

RG 2010 EXECUTIVE SUMMARY

Establishment of a new ESARDA Reflection Group

The latest ESARDA Reflection Group exercise was launched in 2010. During the 2000-2010 decade, important developments in the field of global security have impacted upon international safeguards, nuclear non-proliferation, nuclear security and nuclear disarmament verification. At the same time, the concept of a nuclear “renaissance” took root with an expansion in ambitions for the civil use of nuclear energy and nuclear fuel cycles, both within the EU and worldwide, including new actors and a wider diffusion of nuclear materials and technologies.

Various critical events had taken place since the previous Reflection Group 2000 and offered grounds for reflection, such as DPRK nuclear tests and Iran’s nuclear programme developments. 2010, in particular, saw a number of important events that entered into the Group’s consideration: the entry into force of Integrated Safeguards in all EU-27; the NPT Review conference; the new IAEA Director General; and the IAEA Safeguards Symposium 2010.

Following a proposal during the ESARDA Steering Committee meeting of 25th May 2009 from the ESARDA President Elina Martikka, it was decided to establish a new Reflection Group (called RG 2010).

The specific terms of reference (**ToR**), adopted by the ESARDA Executive Board in January 2010 and presented to the Steering Committee in Luxemburg on May 3rd 2010, read as following:

- **ToR 1** : *to review the status of implementation of the decisions taken by ESARDA, based on the proposals of the RG 2000;*
- **ToR 2** : *to assess the international and European context and trends in nuclear non-proliferation and safeguards, security and disarmament verification areas and their impact on ESARDA’s research and development activities;*
- **ToR 3** : *to analyze whether further actions and activities are needed in order to meet ESARDA members’ needs at European and international level;*
- **ToR 4** : *to make proposals to the Steering Committee regarding possible improvements in the objectives, scope, structure and operations/management of the Association.*

Working method

To take account of the diversity of inputs to ESARDA, members of the Reflection Group were selected from: the steering committee; working groups; direct users of the R&D activities of ESARDA; and, finally, individuals with major involvement in international safeguards activities. Michel Richard was appointed as the chairman of the group. The following table provides a list of the members:

Michel Richard	Chair RG2010 and VTM WG Chair	CEA/DAM
Elina Martikka	Former President of ESARDA	STUK
Kristóf Horváth	President of ESARDA	HAEA
Filippo Sevini	ESARDA Secretary	EC JRC-IPSC
Louis Victor Bril	Former ESARDA Secretary, VTM WG	EC/DG RELEX
Yetunde Aregbe	DA WG vice-Chair	EC JRC-IRMM
Joao Gonçalves	C/S WG Chair	EC JRC-IPSC
Tapani Honkamaa	C/S WG	STUK
Wolfgang Kahnmeier	IS WG	EC DG ENER
Monica Marucci	NMAC AG WG	EC JRC-ITU
Arnold Reznicek	IS WG Chair	UBA gmbh
Gotthard Stein	VTM WG	FZ Jülich
Bruno Pellaud	Individual member	Former IAEA safeguards DDG
Marc Cuypers	Individual member	Honorary Director of JRC

The methodology was based on a three-stage approach:

- **Stage 1** (January ⇨ June): A brain-storming phase, during which the Reflection Group addressed basic questions including: "Where is ESARDA now?"; "What has ESARDA achieved?"; and "Where should ESARDA go and how?". The discussion was fuelled by presentations and papers on topics that arose from the analysis of the RG 2000 recommendations and achievements, and assessments of the international and European context;
RG 2010 focused on analysis of the current status of ESARDA activities in terms of management structure of the Association, the R&D activities of the working groups and the external communication activities;
- **Stage 2** (June ⇨ October): Identification of needs/ challenges;
- **Stage 3** (October ⇨ 2011): Review of recommendations/conclusions.

Stage 1: Analysis of the current status of the Association, also from the point of view of implementing the recommendations of the previous Reflection Group 2000.

ESARDA is an **Association**, established by an Agreement which has legal force according to the Belgian law. In 2010 ESARDA had 23 Parties, two non-EU Associated members and 7 individual members.

The Association is governed by a Steering Committee and managed by an Executive Board. The President and vice-President are elected for two years, whilst the Secretary is nominated by the EC Joint Research Centre.

The heart of ESARDA's activities is within its eight **working groups**, covering both specific technical areas (discipline-orientated) and overarching fields of development (the "horizontal" working groups).

The full list of ESARDA Working Groups is:

- DA, NDA, C/S, VTM, IS, NA-NT, TKM and EdComm.
- *RG2010's assessment of the current status of ESARDA showed that RG2000's recommendations for Working Groups had largely been fulfilled and, where not, that they remained pending.*
- *This is, for example, the case of a recommendation on activity associated with final repositories, for which a safeguards approach is not yet defined.*

Recent changes saw the conclusion of activities within the Fuel Fabrication Plant WG, whose establishment had been recommended by RG2000 and the Nuclear Material Accountancy Audit Focus Group. In both cases, the goals were reached and the competences partly migrated to the redefined "Implementation of Safeguards" WG, itself an evolution of the Integrated Safeguards working group. A new WG, dedicated to Novel Approaches and Novel Technologies, started its work in October 2010.

