as possible. They use it only in case of emergency, training is not regular, if people have to wear protection clothing – can knobs be operated?

The typical approach for detector performance testing is: hint – detection – deactivation: detect a possible nuclear threat, before the radioactive substance is released. Testing must cover typical problems occurring in the field. Among them are: unknown geometry under outdoor conditions (backscattering of materials, shielding etc.) or the influence of dead time losses; the time needed for warming up the instrument. It is important to check how the system responds to a high dose rate (overload) significantly above the specified maximum value. Other parameters to be monitored are reading the display at night, high temperature, direct sunlight, etc. Battery life time depends also on temperature.

When standards are drafted, care should be taken to avoid the problems of inflexibility. Drafting should not be dominated by special interests, e.g. manufacturers, excluding competitors or discouraging innovative (alternative) approaches. Understanding the whole system is extremely important. Conceivable real scenarios should be the basis of thinking. Future applications and system integration need to be taken into account.

As practical examples for realistic scenarios “Measurement Container NaNu for fast global deployment”, “Inspection of suspicious objects in the context of radiologic or nuclear terrorism”, “Gamma Measuring Portal in operation”, Gamma camera RoSCAN-scan of a building” have been presented and discussed.

Conclusions drawn by Mr. Rosenstock with respect to efficient testing of detectors were: analyze carefully existing standards and procedures; take into account as many as possible “realistic” scenarios; think of the whole system; don’t limit test procedures to parts of a system; does the user know the limits of application? Any test documentation (certificate) must avoid clearly any misinterpretation by non specialists.

Institute for the Protection and Security of the Citizen Joint Research Centre - European Commission (JRC Ispra), V. Berthou

“Testing of RN devices - the ITRAP+10 European Initiative”

After a short description of the JRC-IPSC, Ms. Berthou gave an overview on the risk of nuclear material which is not under control; The Illicit Trafficking Radiation Assessment Program has been initiated by IAEA. A first ITRAP project has been carried out 1997 to 2000 by IAEA and Seibersdorf Research Center. This had a huge impact on IAEA, ANSI and IEC standards development. Today, 10 years later, there is new technology & equipment on the market requiring new tests. The new ITRAP+10 project is in the frame of arrangement of DG JLS and JRC. Eight families of instruments will be tested, in order to to assist member state organizations.

Partners in the project are DNDO, DHS, IAEA. Experts and partner laboratories are invited to apply for getting included on the short list; testing of test procedures will be finalized first quarter of 2011. The actual start of real tests is envisaged around the second quarter 2010. Certification is NOT an objective of the ITRAP+10 project. Most important results to be expected from this initiative are: development of guidelines to be used as technical specifications by MS when purchasing detection equipment relevant in the nuclear security field; testing procedures ready to be implemented; feedback about the requirements included in the international standards; feedback to the companies about the quality of their instruments and how to improve them. Other spin-offs of the project such as a network of EU nuclear laboratories ready to implement the testing procedures are desirable.

German Federal Agency for Technical Relief (THW), A. Broemme

"Operational options of the German Federal Agency for Technical Relief (THW) to manage emergency CBRN situations"

There is no practical experience with CBRN up to now, only planning and preparedness. But chemical incidents occur every day. Operations with CBRN threat substances impose higher risks to the FR staff and the involved persons have fewer experiences. Under such conditions operations need two times more time and also more responders, as they have to be exchanged more frequently. Still, under hazardous CBRN conditions, i.e. in the contaminated zone, THW has to be able to perform the typical tasks – Search – Rescue – Salvage – Clearing - Civil Protection. Also, self-protection of the THW staff must be assured. Other tasks in such operations include decontamination and waste disposal.

Support and cooperation with fire brigades, local police and other FRs is foreseen. As an example for typical THW operations Mr. Brömme reported on the bird flu incident at the Island of Rügen in 2006.

Summary of Plenary Discussion

As an input for the plenary discussion, results from the first Creatif workshop have been presented by F. Strebl. In brief, stakeholders have expressed a strong preference for the testing of detection equipment. Testing should be based on standards, which partly need to be developed. Testing should be done by independent facilities.

Q: Is there a need for testing and certification of detection equipment?

A: This question will get different answers if you ask different stakeholders. Do it like DIN - you need a broad agreement, i.e. all kind of stakeholders need to be involved in the definition of testing standards, then it will be broadly accepted.

