

## Topical issues in nuclear safeguards

Van Zyl de Villiers, INMM/ESARDA workshop, 5 October 2015

I want to briefly discuss a number of current issues in international safeguards and what the IAEA Department of Safeguards is doing to enhance the effectiveness and improve the efficiency of safeguards implementation, and then turn to aspects of the theme for this workshop.

Let me start by discussing the changing nuclear world.

Right across the globe more nuclear facilities and nuclear material are being brought under IAEA safeguards. More countries are introducing nuclear power and a number of those with existing nuclear power programmes are expanding them. Some other countries are phasing out nuclear power, but this does not mean that the nuclear material involved will be removed from safeguards.

Over the past five years, the number of nuclear facilities under safeguards has grown by 12% and the quantity of nuclear material under safeguards by some 17%. This is a trend over which the IAEA has no control, and we are legally obliged to safeguard all nuclear material and facilities declared by States under their Safeguards Agreements.

International nuclear cooperation is intensifying, with an expansion of trade and services in nuclear and related technology, equipment and materials. A number of older nuclear power plants are being modernized and new plants are becoming more technologically sophisticated. Also, new technologies such as small and medium-sized reactors and pyroprocessing are emerging.

Nuclear power expansion is shifting towards Asia. In addition to this, the international geopolitical and security situation is changing rapidly. This includes numerous domestic and regional conflicts and the emergence of non-state actors (in some cases taking control of parts of states), presenting some new challenges to in-field safeguards activities.

Since January 2014, under the Joint Plan of Action (JPA) – agreed between the so-called E3/EU+3 countries and Iran - we have doubled our verification effort in Iran. This has had significant resource implications, not just in financial terms – which have been covered by additional extra-budgetary resources – but also in terms of staff time and expertise. Many of our best and most experienced inspectors and analysts are now working on the Iran file full-time, which means they are not available to work on other files.

Furthermore, as requested by the UN Security Council, the IAEA is preparing to take on responsibility for the nuclear verification and monitoring component of the Joint Comprehensive Plan of Action (JCPOA). This Agreement - reached on 14 July this year - builds on the JPA and involves an extensive and long-lasting verification regime being put in place. In August the Board of Governors gave the go-ahead for the Secretariat to plan for its part in the JCPOA.

So, the demands on IAEA safeguards are growing and becoming more complex, with no proportionate increase in resources.

#### Actions by the Safeguards Department

It is important to note that even though the nuclear landscape constantly changes, the IAEA's obligations and those of Member States pursuant to their safeguards agreements remain unchanged. Therefore, further improvements to the effective and efficient implementation of safeguards are essential: in other words, we have to increase our productivity.

We can do so in three basic ways:

- by further optimizing the internal processes within the IAEA;
- by improving cooperation between States and the IAEA in the implementation of safeguards, particularly addressing the difficulties some States have in executing their part of safeguards implementation; and
- by making better use of modern technology in our work.

It is in everyone's interest that we maintain credible safeguards. As long as the nuclear world continues to change, we have to adapt and change with it. It is clear that, in the context of a static budget, without further improvements to the way we work, it will be increasingly difficult to guarantee an effective, reliable and credible safeguards system.

In terms of processes, the IAEA is pursuing the further optimisation of safeguards implementation on State level. This encompasses the implementation of safeguards in a manner that considers a State's nuclear and nuclear-related activities and capabilities as a whole - obviously within the scope of the State's safeguards agreement. While the State-level concept may sound new to some, many of its constituent parts have in fact been applied for many years, including the evaluation of all safeguards relevant information for a State and the consideration of factors that are specific to a State in the implementation of safeguards.

The benefits of implementing safeguards at the State level have already been demonstrated, as is evident from a comparison of the types of safeguards agreements in place, the material under safeguards and the IAEA's verification effort. In this regard there is roughly the same number of States in the following three categories: States with a CSA, AP and the Broader Conclusion under integrated safeguards; CSA+AP States without the Broader Conclusion; and States with a CSA only. The first group accounts for about 77% of nuclear material under safeguards, but the IAEA expends only slightly more than half of its verification effort in the field in these States. The second and third groups both contain a relatively low percentage of the remaining material under safeguards, but the latter group accounts for a disproportionately high component of the cost of verification.

