**FEBRUARY 2022** 

# Reflections on Safeguards Culture

Valeri Bytchkov and John Carlson

A PRODUCT OF The Future of IAEA Safeguards: Rebuilding the Vienna Spirit through Russian-U.S. Expert Dialogue





Center for Energy and Security Studies www.ceness-russia.org

### Introduction

ulture" is a notion that describes the values, norms, systems, beliefs, ideas, aspirations, technology, and arts, as well as the social, economic, and political organization of humankind as a whole. Culture is expressed by individuals, associations, communities, nations, governments, and institutions. Participants in specific fields of collective human knowledge may share a culture of values, goals, and conduct. Concerning

the use of nuclear energy, widely shared cultural aspirations include the aim to reduce the risk of devastating effects of nuclear activities, including severe accidents and the use of nuclear weapons. "Nuclear culture" therefore includes norms, behaviors, and activities aiming to minimize the risks associated with nuclear weapons, nuclear terrorism, and nuclear accidents. The International Atomic Energy Agency (IAEA) is responsible for coordinating international efforts in promoting the safe, secure, and peaceful use of nuclear energy and countering its negative effects, including the proliferation of nuclear weapons. With these goals in mind, the IAEA's safeguards system was developed to verify compliance of states with their obligations concerning the peaceful use of nuclear energy, undertaken in safeguards agreements concluded with the IAEA. The IAEA safeguards system serves as the verification mechanism for the non-proliferation obligations of non-nuclear-weapon States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

The concepts of "nuclear safety culture" and "nuclear security culture" are well established in IAEA practice, but no similar terminology is used for nuclear safeguards. This paper discusses whether there is benefit in introducing the notion of safeguards culture as part of promoting safeguards principles and concepts, and integrating it into the ongoing development of safeguards among institutions, organizations, and personnel. This question is not limited to the IAEA: safeguards implementation should be approached as a collaborative effort between the IAEA, governments and national safeguards authorities, and facility operators.

### IAEA Responses to the Global Challenges of the 1980s and 1990s

Nuclear safety, nuclear security, and nuclear safeguards are often considered comparable subject areas: the concept of "3S." However, there is a significant difference between IAEA safeguards implementation and the other two. In the areas of nuclear safety and security, the role of the IAEA is to coordinate international research and development, to guide legislative and regulatory work, and to assist states with the implementation of principles, guidelines, and technology. In the area of safeguards, the role of

Consciously or unconsciously, underlying values, attitudes, and beliefs affect the way people approach safeguards.

the IAEA is to verify the compliance of states with their safeguards agreements concluded with the IAEA.

The terms "nuclear safety culture" and "nuclear security culture" are officially used in the areas of safety and security,<sup>1</sup> but no similar term officially exists in the area of safeguards. To understand the reason for this disparity, one should go back to the events of the period from 1979 to 1991.

Nuclear safety. In the area of nuclear safety, the first alarm sounded at the time of the 1979 accident at the Three Mile Island nuclear power plant, in Pennsylvania. This accident seemed to show there was not much to worry about in terms of public safety, because there were no significant off-site consequences despite mistakes made by the operators. The built-in safety measures prevented the accident from escalation. However, during the 1986 accident at the Soviet Union's Chernobyl nuclear power plant, the reactor's safety systems were overwhelmed and there were widespread consequences. The accident was due to both the operators' mistakes and the reactor's design shortcomings. The scale of that event was so large that an international response was required. In order to ensure that "nuclear safety issues receive the attention warranted by their significance," the IAEA and the member states came up with the notion of a nuclear safety

culture. The broad goals of promoting such a culture were:

- For facility operators to comply with safety rules.
- For facility designers to ensure that nuclear safety issues receive appropriate attention during facility design.
- For national regulators to ensure implementation of the above two principles.

Nuclear security. Issues of nuclear security started to gain international attention in the 1990s, when fears of nuclear terrorism gained momentum. The discovery of illicit trafficking in nuclear material and a clandestine market for nuclear-related equipment and technology contributed to these fears. The old concept of physical protection was no longer sufficient because of its perceived passive nature. A new concept was developed, based on a proactive attitude toward addressing possible acts of nuclear terrorism. In order to ensure that nuclear security issues received the attention warranted by their significance, the IAEA and member states came up with the notion of nuclear security culture. The idea was very similar to that of the nuclear safety culture. The main goals to be addressed under a nuclear security culture were:

 For nuclear site operators to comply with nuclear security guidelines and regulations, to

<sup>&</sup>lt;sup>1</sup> The IAEA has issued guidelines for safety and security: Safety Culture, IAEA Safety Series No. 75-INSAG-4 (1991), <u>https://www-pub.iaea.org/mtcd/publications/pdf/pub882\_web.pdf</u>; Nuclear Security Culture: Implementing Guide, IAEA Nuclear Security Series, No. 7 (2008), <u>https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1347\_web.pdf</u>.

install necessary equipment and implement procedures, and to train personnel,

For national regulators to develop security regulations and guidelines and to ensure their implementation.

In 2002, the IAEA created the Department of Nuclear Safety and Security to deal with these subjects.

