The Working Group's Commitment ("White Paper") Issue 1

The EFNDT Working Group 5 "Public Security and Safety NDT Technology" (WG5 PSSndtT), Aims and Tasks

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This text reflects the current situation which always may be subject to changes. Therefore, it might be revised accordingly at any time.

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Vision and mission

Preservation of human achievements and progress doubtlessly is a pillar of our society. This includes detecting threats in time to prevent disasters which may rise either from forces of nature, defective technology, human failure or malicious intend. In this view, principally no difference can be spotted between safety and security though both are enforced by different institutions. However, the unifying rationale gives rise to form bridges between them. This is the Working Group's mission.

Preventing is better than healing, an old proverb says. Numerous preventive measures exist; depending on who is in charge of countering which threat rather than which technology may be most appropriate. Rather prominently, the X-ray technology is well introduced in the medical diagnosis, in technical safety as well as in public security measures as encountered in any airport security check. The split responsibilities inevitably lead to different specifications, definitions and standards pertaining to the specific applications though the related physical principles and requirements remain rather similar if not the same. This example shows that it should be conceivable to exchange ideas and experiences between the different application areas. It is the Working Group's commitment to both, providing a common forum for the technical safety and the public security areas and initiating cooperative efforts.

The activities are definitely not confined to certain technologies or applications. They should encompass principally all detection technologies pertaining to threats arising either from technical flaws, natural forces in context with human technology, human imperfectness or even malicious intend. The general purpose of all these technologies is to detect signatures indicating a threat in time before a disastrous event may happen, or at least to mitigate the aftermath to be expected. It is rather obvious that the "malicious intend" is a security matter whereas the other areas mentioned belong to the large field of technical safety, and these two areas are assigned to different responsibilities. The disadvantage of this separation certainly is the lack of communication preventing the exchange of experiences and of information on new approaches. Furthermore, different terminologies and concepts have been developed in preventive strategies, crisis management, educating personnel, standardisation and certification wherever established, and last not least in assessing performance and reliability. The Working Group 5 is committed to bridge this gap enabling a mutual exchange wherever appearing promising while respecting essential differences. This should also pave the way to new approaches on either side. In any case, the aspect the NDT community could profit from certainly is how to cope with unexpected situations.

The means of achieving such a goal first of all consist of communication to be organised in dedicated meetings and workshops or sessions within larger conferences. This is to discuss both, problems to be resolved and detection technologies that might already exist somewhere or may require some further development. All EFNDT members are encouraged to revise their own technologies if they might be useful for security purposes. This definitely includes novel emerging technologies such as Terahertz applications. To complete the round, everyone active in the security field is invited to join in, particularly the end-users but also law enforcing authorities and providers of services and equipment. Such events are also meant for providing an occasion to form consortia for common grant applications.

The current position, viewed in a very own way

In a simplified way, disasters could be regarded as deliberating uncontrollably either tremendous amounts of energy or releasing harmful materials. As a consequence, any accumulation of high potential energy or of dangerous substances already poses a threat and should be therefore strictly under control. The cause of disasters could be rather different, natural forces, technical defects of any kind, neglect, human failure or even malicious intend. While the first one may be hard to predict, particularly the last one gave rise to separate between safety and security in terms of responsibility. However, regarding the outcome of any disastrous event this differentiation tends to vanish at least for the victims. This leaves to assume that the different causes may have some common features, maybe expressed in different ways. One of them just consists of the mere presence of a high potential risk in any case. This is why critical infrastructures deserve adequate protection. The other feature could be represented in signatures that do not belong to the site where they have been located while indicating a certain threat. This could be either a crack at a critical site of a construction or a bomb in the luggage destined to be taken on board of an aircraft. Both are searched for using X-ray technology – and here we are, a common denominator.

There are various further technologies that could be listed in this context. They may be well introduced in certain fields of technical safety but even their existence may be not fully aware in other areas such as those committed to public and environmental security. This already gives rise to the Working Group's intension to invite for an exchange of knowledge and experience between the players in each field. It should serve identifying both common features that may be transferable as well as different requirements due to a diversity of circumstances or various levels of *a priori* knowledge about the objects to be interrogated. An absolute prerequisite for such a dialog is a base of common understanding, particularly pertaining to such terms as "risk", "safety", "security", "uncertainty", "mitigation", just to name a few. As a consequence, defining a common terminology should always be an intrinsic part of the collaborative work within the Working Group 5. As an essential step towards realisation, this dialogue should pave the way to the development of common research tools and programmes preventing duplication in the basics but also determining the point of specialisation into either direction. It comprises the improvement of existing technologies but remains open for any novel approach.