This clearly indicates that State-level approaches under integrated safeguards, and the implementation of the AP, provide opportunities to assure effectiveness of Safeguards while allowing efficiency gains.

In our efforts to achieve greater optimisation in our working processes, we ensure that safeguards are implemented consistently, objectively and without discrimination. Further to

the need to improve its productivity and in line with the requirements of safeguards agreements, the IAEA keeps the frequency and intensity of routine inspections for States to the minimum level necessary to draw soundly-based conclusions. It also continuously works to ensure that optimised and consistent processes are followed in its work at Headquarters.

### The role of States in safeguards implementation

The practical, day-to-day implementation of safeguards works best when it is conducted as a common effort between the IAEA and Member States to achieve a successful outcome. I will now discuss what States themselves can do to improve the effectiveness and efficiency of IAEA safeguards implementation.

In line with the call of the Board of Governors in September 2005, States with the original text of small quantities protocols should either amend or rescind them as soon as possible. SQPs with the amended text facilitate the availability of more information to the IAEA, for example through initial inventory reports by States and early notification of decisions to construct or authorize construction of a facility. At the end of 2014, 42 States had yet to amend their SQPs.

The additional protocol to comprehensive safeguards agreements has been demonstrated to be a powerful tool to increase confidence that States are honouring their obligations. While acknowledging that it is entirely a State's own decision whether to bring an additional protocol into force, we should all keep on encouraging States to do so.

Some States have yet to establish their State authority and system of accounting for and control of nuclear material. Moreover, of those that have been established, not all State authorities have the necessary resources, independence from operators, and technical capabilities to implement the requirements of safeguards agreements and additional protocols. In particular, some State authorities do not provide sufficient oversight of nuclear material accounting and control systems at nuclear facilities to ensure the required accuracy and precision of the data transmitted to the IAEA.

Improvements are also needed from States in a variety of other areas, ranging from their provision of visas for IAEA inspectors, to the timeliness and accuracy of their reporting, to the provision of access to facilities.

It is encouraging that some States *are* seeking to improve matters through a variety of means. For example, by hosting regional workshops to raise awareness of IAEA safeguards; or by providing the use of facilities for training of IAEA inspectors, thus supporting the development and qualification of those inspectors; or by discussing early design concepts with the IAEA to assist in developing safeguards measures for emerging new nuclear fuel cycle technologies.

Another important way in which several States have helped to improve the effectiveness and efficiency of IAEA safeguards, is to agree to the installation of unattended monitoring systems in situations where it would lead to a reduction in the number of inspections.

The level and quality of cooperation between the State and the IAEA also helps to improve productivity. We are making a conscious effort at the IAEA to foster more cooperative

partnerships with national and regional safeguards authorities. Real progress is being made, but more has to be done.

### Technology development

I now want to discuss the importance of technology development in our efforts to improve our productivity. Through our R&D programme, backed by our Member States and the European Union, we continue to invest in better scientific safeguards equipment and techniques. In this way we can improve our overall cost-effectiveness. Member State Support Programmes continue to make substantial contributions (in cash and in kind) to IAEA safeguards. There are now 20 States and the European Commission with formal support programmes with the IAEA.

Within the Department of Safeguards, we are currently embarked on three major multi-year projects:

- Through the *Modernization of Safeguards Information Technology (MOSAIC)* project we are conducting a major overhaul of our information technology. Once fully implemented, this will enable us to strengthen information security and to help streamline many of our processes through the use of IT tools.
- We are already modernizing our laboratory facilities and the supporting infrastructure at Seibersdorf in Austria through the ECAS project - *Enhancing Capabilities of the Safeguards Analytical Services*. This involves, amongst other things, the expansion of our Environmental Sample Laboratory and the construction of a new Nuclear Material Laboratory that will provide a secure, flexible, fit-for-purpose facility for the analysis of nuclear material samples.
- The *Next Generation Surveillance System (NGSS)* project introduces an optical surveillance system that replaces obsolete surveillance systems. Many of these systems are jointly used by the IAEA and other inspectorates.