For CBRNE detection systems it could be a straightforward option to use two different standards - one for procedures (test methods, recognition) and one for additional classified tests and requirements.

Testing agents: For many end users toxic chemicals are more important than chemical warfare agents, standards should be flexible to be adapted to clients. Different users will have different needs; requirements for testing and methods can be different, a fixed list of target materials does not seem feasible.

At least for RN radionuclides and sources are defined already. In this case, it is even more important, to be aware that often the conditions for measurement are not identical; the concern is to force manufacturers that the meaning of specification is equivalent. Therefore, testing standards are needed to get comparable results for different devices.

Q.: In order to achieve comparability of testing results, isn't accreditation the best way to solve the problem?

Yes, but some important test centers are not willing to go for accreditation, as this implies a lot of administrative work and also high costs.

Q: Is it necessary to perform both laboratory tests and operational tests?

A: There should be two steps in testing: lab-testing and afterwards operational testing; instruments can be good in lab but fail under real operation conditions. There is agreement that we need two approaches, lab tests and filed testing of devices; CREATIF has developed a "Operational testing framework", stakeholders are asked to have a look on this concept and also fill in the respective questionnaire.

Remark: Parameters like battery life-time or temperature variation can also be tested in the laboratory, but other factors like usability under real operational conditions (e.g. scanning containers under harsh environmental conditions) needs outdoor-testing. Finally, the end-user has to define the needs. There is a comment that end-user would like to have the equipment already tested and can rely on recommendations.

Q.: Shouldn't we standardize simulants, and testing agents?

Remark: Only 1% of end-users have used their equipment under real conditions because CBRN incidents occur rarely. So they would not even know about problems; it is important to be aware that there is a huge difference between simulant testing and testing with real agents.

A.: Army relies on its research centres but also on a few other recognized laboratories like FOI or Spiez; tested detection limits are different, they all use internal testing protocols, but the customers trust in laboratories' expertise to choose the suitable procedures for testing.

Comment: Transparency for an open testing process is highly needed by end-users, on the other hand testing results are always confidential, normally the customer of a testing centre wants to control which results are published (or not). One way to solve the confidentiality problem is accreditation and it is also applicable to the testing of detection equipment.

Hypothesis: We need to test. Therefore, we will need test procedures (for certain purpose) - this is the major problem/work to do; how to proceed to obtain (standardized) test procedures? At least, technical specifications to be tested should be correct and agreed with the end user.

Comment: End users (like army) seem to prefer their own lab for testing of the equipment rather than to seek for independent testing facilities.

Answer: Standards are discussed for a long time, usually this is only a slow progress; big test laboratories of end users have experience and don't need/want influence, so they don't see a need for standards but rely on their own testing procedures. Small end-user organizations would need standards and test laboratories, as they cannot afford to finance own testing laboratories to cover testing needs.

2.3 Session 3: "Agenda 2020" - European Certification System for CBRNE Sensor Systems and Devices

German Institute for Standardization (DIN), Division Innovation, R. Marquardt

"R&D phase standardization fostering security technology and services"

First, Mr. Marquardt gave a short overview about the German Institute of Standardization DIN. The main objectives of DIN include the involvement of all stakeholders, regardless of their economic strength or foreign language skills; promotion of free trade through active involvement in international and European standards work; national adoption of international standards; production of uniform and consistent standards; avoiding duplication in standards work; compliance with legislation; active role in consensus-building.

DIN is cooperating with other standardization bodies like ISO, CEN/CENELEC, IEC and DKE. DIN is member of CEN, who take over European standards projects, and give it back to national bodies, to organize and carry out the work for one project, so they act for CEN; the same is done for ISO.

Standardization has a two-fold role. Traditionally, it is a source of technological know-how, supports trade facilitation and technology transfer; provides the scientific basis for legislation. But it also has a value-added role in influencing the innovation process, namely standardization promotes knowledge and technology transfer; it helps to disseminate and implement innovative knowledge. In each case it has to be decided, which info should be written down in a patent (how a product works), and which info should go into a standard. There are different types of standards in the research and innovation process: terminology – oriented basic research – measurement and testing – applied research – interfaces – experimental development – compatibility, health, environment, safety. Networking is an important advantage for the actors in the field of standardization. So, it is a benefit for the German industry.

For the field of CBRNE, standardization is covered by different standardization bodies; mainly they deal with publishing of guidance documents, standards and specifications primarily for products, measurement and testing. Harmonization of requirements seems to be needed. For radiation detection equipment, international standardization work is mirrored by DIN standards.