The Training and Knowledge Management WG organises the ESARDA Safeguards Training Course, which has become a very successful regular event, foreseeing in 2011 its 8th event at the traditional location of the JRC Ispra, with an additional course in Uppsala, Sweden.

ESARDA's communications are overseen by the Editorial Committee, responsible for preparation of the ESARDA Bulletin, under the leadership of the Bulletin's Editor, and development of symposia programmes. The web-site, www.esarda.eu, is hosted by the EC Joint Research Centre, which also facilitates publication and distribution of material and provides the key role of Secretary to ESARDA.

- *RG 2010 found the internal/external communication of ESARDA (e.g. symposia and topical meetings, ESARDA bulletin and Web site) fully satisfactory and encouraged the Editorial Committee to pursue continuous improvements of the quality of these important means, to encourage exchange of information and collaboration between members of ESARDA and with the safeguards and non-proliferation community at large.*

Stage 2: Identification of needs and challenges

One of the most important issues, which had already become apparent within the RG 2000, was the revolution in **IAEA safeguards** and their impact on Euratom safeguards. The so-called “State Level Approach” and the **Integrated Safeguards** systems introduced by the Model Additional Protocol resulted in an extended framework and approach.

Conclusions on the absence of proliferation activities in a State need to take into account not only the “classical” accountancy of nuclear material at facility and State level, but also the coherence of a broader set of indicators, including satellite imagery analyses, environmental sampling and trade data.

This approach, which seeks to utilize all safeguards-relevant information, is supported by a new system of short-notice, unannounced inspections and complementary accesses aimed at a more efficient and “objectives based” implementation of safeguards

- *RG 2000 commenced a discussion on how **ESARDA** could, or should, evolve from being involved strictly in nuclear safeguards towards the **broader area of non-proliferation**, for example taking into account States’ capabilities possibly contributing to nuclear proliferation, and security.*
- *Specific (even if limited) proposals were made and started being implemented within ESARDA working groups. This, for example, is the case of **export control**.*

The DPRK nuclear tests in 2006 and 2009, as well as the evolving debate on the Iranian nuclear programme, showed the ever-increasing threat of nuclear proliferation. In this context it became clear that, much more than nuclear material illicit trafficking, the key element assisting these new programmes was and is the spread of dual use technology.

The Comprehensive Test Ban Treaty and the Fissile Materials Cut-off Treaty, and above all the emphasis deriving from the Nuclear Summit called by US President Obama, revamped the discussion on nuclear disarmament from its low profile within the NPT 2010 conference.

The **European context** has also strongly changed since 2003 with (inter alia): establishment of the European security policy and the **European Strategy against WMD (2003)**; development of the European Union Common Foreign & Security Policy; and the entry into force of the Lisbon Treaty, bringing a new organisation and a new scope in particular with the introduction of a Permanent President of the EU beside the Rotating Presidency by Member States, and the creation of the new European External Action Service, chaired by the High Representative of the European Union for Foreign Affairs, Catherine Ashton.

The EU confirmed its desire to strengthen the NPT as the cornerstone of the international nuclear non-proliferation regime, favouring a balanced approach between its three pillars: non-proliferation, disarmament and peaceful uses of nuclear energy.

The signs for a nuclear renaissance will have to be reconsidered in the aftermath of the Japanese tsunami and the **Fukushima accident**. Many countries had shown interest towards nuclear energy, including in some cases countries without a tradition of nuclear-relevant technology.

Assistance and verification activities within a scenario of expanding nuclear energy will have to cope with the **zero-growth budget of the IAEA**, and with the retirement of many experienced inspectors. The latter fact may raise some concern but, at the same time, offers the IAEA the opportunity to move towards the new objectives-based approach by recruiting staff with different competences, including investigative and analytical skills in addition to traditional accountancy skills. Notwithstanding, of course, that traditional measurements remain the basis of a verification system.

Analysis of the situation within Europe showed that most of the open issues and alternatives relate to the **back-end of the nuclear fuel cycle**. Reprocessing is still the main option pursued by France and UK. Most Member States have chosen to put their nuclear waste in long-term dry or wet storage before final disposal. The most serious problems remain with high-level waste, where there is no clear strategy. Only Finland and Sweden have selected final disposal sites and started construction activities.

- *RG2010 observed the lack of facility-specific WGs and sees in the new “Implementation of safeguards” WG the ideal forum for dealing with the definition of **new safeguards concepts for final repositories**.*

New reactor concepts are developed within the Generation IV Forum, bringing about new fuel cycle facility types and materials. Besides considerations of proliferation resistance, the so-called **Safeguards by Design** approach was launched by the IAEA in 2008 and fully supported by the EURATOM Support Programme, as well as many Member States. IS WG has already set up a specific Sub-group on Safeguards by Design, and the first “innovative” facility type to be addressed will indeed be final repositories.