These modernization projects will help the Department of Safeguards to meet the challenges of a changing world, and to continue to ensure effective and efficient nuclear verification.

### Capacity building

With reference to the theme of this workshop “Building international capacity”, the IAEA contributes to safeguards capacity building in a number of ways. The main internal activity in this regard is the extensive training and development of our own safeguards staff, initially through the Introductory Course on Agency Safeguards (ICAS), followed by further training in specialised safeguards topics in subsequent few years.

In the broader context, activities with external stakeholders include advisory missions, training courses, documentation and guides, and legal advice. For example, IAEA SSAC Advisory Service (ISSAS) missions, performed at the request of States, are aimed at furthering the effectiveness of an SSAC through a thorough review of and recommendations on the legal, regulatory and technical framework of the State’s safeguards system.

The IAEA’s Department of Safeguards provides training for States in implementing safeguards under comprehensive safeguards agreements and additional protocols. In general, training is

aimed at establishing and maintaining an SSAC as required by the CSA. The SSAC includes the State safeguards authority, facilities under safeguards and all relevant legislation, regulations and arrangements, and serves as the mechanism for cooperation with the IAEA in fulfilment of the safeguards obligations of the State.

Courses are based upon the three core functions of a State's safeguards authority:

- overseeing all nuclear activities in the State for the purpose of assuring that the nuclear material is used only for peaceful purposes;
- providing correct and complete information, on time, to the IAEA, as required under the safeguards agreement; and
- facilitating IAEA activities to verify the information provided and to resolve questions and inconsistencies, and providing access to IAEA inspectors.

In addition, at the request of a Member State, targeted training courses can be arranged to address specific areas of safeguards interest, such as nuclear material accountancy, export control, additional protocol implementation, and processing and reporting of safeguards related information.

The IAEA also assists States by providing a comprehensive set of reference and guidance documents. Two important ones are the following: *Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols* (IAEA Services Series 21, published in March 2012) and the *Safeguards Implementation Guide for States with Small Quantities Protocols* (IAEA Services Series 22, 2013; available in English, French and Spanish). In 2014, the IAEA published the first of four 'Safeguards Implementation Practices Guides' (SIP Guides), entitled *Safeguards Implementation Practices Guide on Facilitating IAEA Verification Activities* (IAEA Services Series 30). This was followed in 2015 by the SIP Guide *Establishing and Maintaining State Safeguards Infrastructure* (IAEA Services Series 31). The remaining SIP Guides will address *Provision of Information to the IAEA* and *Collaborative Approaches to Safeguards Implementation*, respectively.

In 2014, the Agency developed the first eLearning programme on safeguards that was developed in the framework of the interactive series explaining the IAEA's milestones approach to introducing a nuclear power programme. The eLearning programme is aimed at decision makers, advisers and senior managers from governmental organizations, regulatory bodies responsible for safeguards, utilities, industries, donors, suppliers and participants of IAEA events as well as newly recruited IAEA staff members.

As an essential part of strengthening its SSAC, the State should review its legal and regulatory framework to ensure that national safeguards implementing legislation continues to address all of the State's safeguards obligations. When requested by a State, the IAEA provides assistance on all aspects of nuclear legislation by reviewing the State's draft text, in particular concerning safeguards and import and export control.

An important component of international capacity building in safeguards and non-proliferation is the flow of staff between stakeholders, both in-country (e.g. between universities, operators,

regulators, government agencies and non-governmental organisations) and internationally (e.g. between the IAEA and States under safeguards).

### Public understanding of safeguards

The high profile of the negotiations that led to the signing of the JCPOA between the E3/EU+3 and Iran has again brought non-proliferation and safeguards issues into the public eye. Media coverage, positions expressed by analysts, and statements by diplomats and politicians - on the negotiation process as well as the outcomes - often conveyed widely differing and sometimes even opposing views on the agreement that was reached and the implications thereof.

This is not surprising, due to both the complexity of the subject and the high stakes for all parties involved. It has, however, demonstrated the importance of the public at large as stakeholders in non-proliferation and safeguards, and the risk of skewed messages or uninformed positions becoming entrenched in the public's mind as "facts".