The importance of certification and standardization has been underlined in the ESRIF report for security products. ESRIA (European Security Research and Innovation Agenda) rises the demand for a European Security Label, as a common "seal of quality" for security equipment, capabilities and solutions. It has to be discussed, how to handle this in Germany, where not

everybody likes the idea on certification. For standardization and certification of CBRNE it is particularly important to involve stakeholders as early as possible and provide transparency using standardization. There is a challenge in standards to organize the market. Also it is necessary to open the political culture towards “Europeanization”.

Involvement is necessary BEFORE the standard is published – afterwards it is too late to ask for changes! So the recommendation to experts is to go into the meetings and give their opinion.

Q: is there a change in policy concerning using patents in standards?

A.: It is not recommended to do so, because you can promote a single company if you use their patent. Sometimes it is not possible to avoid it – then the fair-use procedure has to be applied. So the policy has not changed, but DIN is more flexible now.

Q.: German industry is in favour of „Declaration of conformity” by the producers. They believe, that certification costs a lot of money and time, and has no value, because the declaration of conformity is as good, do you think so?

A.: This is true in Germany, but may be a problem. For the security field the discussion has to go in a different direction, independent testing standards are desirable. Another participant expressed the opinion that certification bodies sitting in Germany are important to bring products to other countries. This system is fully implemented in the German and European market. The producers like the self-declaration, but often certification is a basic requirement for entering the international market.

There is a difference between large companies, where the cost for certification are distributed on many sold items, this is different for small companies, where only a few items of a specific device can be sold on the market per year. Small enterprises cannot come up with a certificate fast enough – so they suffer from being not allowed to sell their product if the certification is needed.

Often representatives of companies want to have their product mentioned in a specific standard. A private body like DIN cannot promote a specific company in a standard for good reasons. In the regulation area by EC directives we have a stable framework and products put to the market are certified – it is a good system. In the area of development of new products, maybe a voluntary European mark would be easier to be accepted. It has a big advantage for producers if they have a competent certification body to give an independent indication of the quality of product in comparison to no-name products.

TÜV Nord, K. Oberste Lehn

“Do Security Requirements complicate the Accreditation of Detection Systems for Contraband and Counter-terrorism Applications?“

TÜV Nord is a German certification body with inspection and certification duties. Today TÜV is testing and inspecting every product you can imagine (regulated and free areas), sometimes there is a need that products have a label (e.g. CE), for medical products this is set in European Directives). Then criteria are well defined.

In the free area we need mutual recognition. The system of certification is safe; it does not have gaps to transfer information to terrorists, so certification is applicable without problems for security products. Mr. Oberste Lehn describes the System of Conformity Assessment: in Germany app. 80 certification bodies are assessing app. 4500 assessment bodies (testing centres, laboratories). DAkks is member of ILAC (for testing activities). 4500 product certifications in non- and regulated areas, 1500 quality systems granted. For conformity assessment procedures harmonized standards are needed.

Accreditation can guarantee that information presented to assessors is well protected. For instance in the medical device area very complicated products combined with much IT software have mandatory testing, including on-site inspection on the site of the manufacturer. Such products have very high development costs – so a leek of information to competitors would be extremely critical – nevertheless all products carry a CE mark and other certification marks (carrying the number of the assessment body). In the voluntary area we find free labels and marks. These products also have to be inspected, a leek of confidential information is critical also in this field and has to be avoided in any case.

By definition, accreditation assures that the testing is reliable. Certification is the attestation related to products. “Specified requirements” define the need or expectation, which may be stated in normative documents such as regulations, standards and technical specifications. The process of accreditation has been described in detail by Mr. Oberste Lehn. If harmonized standards are lacking, validated in-house methods need to be developed and very well described. He recommends the use certified reference materials, perform proficiency tests, take part in round-robin exercises - then validation can be done in-house as well. Traceability is a must, all of this has to be assessed by an inspection assessor (external, recognized by an accreditation body). Weak points in the accreditation systems can be suspected concerning confidentiality of information. Test procedures (in house methods) have to be reviewed by external assessors. Every assessor has to sign a letter of confidentiality. The document review can be done on-site to avoid post transfer (no leak of info possible on this path). Also, harmonized reports can be used (only a checklist), they do not have to contain all the confidential details met during the assessment.