As with any technology designed for applications where failing might have drastic consequences, testing for reliability is an absolute necessity. Within the technical safety, the requirements are available for everyone in the form of standards so even someone only bearing in mind to offer e.g. a testing service or a new device is able to obtain information about the required performance and reliability. It has to be discussed how far open and publically available standards and guidelines could infringe on classified information that has to be respected also quite in the interest of public security. Performance assessments finally should encompass whole systems implemented in an environment typical for the intended use together with adverse conditions for both, the instruments and the operators as encountered in any field application albeit any outdoor non-destructive testing or on-scene inspection. Routine scanning procedures with rather monotonous protocols may have problems with overlooking and false indications either in an industrial production line or at a

luggage conveyor belt. The difference might be that the former could be more tiring than the latter because always the same sort of specimen is passing by.

The Working Group's scope exceeds the technical matters and operational mentioned before by including recommendations for and standards pertaining to performance, quality, reliability and training. While the NDT-community has adopted a 3-level qualification system in each technological field this appears to be rather heterogeneous regulated on the security side. There are various education schemes that certainly would profit from some kind of harmonisation based on an exchange of experiences which could be manifested in form of standards. By the same way, accreditation and certification processes well introduced in one area with success could be transferred into others that are less regulated yet. On the other hand, caring for public security may involve coping with unexpected situations more than in the field of NDT dominated by maintenance aspects. Accordingly, the qualification curricula may have different emphases in this respect. At this point, the NDT community even would have a distinct chance to learn from the other side. Finally, the importance in preventing disasters obligates to an adequate responsibility that could be manifested not only in profound knowledge but also in certified test and evaluation procedures. For an European federation, it is adequate, if not compulsory, to achieve all this on an European level.

Achieving these goals is intended by both, providing an exchange platform for all the parties involved and to aim for common projects, i.e. joint grant applications. It is essential to bring together the different communities, the non-destructive testers on one hand and developers, providers and users of the pertaining technologies on the other hand, including all the researchers and the public authorities involved therein. Previously, the Working Group 5 has been active in humanitarian demining. In the meantime, it is the accepted philosophy not to confine to be active a single specific field only but to cover all aspects of technical safety and public security. This pertains to dangerous objects such as improvised explosive devices and to remnants of war as well.

Therefore, the Working Group 5 encourages all EFNDT members to revise their very own technologies acquainted with and regularly used for putative security related purposes and invites everyone working in any of the related areas and seriously interested in the interdisciplinary approach between technical safety and public security. The problems to be resolved are too obvious. It should be also clear that no single technology may have the capability to resolve one of those problems alone. Therefore, the Working Group strongly emphasizes synergistic approaches.

The raise of an idea

After the armed conflict that has restructured the Balkan in the nineties the remnants of war formed obstacles to return to normal life. One of them was the presence of unexploded antipersonnel mines, a problem common with several more countries outside Europe. They prevent the economic usage of lands, they even make them inaccessible. Urged to resolve this problem approaches had to be considered beyond the existing ones such as probing with metal detectors, prodding, searching with dogs and mechanical clearing with armoured flails. Since non-destructive testing encompasses numerous searching and scanning technologies the idea was to ponder if there might be one or the other also suitable in the field of humanitarian demining. Since 2002, this approach has been discussed several times:

- 8th ECNDT 2002 Barcelona (http://www.ndt.net/article/ecndt02/455/455.htm)
- Articles in ZfP-Zeitung, Germany's NDT-bulletin (e.g. http://www.ndt.net/article/dgzfp/pdf/zfp82-osterlohmuellerewert.pdf)
- Development of advanced devices for mine detection (e.g. http://www.ndt.net/article/wcndt2004/pdf/materials_characterization/550_krstelj.pdf)

Already in the beginning it became evident that some approaches may be helpful not only in searching for antipersonnel mines but also for identifying improvised explosive devices (IEDs). While the mines are threatening certain areas only an IED may be encountered everywhere. As a consequence, the scope of the EFNDT WG5 has been extended to cover also the problems of terrorists' threats.

