Mike Farley*
Immediate Past Chairman of ICNDT

JOINING UP THE WORLD OF NDT – the role of ICNDT in a changing world

Wstępując do świata badań nieniszczących – rola ICNDT w zmieniającym się świecie

ABSTRACT

ICNDT and its Regions provide a unique network for multilateral cooperation between NDT societies devoted to the development of the science and practice of NDT for the benefit of the public worldwide. As NDT, and the industries it serves, become more globalised, the need for international cooperation increases in priority and ICNDT and its Regions become more important. The individual member NDT Societies have vital roles to play and acting collectively have considerably more influence than if they act individually.

Keywords: *NDT organizations, standardization, integration and cooperation*

STRESZCZENIE

ICNDT i jej Oddziały tworzą unikalną sieć wielostronnej współpracy między Towarzystwami Badań Nieniszczących (BN), oddaną rozwojowi nauki i praktyki NDT dla dobra światowej społeczności. Wraz z tym jak badania nieniszczące i przemysł, który im służy, stają się bardziej globalne, znaczenie międzynarodowej współpracy wzrasta, a ICNDT i jej Oddziały stają się ważniejsze. Poszczególne narodowe Towarzystwa Badań Nieniszczących odgrywają istotną rolę i działając wspólnie mają znacząco większy wpływ, niż gdyby działały indywidualnie.

Słowa Kluczowe: *Organizacje BN, standaryzacja, integracja i współpraca*

BSc PhD FEI FInstNDT Chairman
Mike Farley

1. Introduction

ICNDT established in 1960 is an international not-for-profit organisation registered as a not-for-profit association in Vienna since 2008. The Members are the national NDT Societies – around 60 in total varying from very large to very small. Members elect a Chairman, Executive Committee and Secretariat to manage their affairs. The ICNDT chooses the NDT Society/country to run the World Conference every four years (19th WCNDT Munich 13-17 June 2016). ICNDT carries out activities in accordance with a Strategic Plan developed with its members and representatives of Regional Groupings of NDT Societies (currently EFNDT, APFNDT, Pan Am NDT, AFNDT).

The paper describes how ICNDT and its Regions work to join together people, societies and organisations working in the field of NDT:

- joined up approach - NDT and CM/ SHM;
- joining up - professionals;
- joining up - globally;
- joining up - the quality infrastructure;
- joining up - qualification and certification;
- joining up - NDT research;
- joining together - to maintain knowledge and motivation;
- joining up - ICNDT and the Regions.

*Corresponding author. E-mail: Mike.Farley@icndt.org

2. Joined up approach - NDT and Condition Monitoring/ Structural Health Monitoring/ Technical Diagnostics

Non-destructive testing (NDT) has a number of important roles to play in ensuring the through-life quality and reliability of many important products whose integrity is of paramount importance. CM/SHM/ Technical Diagnostics additionally allows maintenance to be scheduled, or other actions to be taken to prevent failure and avoid its consequences. Conditions that would shorten the normal lifespan can be addressed before they develop into a major failure. The correct and integrated application of NDT and CM/SHM/TD can prevent accidents, save lives, protect the environment and avoid economic loss. Joining up of NDT and CM/SHM/TD programmes can maximise benefits and reduce through-life costs.

ICNDT includes CM/SHM/TD in its scope (referred to as just CM in the remainder of this paper), reflecting the scope of activities of around half of the members. ICNDT's actions in this subject area are organised by the newest of its Working Groups – WG6.

3. Joining up - professionals

Nowadays NDT and CM should sit confidently alongside other engineering disciplines in a team approach to integrity and reliability. In the past NDT was sometimes treated as a second grade, overhead activity with no added value. Now NDT engineers and technicians are professionals, the technicians are certificated and the engineers may be formally registered (eg IEng, TechEng and Chartered Engineer in the UK). ICNDT encourages its members to link to other professional societies in engineering.

The ICNDT Guide on Education and Training in NDT [1], published in 2015 following two international Workshops, promotes best practice in the education and training of technicians and engineers in NDT and essential related disciplines – both

those who may be considered NDT specialists and other engineers who should know about NDT. These training courses recognise that NDT specialists may be involved in the execution of NDT but also, increasingly and importantly, in "NDT engineering" – upstream and downstream of execution of NDT.

A Workshop on the role of e-learning in NDT and CM was held during the 19th WCNDT and will be reported on the ICNDT website [2].

4. Joining up – globally

Design, building and operation of plant, equipment and machinery are globalised.

Industrial companies procure equipment and materials from wherever is most cost effective, increasingly from developing countries, using local NDT services working to the contract standards. Site construction of plant may be by home personnel or by teams from other countries.