Oberste Lehn presented a “ready-to-use” to-do list from IEC for a silent accreditation system. This could be used for CBRN topics.

- Define the basic requirements (ISO 17025, ISO 17043, ISO 17011)
- Define the basic requirements on qualification of assessors / peer evaluators
- Conduct training courses / implementing a technical sectoral committee (e.g. for forensic testing the sectoral committee will only have policemen as members; so there is no gap for information, only police can have the info!)
- Define the basic assessments
- ISO 17002 conformity assessment; on-site peer review, Pt-testing organisation
- Define basic requirements on reporting (e.g. harmonized check-lists)
- Define the basic requirements of exchanging the experience (assessors; conformity assessment bodies).

A roadmap for accreditation in the field of CBRNE needs to include agreement on the way of recognition; mutual recognition of interested parties, self declaration of competence; establishing of technical committees for peer-assessments, implementation in a national

accreditation system. Peer-assessment does not involve external parties, only if all parties agree, the CBRNE system could be implemented in the national accreditation system.

An example is given, where BKA and several Criminal Police offices have achieved accreditation for testing of forensic methods and specific ICT applications. As a conclusion, the question raised in the title of the presentation has been answered with a clear NO – there is no problem to implement accreditation in security-sensitive topics.

Isdefe (Ingeniería de Sistemas para la Defensa de España - Systems Engineering for the Defence of Spain), C. Marti Sempere

"An EU CBRNE certification label. Economic aspects and impact on industry"

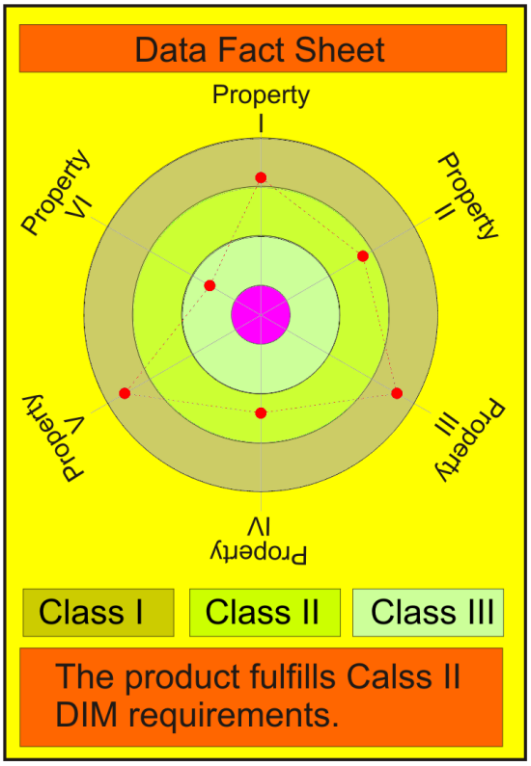
Mr. Marti Sempere has an economic background and was invited to analyse the impact of standardization and the introduction of labels in the field of security products like detection systems. In general, if the customer place is very large, standards will have a larger impact and then standardization is very important. Mr. Marti Sempere outlined the most important implications of standards on economic aspects. In short, the existence and use of testing standards make it easier to produce, sell and buy detection equipment. Such standards enable the market and are part of the infrastructure for innovation-led growth. In the field of CBRNE the number of potential customers on the market is lower, but it is important to think of the whole EU rather than of small national markets. This is especially important to keep in mind if you speak about the costs of producing standards, which is a time consuming process. Several aspects raising costs for the development of standards have been discussed in the presentation. The problem of strategic behaviour can appear during the drafting of a standard with the aim of steering the process in a way that favours their own particular competencies, thus gaining market share or even excluding potential rivals whose products do not show certain attributes or do not surpass certain performance thresholds. Even official standardisation bodies may be captured by some industries when they provide convincing testimony that performance and attributes requested are necessary. The right instruments to avoid this problem are: openness, inclusiveness, transparency, coherence, as well as the use of fair reasonable and non discriminatory licences when IPR are included in a standard. Concerning the certification of products, the benefit for the end-user is accompanied by increased costs and difficulties to bring products quickly to the market on the side of the manufacturers. Finally, Mr. Marti Sempere listed the most important benefits which could be realized by implementation of a European Security (or CBRN) label. In the conclusion he stressed that the development of an EU CBRNE label shall be welcome. Standards are proven to have a very positive effect on markets raising quality, reducing search cost, stimulating innovation. Yet, standards may have undesirable effects that should be closely monitored to avoid a negative impact on market like excessive cost, sluggishness, discriminatory conditions, exclusion, or the creation of oligopolistic markets with a negative impact on customers (less product variety, less innovation, higher prices, etc.). An industrial and economic impact analysis of the development of an EU CBRNE detection equipment label should be considered during the development of a roadmap on certification of products.