- broadening the scope documents (see WG5 press release and minutes)
- 9th ECNDT 2006 (http://www.ndt.net/article/ecndt2006/doc/Tu.3.4.1.pdf, http://www.ndt.net/article/ecndt2006/doc/We.3.5.2.pdf)
- MATEST contributions (e.g.: K. Osterloh, N. Wrobel, H.-J. Kunte, U. Zscherpel, U. Ewert, Making the world a Safer Place – Some Know-How Already Exists, MATEST 2009, Cavtat - Dubrovnik, 2009-9-23/26, 10, ISBN: 978-953-7283-03-2)
- 10th ECNDT 2010 Moscow (http://www.ndt.net/article/ecndt2010/reports/2_06.pdf)

Current needs and challenges

Existing Problems and Challenges:

- The antipersonnel mine problem still persists in spite of the Ottawa Convention claiming a world free of mines within 10 years, i.e. until 2011.
- The world experiences a steady change with new power constellations unparalleled in history with accumulations of potential energies and of noxious materials never seen before.
- Coping with unexpected situation always is a challenge in either area. Any mutual exchange of experience may be one of the best preparations.
- Improvised mines and booby traps are encountered that nobody else knows how to handle than those who implemented them.
- Innocent and unprepared citizens are threatened particularly in public, crowded places since they have become declared targets of intended terroristic or criminal acts.
- The air traffic and nuclear power plants are obviously most vulnerable to such attacks and therefore have the highest degree of security regulations. Other areas also prone are less regulated.
- Each implemented security regulation has an impact on operational efforts, costs and overall efficiency.
- Both, technical safety and security measures are requested to be balanced between necessities (however defined) and putative risks (however assessed).
- Reassessment of risks and levels of measures will be necessary over and over again and requires appropriate probabilistic and statistic methods.
- Certain scientific principles suit more than a single field of application, however, always with limits one has to be aware of. Different areas such as safety and security still may have divergent requirements, may need alternative parameter settings or variations in the instrumental setup.
- Equipment and measures have to be sufficiently reliable to protect efficiently (however defined, preferably by accepted standards) sensitive infrastructures.
- Measures should not impede unduly all normal processes. This particularly applies to avoiding unnecessary false alarm rate that require certain actions.
- Al personnel involved in any safety or security measure must be able to cope with the operational procedures, identifying indications and triggering alarms adequately.
- Further training of the personnel, maintenance of equipment as well as the development of novel approaches due to identified lacks or new threats is essential to provide appropriate safety and security in a long run.

Standards and agreements

Standards are supposed to:

- define
    - capabilities, needs
    - substantiated requirements
    - products and services adequate to the demand
    - technical specifications in either direction (lower/upper limits)
    - frames of applications
- describe
    - the instrument/method/procedure adequately
- provide
    - a catalogue of demands
    - manufacturers with requests
    - “checklist” for approvals (criteria)
    - a way how to evaluate
    - qualification criteria for manufacturing and testing
    - qualified procurement procedures
- ensure
    - quality in products or services, resp.
    - safety/security on a mutually agreeable level
- prevent
    - non-realistic expectations (“100 % security”)
- avoid
    - blueprints for terrorists and criminals
    - promises that cannot be satisfied
    - setting limits for the future
    - jeopardising research work

Finally: terrorist attacks are not standardised!