Safety, reliability and availability thus depends on the whole supply chain of companies and contractors all around the world, each with their own NDT personnel and equipment.

ICNDT recognises the need for an international quality infrastructure that can facilitate global trade and effective NDT and CM.

5. Joining up - the quality infrastructure

NDT and CM are vitally important for new build, in-service inspection and life extension and need to be reliable, with the level of reliability dependent on the risk and consequences of a failure:

- NDT in quality control during manufacture:
  - code based NDT with established acceptance standards applied by certificated NDT personnel is generally sufficiently reliable based on longstanding practice;
- pre-service and in-service inspection (or CM) to demonstrate continued fitness for service, or to justify life extension:
  - much more specific consideration of the types, sizes and orientations of flaws is required to allow technique selection, followed by more specific training and certification, and in some cases inspection qualification;
- NDT to investigate specific deterioration issues that threaten the integrity of a structure:
  - specific design of techniques, qualification of equipment, procedures and personnel on representative testpieces.

In each case there are four important factors to achieve the necessary quality and reliability of NDT and CM:

- the responsible engineer must specify his requirements very clearly in terms of the regions to be inspected, % coverage, and the types of flaws or deterioration to be looked for (100% coverage of all-encompassing combinations could be prohibitively expensive);
- methods, equipment and personnel must be capable of the purpose for which they are being employed;
- the selected NDT process must be implemented thoroughly;
- results must be reported and communicated clearly.

There is a need for a joined-up approach between Engineers and NDT specialists at each stage of the NDT Quality chain (Fig. 1.). Quality and reliability of NDT (and CM) depends on each element of the chain.

Fig. 1. NDT quality chain – extended
Rys. 1. Łańcuch jakości w BN - rozszerzony

The Quality Chain shown in Figure 1 is extended compared to previous versions presented by the author to better link up at each end (design and specification of NDT and reporting) and to include an additional important link (employer's responsibilities).

ICNDT's new Strategic Plan [3] approved by the General Assembly in Munich at the 19th WCNDT includes new actions to address reliability, employer's responsibilities and the overall chain.

6. Joining up - qualification and certification

The NDT quality chain is very dependent on personnel training and certification. This has been an area of intense ICNDT activity for many years and is the responsibility of Working Group 1 (21 members from 21 countries) and the ICNDT Certification Executive Committee.

It is clear that we need NDT Certification that we can rely on all around the world. This depends on correct understanding and implementation of Third Party certification and In-company certification (SNT-TC1A).

Third party certificates gained in one country need to be valid/recognised world-wide. This depends on harmonisation and mutual recognition of similar Certification schemes. ICNDT's recent and planned activities are directed towards these objectives and focussed on the unified International Standard ISO9712 published in 2012. More detail of ICNDT's actions is given on the ICNDT website and recommendations are given in the ICNDT Guide on Qualification and Certification of NDT personnel [4]:

- recommendations to users of central third-party certification:
  - when central third-party certification is appropriate, it is recommended that regulators and industry define the levels of competency of NDT personnel who are certified in accordance with ISO 9712 by a certification body accredited to ISO/IEC 17024 or approved by ICNDT and, where possible, which is recognised in the ICNDT Multilateral Recognition Agreement;
  - regulators, users and auditors of NDT operations

should recognise the importance of employers of NDT personnel properly fulfilling their responsibilities to authorise personnel to work after first confirming that their employees are adequately trained, experienced and qualified;

- recommendations to certification bodies:
  - certification bodies are urged to provide certification to ISO 9712 in order to maximise the value of their certification. In anticipation of future harmonisation, their training syllabuses should encompass the requirements of ISO/TR 25107;
  - national NDT societies seeking to establish national certification schemes are recommended to consider seeking cooperation with an existing personnel certification body (PCB) as an alternative or complementary approach. This does not preclude setting up a local PCB;
  - NDT societies or PCBs that are operating outside their own home country are encouraged to cooperate closely with the national NDT society where they wish to operate. In practice, this should be achieved by means of a signed agreement between the parties. When there is a disagreement, the matter should be referred to ICNDT for mediation;
- guidance for developing countries seeking to establish national certification schemes is provided in an Appendix;
- recommendations to national standards bodies:
  - in adopting the international standard ISO 9712, the ISO member body is strongly urged to apply it without deviation from the original text in order to ensure that it acts as a harmonising influence. Significant deviations, although permitted under ISO Guide 21, could result in a refusal to recognise or accept NDT personnel certification.

There is an important section in the Guide on the "Responsibilities of the employer".