Stage 3: Coping with identified challenges and opportunities **RG2010 Recommendations**

To support the “**objectives based**” **safeguards** approach, application of the physical model, misuse and diversion scenarios with plausibility checks are elements which should be considered together with classical safeguards.

- *RG2010 recommends that system analysis is implemented to support a consistent objectives-based safeguards and verification approach.*

Facility-specific issues are dealt with within the IS WG, which should serve as a reference for updating of safeguards implementation issues, as well as researching new approaches for new facility types.

- *RG2010 observed the lack of facility-specific WGs and sees in the new “Implementation of safeguards” WG the ideal forum for dealing with the definition of **new safeguards concepts for final repositories**.*
- *ESARDA should continue developing **Safeguards by Design** activities to support the IAEA and Member States in the development of safeguards concepts for new facilities.*
- *IS WG could also serve as a contact point, to establish connections between operators of similar plants in different States, for discussing problems and experiences.*

Measures within both nuclear safeguards and nuclear security aim to prevent harmful effects from the **malevolent use of nuclear materials**. Prevention, detection and response actions can be similar in security and safeguards, even if relevant differences are present: e.g. the level of accuracy and reliability needed by radiation detection equipment to serve either field.

- *Based on reflection on the application of the same type of equipment to security or safeguards, RG 2010 recommends a detailed assessment of the possibility of expanding from solely safeguards towards **nuclear security (broad sense) R&D**.*
- *ESARDA should have a permanent Nuclear Security WG, dealing with collection of information / best-practices, including e.g. border monitoring and detection of illicit trafficking.*

Environmental analysis and nuclear forensic science have experienced significant developments in recent years, which now support safeguards conclusions on the absence of undeclared nuclear material and activities.

- *More broadly then, ESARDA should emphasise the **technical convergence of nuclear safeguards, nuclear forensics and nuclear security** by defining methodologies that serve all three purposes.*

Export control is a barrier to the diffusion of dual use items and technologies.

- *RG2010 recommends creating a WG on dual use goods **export control**.*

This has meanwhile been recognized by ESARDA, with the start of a new Sub-Group within VTM WG which may later evolve into a fully-fledged working group. The added value with respect to other groups is in both the diversity and synergies between actors associated or contributing to ESARDA, ranging from suppliers to regulators, R&D and education, as well as international organisations (IAEA and EURATOM).

Disarmament

→ *RG2010 recommends that, contingent upon the launching of FMCT negotiations, ESARDA should draw on the expertise of its members to initiate preliminary work on **cut-off and disarmament verification**, with the objective of providing the Conference on Disarmament with professional advice.*

Remote monitoring, and development of NDA and C/S used remotely, with a high degree of authentication are activities recommended by EURATOM and IAEA.

→ *RG 2010 recommends that ESARDA keep close watch on **cyber-security** topics and assist the safeguards community. This could be dealt with by the Containment and Surveillance WG*

ESARDA Customers

ESARDA is a network of actors, with a range of competences in international safeguards and related areas, with a broad spectrum of expertise. These are the key component of ESARDA WGs and can therefore provide their input to other activities.

→ *To complement this, a questionnaire or similar type of survey could be foreseen to **other possible customers**.*

The **ESARDA Safeguards Training Course** is a success that could be further expanded by TKM WG to address potential customers in the safeguards/security community.

→ *Lectures for policy makers could be foreseen, to raise the level of awareness for ESARDA's capabilities and safeguards training.*

ESARDA Working Groups provide invaluable advantages for the inspectorates, as they act as a forum for enhancing mutual understanding; for the exchange of experiences; and for the further development of techniques and measures, as it was for example, NMAC AG WG for Euratom and Novel Technologies WG for the IAEA.

→ *ESARDA WGs should maintain and reinforce their role in research and training, and respond to the inspectorates' needs;*

→ *National authorities should be invited to attend ESARDA Symposia or WGs, to benefit from ESARDA competences, helping to maintain national competence in areas currently not pursued in a particular country (e. g. final disposal);*

→ *RG2010 also proposes that ESARDA act as an independent reviewer for proposed research projects.*

Membership and collaborations

→ *ESARDA should expand its membership base in order to increase its role in the promotion of nuclear security and non-proliferation in the world. More industrial companies active in the supply of nuclear equipment, fuel and services should be invited to join. Other national authorities in the new Members States of the European Union should also be approached.*

→ *Academic institutions should also be invited to join ESARDA.*

→ *RG2010 recommends that the Steering Committee evaluate the opportunity and benefits to formalise a collaboration agreement with the INMM. Possible fields of collaboration include the identification of R&D topics for improved Safeguards and Nuclear Security, information exchange, common actions (e.g. training), etc.*

Management

→ *RG2010 considers that the present management structure and ESARDA contract serve very well the needs of the association.*

Continuous reflection

→ *The proliferation challenges and scenarios evolve rapidly, therefore RG2010 recommends that a reflection process is held more frequently than present, e.g. every 2-3 years.*