Federal Institute for Materials Research and Testing (BAM), J. Beckmann

"Agenda 2020 for an European Certification System for CBRNE Sensor Systems and Devices – the Concept for a Roadmap"

In the introduction, Mr. Beckmann briefly described the terms CBRNE, Toxic Industrial Material, Detection, Identification, Monitoring to define the boundary conditions for a future certification system. A vision on a CBRNE Certification has been presented to deduce a Roadmap for the development of an European CBRNE Certification Concept for devices and sensor systems (Agenda 2020). It will be embedded in existing national and international accepted structures of accreditation (e.g. with accredited testing laboratories and certification bodies working according to the EN 45011 / ISO Guide 65 standard).

As said in earlier contributions at this workshop, for the development of standards, all stakeholders should be invited. Everybody buying the equipment should be seen as an end-user not only the traditional FRs. It is important that user-needs are introduced, as manufacturers don't know the exact end-user needs. The EU CBRN Action Plan is mainly based on needs of police and anti-terrorism units, fire brigades are not so well represented.



Costs of certification according to Mr. Beckmann should be covered by the European Commission, as this is a demand from the society.

By developing a "CBNRE Certification Label" to visualize the tested quality according to well-defined criteria (standards / protocols as suggested by the Certification Council) end-users are supported and issues of confidentiality can be avoided. Data sheets can give information on different detector properties defined as specific classes rather than reporting specific technical values.

Mr. Beckmann reported on first activities for testing of x-ray tools for vehicle and container inspection. For this example, the development of testing, product and system requirements has been started triggered by the "100% Scanning directive by US"

Cotecna Inspection SA., M. Miller

"Container tests state of art and future requirements (the reality)"

Mr. Miller started with a brief introduction about Cotecna. The company is dedicated to offering services and provide innovative solutions that improve and secure the trade environment (e.g. non-intrusive inspection of cargo containers). Future requirements of CBRNE detection equipment are elaborated, customers' top priorities include scanning systems with low or no false alarm rate, no false «negatives», faster throughput, easier operation, better imaging, better «low dose» solutions, better material discrimination, much

lower cost, easier maintenance, longer operational life, commercially viable Chem & Bio detection solutions. Some new promising technologies are just emerging, but testing of stated properties is a must to provide trusted information on detector capabilities. Private sector service providers want to recommend customers tested equipment. Otherwise comparison of equipment is impossible, claims of manufacturers can only be proven by testing of equipment. In this context, Mr. Miller highlighted the importance of harmonization of testing and the mutual recognition of certification. This is especially important for global service providers.

Q.: How much is the actual percentage of containers scanned, referring to the 100% Scanning Directive in the US?

A.: 1-2 % depending on the region, but there are countries, where up to 60% of imported containers are scanned, but mainly for purpose of customs / false declaration.

During the lunch break, H. Ciglasch from the Berlin Criminal Police (LKA Kompetenz-zentrum Kriminaltechnik LKA KT 61) gave a demonstration of the LKA – KT 61 CBRN Mobile Laboratory and Reconnaissance Vehicle.