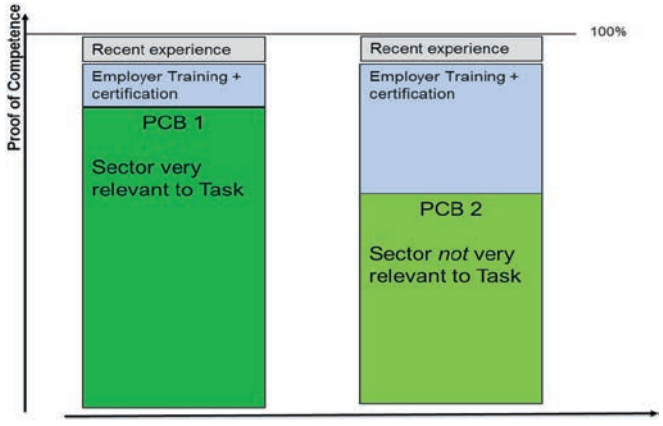

Fig. 2. Differences between pcbs should be compensated by the employer
Rys. 2. Różnice pomiędzy ciałami certyfikującymi personel (PCB) powinny być kompensowane przez pracodawcę

An employer of NDT personnel carries important responsibilities for the overall quality of NDT operations. These should be reflected in the employer's quality procedure for NDT (which may be known as the written practice). The employer retains these responsibilities whether he uses third-party certification, in-company certification, or a combination of both. This section of the ICNDT Guide clarifies the employer's responsibilities and gives guidance on how the employer should fulfil these responsibilities. In this context, the employer (or responsible agency) is defined as 'The organisation for which the candidate works on a regular basis'. If the individual is self-employed, he shall assume all responsibilities specified for the employer or responsible agency.

It is a central tenet of the ISO 9712 standard that the employer has overall responsibility for the results of NDT operations and is fully responsible for the authorisation of his staff to work. In practice, this must should include checking that the NDT tasks to be carried out are within the scope of the individual's certification (sector, method and level) and his/her's recent experience, if they are not, organising additional employer/company job-specific training and/or examinations – see Figure 2. In some countries the central third party certification may be supplemented by industry sector specific training and examinations (sometimes called "trade tests") to fill this gap. In some industries specific Job Task Analysis may be carried out to determine exactly what job-specific training and/or examinations are appropriate.

Progressively increasing degrees of harmonisation can be represented diagrammatically, as shown in Figure 3, where the areas of ICNDT activity and the level of the ICNDT MRA are indicated. There is a strong case for recognition of certification even without complete harmonisation and many practical examples of recognition are familiar:

- personnel certificated under earlier versions of the standard retain their certification until it expires;
- personnel certificated under another standard (EN473) are similarly recognised;
- personnel certificated by another PCB are given exemptions from examinations.

The alternative to such recognition is to require NDT personnel to take repeat examinations, demoralising for the very people we need to motivate, and causing undesirable cost and delay.

A separate ICNDT Guide on Qualification and Certification of personnel for Condition Monitoring has been published [5].

7. Joining up – research and development

ICNDT seeks to help promote research and development in NDT and condition monitoring and to facilitate contacts between researchers around the world. To help NDT specialists make the case for funding ICNDT has produced the "ICNDT Guide on NDT - why it is important and why more R+D should be supported" [6].

It is stressed that research is needed both to find new techniques and new applications of existing techniques but also in support of the better understanding and qualification of existing techniques.

NDT and CM conferences (World, Regional and national) have an important role in promoting contact between researchers but also, because of the vertical integration of the NDT industry and the practice of combining NDT conferences with equipment exhibitions, facilitating the links between academic researchers and industry. ICNDT, the Regions and many members follow this model.

In specific areas, ICNDT is helping to promote interaction

between specialists in the period between World and Regional conferences by setting up "ICNDT International Specialist Groups" (ISGs), each hosted by a Member Society. The initial plans are for eight groups (Hosts indicated):

- full matrix capture - BINDT;
- teraherz imaging – BINDT;
- microwave NDT – ASNT;
- magnetic Memory Method- RSSNDT;
- NDT of Art and Heritage - BINDT;
- NDT Reliability – DGZfP;
- non-linear UT – DGZfP;
- guided Wave UT – KSNT.

ISGs will be open to all members of NDT Societies in ICNDT and will organise their meetings on the internet.

8. Joining up –to maintain knowledge and motivation

ICNDT recognises that both knowledge and motivation are important in the quest for high quality and efficiency in NDT and CM. The organisation encourages member-run NDT societies where individuals can participate, contributing to the work of the society, learning from the experience and enjoying the benefits. Most member societies also have web-sites and increasingly make use of social media to encourage participation. An ICNDT Workshop on use of social media was held during the 19th WCNDT and this will be reported on the ICNDT website [7].