The nuclear industry as a whole has, since its inception, been exposed to negative public perceptions and challenges to get a balanced message across. We should therefore not be surprised that a similar situation exists around the Iran issue. This places a responsibility on us, and presents a timely opportunity, to provide perspective to the discussions in our immediate environment as well as the public domain. I am quite sure that this workshop will make a positive contribution in this area.

Another aspect of the understanding – not merely opinion – of international safeguards that, in my view, deserves more attention, is the continuity and transfer of knowledge and understanding of nuclear safeguards along the following chain: IAEA Secretariat ↔ Missions/Embassies in Vienna (or elsewhere in Europe, if States do not have representation in Vienna) ↔ key government ministries in States with CSAs ↔ State safeguards authorities ↔ facility operators, universities and other organisations involved in safeguards matters. Ideally this chain should be an open channel for the flow of information in both directions, thereby facilitating optimal safeguards implementation, policy making in States with safeguards agreements in place, and decision making by the IAEA Board of Governors. I trust that the outcomes of this workshop will also be usable to bridge some of the gaps that may exist along this chain.

### In conclusion

The IAEA is doing its best to ensure that its safeguards conclusions continue to be soundly based so that we can sustain the confidence of our Member States and the international community as a whole. However, the implementation of credible safeguards requires a joint effort by all role-players, a serious commitment on political and operational level, a pool of competent people, and global appreciation for the complexity and importance of the work we are all doing.

We are looking forward to the continued contributions of INMM and ESARDA in this respect and to the perspectives gained during this workshop.

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**IAEA**

International Atomic Energy Agency

# Overview

*The changing nuclear world*  
*Actions by the Department of Safeguards*  
*The role of States*  
*Technology development*  
*Capacity building*  
*Public understanding*



# The changing nuclear world

More facilities  
and material

Cooperation  
and technology

Geopolitics

JPA

JCPOA

# Actions by Safeguards Department

- Internal processes; SG implementation on State level
- Relationship between nuclear material, SG agreements and SG effort
- Cooperation with States; new technologies

# The role of States in SG implementation

Amended  
SQPs

Additional  
Protocol

SSAC;  
SG authority &  
capacity

Working with  
the IAEA

Use of  
technology

# Advanced technologies

R&D; MSSP

*MOSAIC*

*ECAS*

*NGSS*

# Capacity building

IAEA internal

- ICAS
- Further training

ISSAS missions

- Review and recommendations

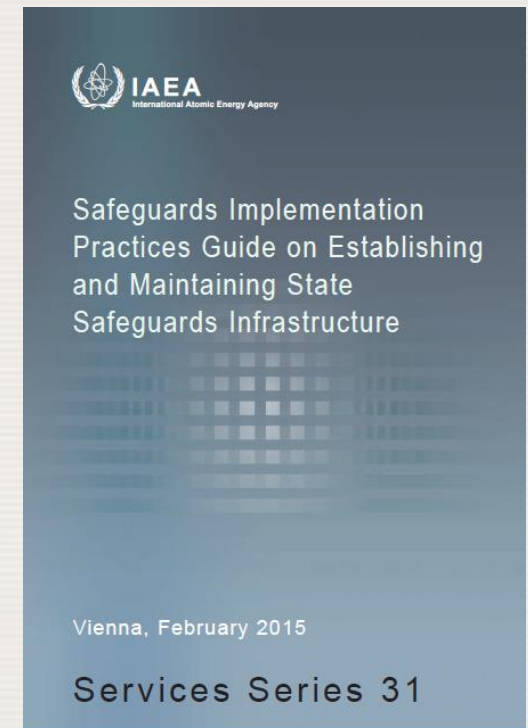
Training to  
States

- Establishing and maintaining SSAC
- State authority core functions
- National & regional

Guidance  
documents

- IAEA Services Series
- SIP Guides

# Capacity building (cont.)



# Capacity building (cont.)

eLearning

Legal and  
regulatory  
framework

SG staff mobility

- In-country
- International

# Public understanding of safeguards

High profile of JCPOA negotiations; different views on the agreement and its implications