Subjects for future considerations

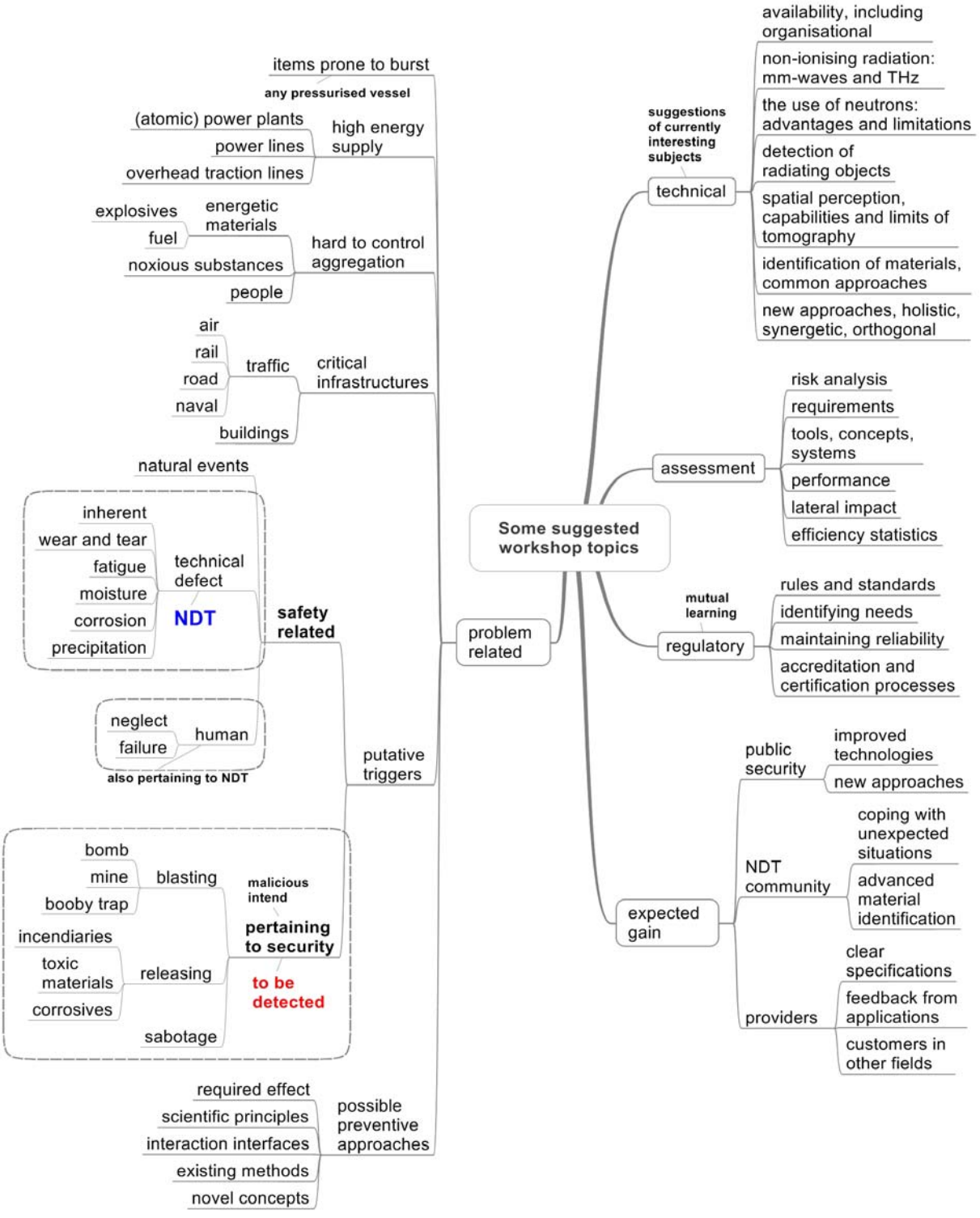

Figure 1: Areas of interest to be considered in the future work of Working Group 5. The core activities of both, NDT and security are marked with boxes and can be related to any other item listed in this diagram.

Conclusive remarks

The EFNDT Working Group 5 is committed to provide a forum serving the exchange of technical knowledge and experience between the two application areas of public security and of technical safety. The latter one is covered by the EFNDT itself whereas the former one should be represented by the end-users of security technologies but also by the providers, the public authorities and by whomever who else may be involved in it. Due to the emphasis on maintaining and securing the activities should focus on preventive measures rather than responding mitigation aspects. However, the protection from new threats arising from previous catastrophic events still remains in the scope of this Working Group.

EFNDT WG 5 intends to make itself more visible to both, in the EFNDT community, the providers of security technologies and the end-users.
NDT and security share the same technology in a considerable extend. Therefore, exchanging ideas, concepts and experiences is more than a meaningful approach in technological development; it may save valuable time and resources.

As a suggestion, the Working Groups (not only WG 5) should approach both, the EFNDT and the national societies to provide slots or even whole sessions within their regular events such as annual conferences for presenting their status, results and achievements as well as future concepts, novel approaches and developments or even newly encountered and unresolved problems. Particularly the latter aspects may even deserve dedicated meetings or workshops together with those groups involved in the particular matter but not necessarily familiar with NDT technologies. This may even give rise to a new kind of a “Working group event” with dedicated contributions pertaining to either the problems emerged themselves or technologies applicable to resolve them.