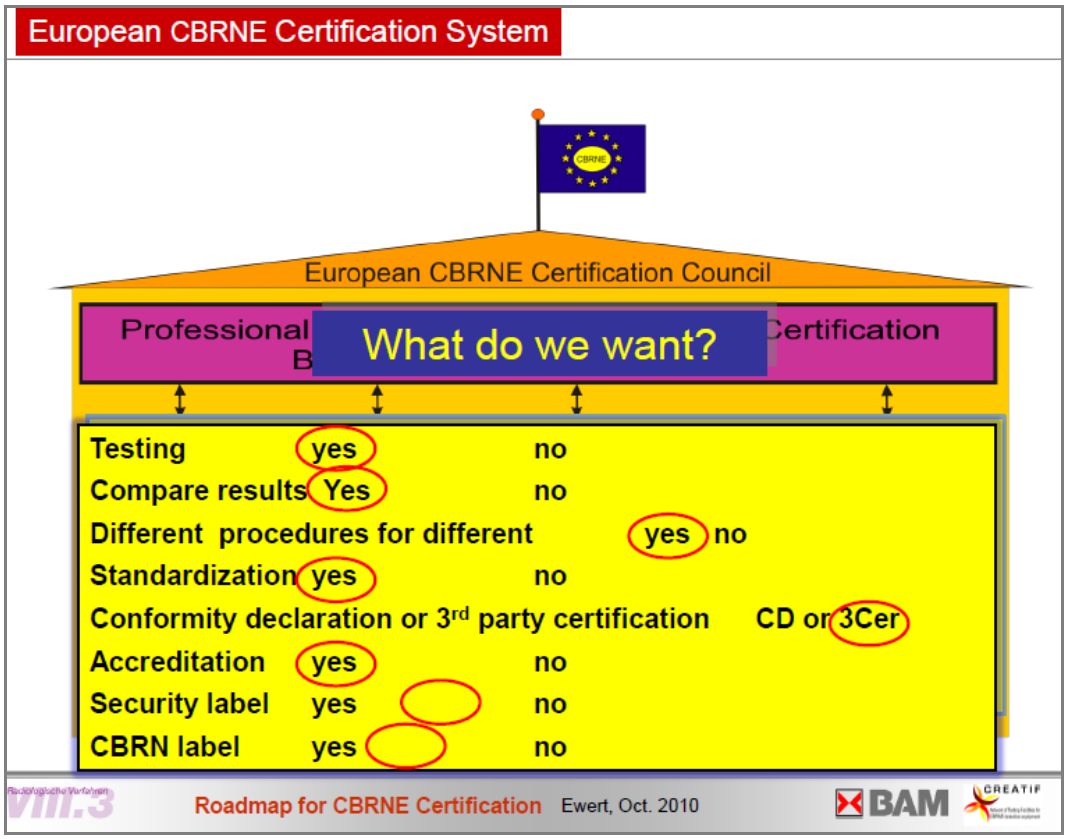
2.4 Session 4: Plenary Discussion: First steps toward a European Certification System for CBRNE

The last session of the Certification workshop was dedicated to a plenary discussion in order to extract most important aspects of the presentations from both days and collect the opinions of the workshop participants on the issue of testing and certification of CBRN detection systems. To stimulate the discussion, Mr. Uwe Ewert from BAM gave a short impulse-speech summarizing the Creatif certification concept.

First it has to be clarified, what can be done at the moment (with the existing standards, market conditions etc.); what should be done (from the viewpoint of different stakeholders) – and what can be done in a realistic timeframe like e.g. until 2020.

There has been doubt that a general and universal solution is possible, as the opinions and experiences of different stakeholder show so much variability – so from the different viewpoints the picture on certification is very confusing. On the other hand, there has been agreement that the topic is relevant and we are on the way, but it is a long-term process to develop a certification system.

In order to structure the discussion, it has been decided to go through the different components of the certification system and map the preferences of the audience. In the figure below, the final results – after discussion of each of the components – is summarized.



Discussion around "Testing"

Do you need different procedures for testing for different customers? Yes – and also for technical testing there will be a need to develop protocols for groups of detection systems (e.g. grouped by operational use). Conditions for the test have to be selected in the right way. Standardization is important, but it has to be envisaged that there are many different testing procedures, so harmonization is difficult. An example can be taken from testing standards for RN detection systems. There is a considerable, but still manageable set of standards to cover all the different products available.

How to ensure that standards contain all parameters necessary to get a full picture, e.g. if many laboratories cannot do testing with live agents in the field?

A.: This can be done by involving all stakeholder-groups, especially end-users in the standardization process.

Discussion around "Accreditation"

It is possible to get accreditation without standards. It is possible to work with validated in-house testing protocols. Measures to ensure comparability of results have to be established (e.g. intercomparison exercises with other labs). Still, the comparability of results will be less good than when working with a testing standard. On the other hand, new products will not have standards, and it takes officially 3 years at least to produce a standard.

If procedures are carried out by competent accredited bodies, it is a good trade and avoids double measuring activities, because test reports are comparable and trusted even if standards are lacking. The mainstream direction is toward accreditation. As a calibration lab you cannot live without accreditation e.g. in metrology, where reliability is a key factor – in the non-regulated area you cannot survive without accreditation. Accreditation is also used to declare the competence of a laboratory.