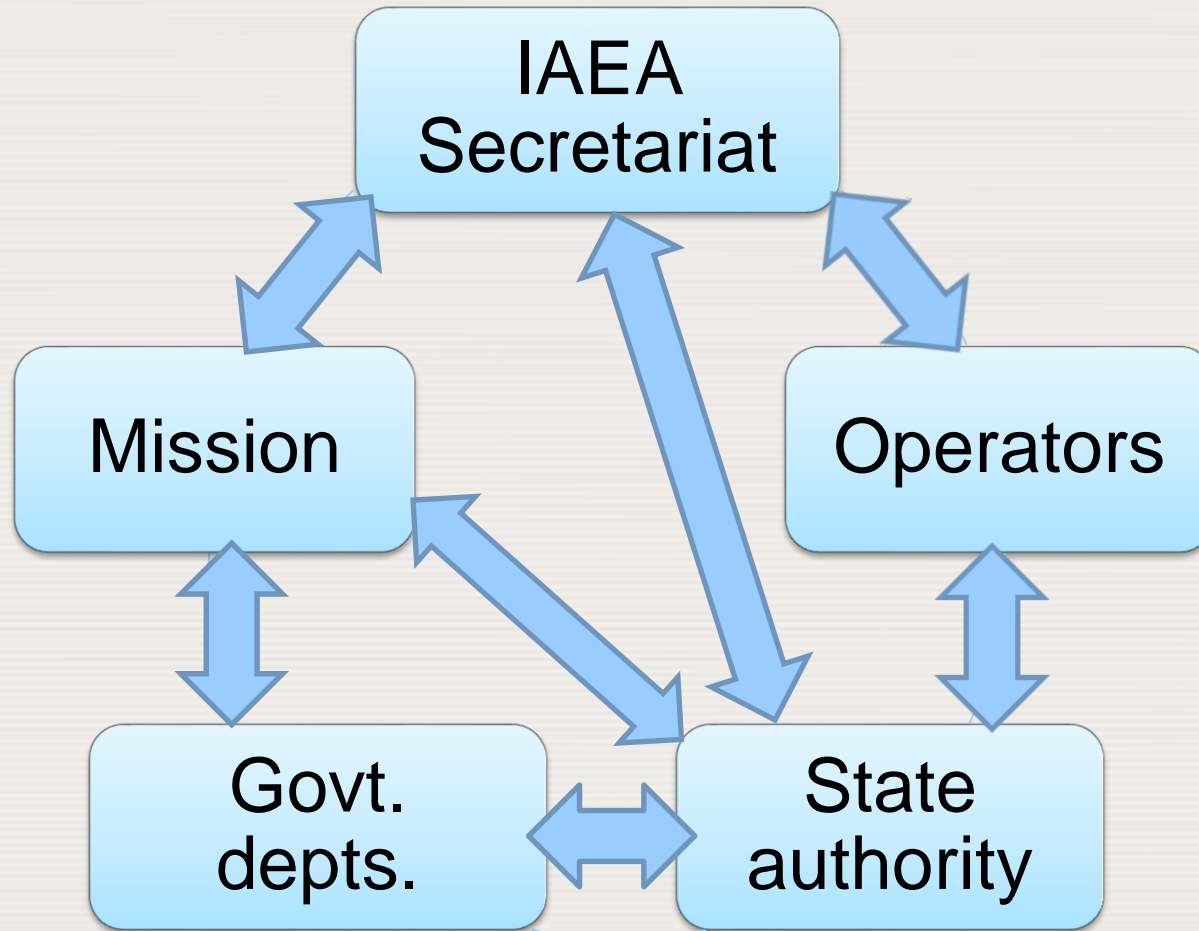
Risk of skewed messages leading to poor understanding of core issues



Public perceptions on nuclear -  
*JCPOA a responsibility and an opportunity*



# Public understanding of safeguards (cont.)



# In conclusion .....

Credible safeguards require:

- *a joint effort by all role-players,*
- *commitment on political and operational level,*
- *competent people, and*
- *appreciation for complexity and importance of the task.*

Looking forward to the outcomes of this workshop!