Nuclear safeguards. In the area of nuclear safeguards, the alarm was sounded in 1991, following the discovery in Irag of undeclared nuclear material and activities, which, contrary to state obligations, had not been placed under IAEA safeguards. The IAEA and member states responded to the challenge in a timely manner. The response gave birth to a slogan,<sup>2</sup> albeit one not expressly related to safeguards culture. At that time the challenge was perceived not as having a cultural dimension but as being primarily institutional, relating to procedures and legal authority. Reflecting this state of affairs, the slogan adopted was "To strengthen the effectiveness and enhance the efficiency of IAEA safeguards."

To expand on this last point: the failure to detect Iraq's undeclared nuclear activities arose because at that time the IAEA did not have procedures for detection of a wholly undeclared nuclear program that had no obvious links to declared facilities. Safeguards activities were focused on what came to be called "correctness"—that is, confirming the accuracy of accounts of nuclear material at declared facilities. The solution identified was to develop new safeguards approaches and procedures to better detect undeclared nuclear material and activities. This became known as the objective of "completeness"—that is, determining whether a state's declarations included all the nuclear material and activities in the state as required by the safeguards agreement. The IAEA had to develop the capability to do so.

The main vehicle for pursuing the necessary changes was Program 93+2. A major focus of this program was to revise or replace the safeguards approaches and procedures that were set out in the safeguards criteria and in related documents, such as the safeguards manuals. The Model Additional Protocol and other safeguards-strengthening measures, which resulted from Program 93+2, started to be implemented in the late 1990s. This process has brought about conceptual change in safeguards implementation, from a facility-level orientation to the state-level concept (SLC). The process of effectuating this change remains ongoing.<sup>3</sup>

## What Is Safeguards Culture?

Several articles about safeguards culture were published in recent years; the majority used the theory of organizational culture, which recognizes three major attributes of organizational culture: underlying assumptions, espoused values, and artifacts. In applying that theory, the authors of those articles considered safeguards culture at the level of an organization. Thus, Trevor Findlay considered functioning of the IAEA; Stephen Mladineo and Sarah Frazar considered work of a state's safeguards authority.<sup>4</sup> Other authors have

<sup>2</sup> A slogan is a means to state an objective and to consolidate efforts in meeting the objective. The importance of slogans can be illustrated by the success of "Atoms for Peace," which played a major role in establishing the IAEA and promoting the peaceful use of nuclear energy.

<sup>&</sup>lt;sup>3</sup> For a brief overview of the development of IAEA safeguards, see John Carlson, Vladimir Kuchinov, and Thomas Shea, *The IAEA's Safeguards System as the Non-Proliferation Treaty's Verification Mechanism* (Nuclear Threat Initiative, May 2020), https://www.nti.org/documents/2646/NTI\_Paper\_Safeguards\_FINAL\_5-8-20.pdf.

<sup>&</sup>lt;sup>4</sup> Trevor Findlay, "Nuclear Safeguards Culture: The IAEA's Nuclear Safeguards Culture: 'Candy Concept' or Powerful Prism?" paper presented at Project on Managing the Atom Seminar Series, October 1, 2014, <u>https://www.belfercenter.org/sites/ default/files/files/publication/findlay-iaea-safeguards-symposium-october-2014.pdf;</u> Stephen Mladineo and Sarah Frazar, "The Importance of Safeguards Culture" *The Nonproliferation Review* 20, no. 3 (December 2013), <u>http://dx.doi.org/10.1080</u> /10736700.2013.853937; and Trevor Findlay, "Transforming IAEA Safeguards Culture," presented at the Institute of Nuclear Materials Management/European Safeguards Research and Development Association Joint Annual Meeting, August 23-September 1, 2021.

proposed various definitions of "safeguards culture."

The IAEA safeguards system, as the verification mechanism of the NPT, plays an important role in the sustainability of the current nonproliferation regime. Victor Murogov and other authors discuss the notion of non-proliferation culture;<sup>5</sup> therefore, nuclear safeguards can be seen as an element of the non-proliferation culture. In fact, safeguards culture and non-proliferation culture are both elements of a general culture of peaceful use of nuclear energy. IAEA safeguards provide an international system that is used to verify compliance of states' undertakings with the peaceful use of nuclear energy.

The present paper considers a broader notion of safeguards culture, which applies to all the actors of the non-proliferation regime: the IAEA, governments, and the nuclear industry. Further, it discusses safeguards culture in the context of the non-proliferation regime and the NPT. The authors do not think it is worth trying to propose a definition of "safeguards" culture"; instead, the authors prefer to discuss some of its main aspects in various fields of professional activity. Specifically, this paper examines factors influencing the ways people perform their duties: why they act in one way rather than another. These factors include their sense of responsibility, their values and beliefs, their vision and education, and their knowledge and skills.

Some of the influences on the ways people perform their professional duties can be outlined as follows:

- At the international level, international values: support for peaceful coexistence, prohibition of weapons of mass destruction, global environmental concerns, and so forth.
- At the national level, national and societal values: nationalism, perceptions of national

interests, political objectives, and so forth; religious values (Christian, Muslim, etc.); type of society (democracy, autocracy, etc.); and social relations and value of human rights.