In the voluntary area it would be possible to make a framework for an accredited certification body, who can then audit non-accredited testing labs, and the accreditation of the certified body is sufficient to issue the certificate.

Discussion around Conformity Declaration

CD is a statement from the manufacturer that declared parameters are correct. It may be, that stated characteristics are correct under laboratory conditions, but under realistic operational conditions this statement may not hold. So it is not that the manufacturer is „cheating", but only incomplete information is given (to hide possible disadvantages of a tested equipment).

For most products we have CD (conformity declaration), but the question is, whether this is enough for the customer. There is a proven demand for reliable and comparable systems specifications. This demand can be covered by testing of equipment. Furthermore, the testing results need to show proven quality – this can be done with accreditation.

Certificate is sufficient – do we need a label?

The label gives you at the first glance confidence that the product complies to specific rules. If the labelling is not obligatory (like CE label, where only labelled products can be sold), the label is only a “nice sticker”. The customer is interested in the detailed testing results – the label is not so important. Important is to show that the product is tested – and stated values are confirmed by a third party.

Labelling can be misleading if the procedures behind are not transparent. The procedure, when and how you get a label is not worked out for the “Security Label” – so this is still missing. A label is important, if customers ask for it. The advertising can misguide the decision process, a label could provide an objective measure of the quality of given equipment.

To measure the costs-benefits of the CBRNE - label it is an important prerequisite to make a decision, whether we need such a label. The Label can be a sign of „European quality“, so it is more a wider idea to advertise the European approach of high and objective tested quality.

2.5 Summary and Conclusions drawn by the Consortium after the workshop

Even huge self-sustained organisations like the German Armed Forces have finally recognized other laboratories, so there is an opening up into the direction of independent testing facilities. Nevertheless, it will remain difficult to integrate the big governmental players into a common process. For smaller organisations it is recognized that there is a demand from other stakeholders to have testing. The degree of awareness is increasing.

The discussion is difficult, because people have a different level of understanding (decision makers vs. field officers; testing experts vs. manufacturers) and viewpoints on the issue of certification and testing. There was a short discussion on the necessity of accreditation of labs. Testing experts from the fire-brigades said that they only measure and test equipment which goes to the own organisation. So accreditation for them is not an option, as they are not meant to provide service to other parties. The position of governmental testing experts affiliated to the Ministry of Defence has been changed in the last years. Now they are open to carry out testing also for civilian customers (e.g. FR), so the testing centres are opening up for the European market. Up now there is no initiative to do the accreditation of testing labs belonging to the Ministry of Defence, but if there is a demand from outside customers, this may be done in the future (as for chemical analytical labs, where the ministry has asked for accreditation). For many testing experts coming from independent testing centres the issue of accreditation is already solved: you need it to be successful on the market in selling testing services.

The roadmap presented by BAM and the first experiences of TÜV in certification of security relevant services and products at the Police and Armed Forces can be a good approach for the development of a certification system for CBRNE detection devices. Finally, there is a roadmap visible already, although the timeline for implementation may be still in question.

By the Creatif Consortium it is seen as a big success that the big players in the CBRNE community followed our invitation and were represented by high-ranking experts. So, there is definitely a will to get involved to shape the process of CBRNE detection systems testing and certification.

The Certification Concept has been presented for the first time to a relevant external audience – and we did not get serious rejections. Up to the step of certification there has been rather broad agreement, accreditation was not fully supported, the label is still not fully understood, and therefore the support is low. This will be an important task for the next project phase – to specify more precisely what exactly could be the definitions of a label for CBRNE detection systems. Although most of the end-users would potentially like a label, there is a more pronounced demand to have a test-report with reliable data on detector properties first. Moreover a cost-benefit analysis should be carried out to support this decision, and to avoid that the label becomes only an advertisement tool for the security market instead of a real source of information for end-users.

3 Acknowledgement

The consortium and also participants appreciated very much BAM's great hospitality and the perfect organisation of the workshop in the historic premises of the Federal Institute of Materials Research and Testing.

Special thanks go to the staff members of BAM Division VIII.3 (Radiological Methods), who have taken all measures to organize a convenient atmosphere and provide support to participant whenever necessary.

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More information can be found at http://www.creatif-network.eu .
Powerpoint presentations of this workshop can be found at:
http://www.creatif-network.eu/workshop2.html