The ICNDT Journal [8] is produced three times a year and used to share information between ICNDT, its Regions and Members. The ICNDT Journal is available electronically and member societies are encouraged to share it with their members.

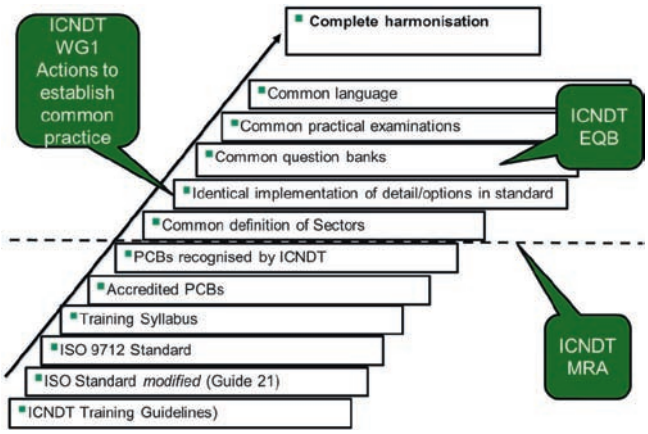

Fig. 3. Progressively increasing degrees of harmonisation
Rys. 3. Progresywnie wzrastające stopnie standaryzacji

9. Joining up – ICNDT and the Regions

A plan to better integrate ICNDT and the Regional organisations (AFNDT, APFNDT, EFNDT, PANNDT) was approved at the General Assembly during the 19th WCNDT and will be implemented from the next General Assembly in 2018.

The planned changes to the organisation will better integrate the activities of ICNDT and its Regions, reduce duplication and sharpen focus. These changes and the new fee structure will allow more use to be made of professional support, reducing the present dependence on the voluntary effort of members and will accelerate the delivery of projects by ICNDT and the Regions. Membership fees for all sizes of NDT society are modest and affordable, a small proportion of a society's annual spend on international activities and a very small proportion of gross annual income. Specifically, the re-organisation plan provides very good value to the membership:

- to Small/fledgling Societies whose membership is an essential step in gaining recognition at home and networking internationally. The new fee structure makes access to ICNDT and the Regions easier for small/fledgling societies;
- to Medium Societies that need to access to international networks and value the opportunities and ability to exert influence globally;
- to Larger Societies which already operate outside their countries' boundaries and can utilise ICNDT and the Regions to further their international programmes.

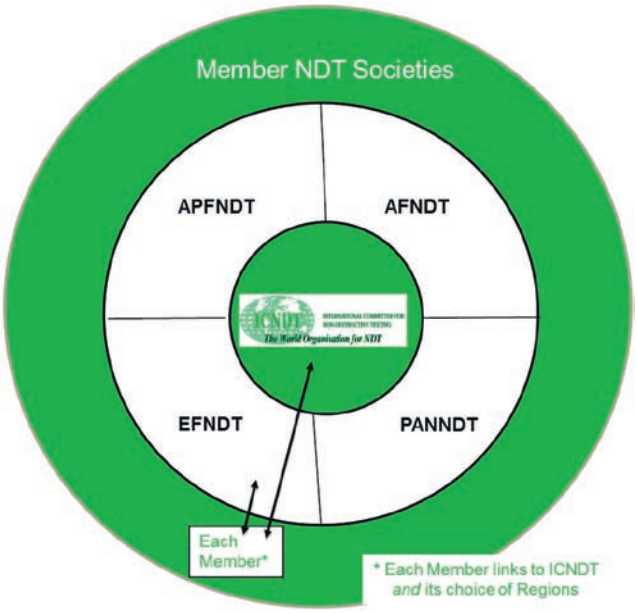

Fig. 4. Integration of icndt and the regions
Rys. 4. Integracja icndt i jej oddziałów

10. References – see www.icndt.org for the latest version of each

[1] ICNDT Guide on Education and Training in NDT, 2015
[2] ICNDT Workshop on the role of E-learning in NDT and CM, 2016
[3] ICNDT Strategic Plan to be published, 2016
[4] ICNDT Guide on Qualification and Certification of NDT personnel, 2016
[5] ICNDT Guide on Qualification and Certification of Condition Monitoring personnel, 2016
[6] ICNDT Guide on NDT - why it is important and why more R+D should be supported, 2015
[7] ICNDT Workshop on the use of social media by NDT societies, 2016, to be published.
[8] ICNDT Journal