- At the level of the institution or organization: type of institution (international, governmental, non-governmental organization ([NGO], business), purpose of institution (the nature of its product).
- At the personal level, attitude toward work: sense of responsibility, striving for high performance standards, application of initiative, vision for the future, and so forth.

There are natural human values and beliefs, and professional values and beliefs that are imposed by an organization. Human and professional values may or may not coincide. In the latter case, people whose values are at odds with their organization's may experience mental conflict or tension. Strong-willed people may either try to improve the organization or leave it; other people continue to work with conflict and eventually adapt to the organizational values. Sometimes, new ideas have arisen because of the conflict between peoples' natural values and beliefs and those imposed by their organizations.

There is a two-way process: the professional culture of an individual is formed, to a large extent, by the organization; the culture of the organization as a whole is formed by the individuals working in it.

## What Is the IAEA Safeguards System and How Does It Function?

The term "safeguards" has no clear definition. This term was introduced in 1945,<sup>6</sup> when it had a broader application compared with its use today. Subsequently the meaning of the term has evolved; it is now used with respect to IAEA safeguards, national safeguards, Euratom

<sup>&</sup>lt;sup>5</sup> Victor Murogov and Albert Zulkharneev, "Nuclear Non-proliferation Culture: A New Resource for Russian Public Diplomacy," International Affairs 58, no. 2 (November 2012), 59–72, <u>http://pircenter.org/media/content/files/11/13603368960.pdf</u>.

<sup>&</sup>lt;sup>6</sup> Agreed Declaration Relating to Atomic Energy by the United States, United Kingdom, and Canada, November 15, 1945, <u>https://iea.uoregon.edu/treaty-text/3383</u>.

safeguards, traditional safeguards, informationdriven safeguards, and so on. To avoid any ambiguity about which variant of safeguards is meant, this paper uses the well-established term "IAEA safeguards system" (established since 1965), which denotes the international system for verification of the compliance of states with their obligations under safeguards agreements.

There are three types of safeguards agreements: comprehensive safeguards agreements (CSAs), concluded by non-nuclear-weapon States Parties to the NPT; "voluntary offer" agreements, concluded by nuclear-weapon States Parties to the NPT; and "item-specific" agreements, concluded by states not parties to the NPT. State obligations and IAEA verification objectives depend on the type of agreement concerned. Each state and the IAEA need to cooperate in implementing the state's safeguards agreement. A state's obligations under its safeguards agreement include meeting its undertakings concerning the peaceful use of nuclear energy, providing information to the IAEA, and providing access and support for the IAEA's verification activities.

This paper considers the implementation of CSAs in non-nuclear-weapon States Parties to the NPT.

The IAEA has the obligation to verify a state's compliance with its safeguards agreement and to draw safeguards conclusions. In performing its verification, the IAEA should avoid undue interference with the state's peaceful nuclear activities.

The functioning of the IAEA safeguards system is shown schematically in Figure 1.

The foundation level, (a), is the most stable level of the system. The safeguards fundamentals are published in the IAEA Information Circulars (INFCIRCs). The latest change on this level occurred with the introduction of INFCIRC/540 (Model Additional Protocol) in 1997.

Level (b), the operation design level, is subject to more frequent change. The relevant information is issued, as a rule, in the IAEA's GOV documents, which have limited distribution. The latest changes on this level related to the modification of the small quantities protocol in 2005, introduction of the integrated safeguards concept in 2000, introduction of the SLC in 2004, and further discussion of this concept in 2013–2014.

Level (c), the implementation level, is the most dynamic one. Day-to-day progress in safeguards application is reported in annual reports, in reports to the Board of Governors, in the *IAEA Bulletin*, and in other reports and publications.

The process reflected in Figure 1 can be also seen as the process of building up safeguards culture.



## Evolution of the IAEA Safeguards System

The IAEA safeguards system evolves with time, responding to external and internal challenges, some of which are connected to the necessity to change safeguards culture inside the IAEA Secretariat. This culture is constantly under development due to the evolution of the safeguards system. There have been two major safeguards implementation concepts in this evolutionary history: the facility-level concept (so-called traditional safeguards), and the SLC. The facility-level concept dominated safeguards implementation during the last century. The main characteristics of this concept are focusing verification activities on individual facilities, developing verification procedures based on analysis of the nuclear material diversion scenarios for declared facilities, and drawing safeguards conclusions regarding diversion or non-diversion of nuclear material from individual facilities.

The SLC resulted from the introduction of the safeguards-strengthening measures developed under Program 93+2, in particular the measures

of the Model Additional Protocol. The SLC was introduced in 2004 and has remained under development since then. The main characteristics of this concept are focusing verification activities on entire states; in the case of CSAs, developing verification activities based on the analysis of acquisition paths that could be used to obtain weapons-usable nuclear materials; and drawing safeguards conclusions for entire states with respect to the states' compliance with their obligations under the safeguards agreement.

The conceptual evolution has resulted in what some experts have called a transformation of safeguards culture. This transformation required understanding the new concepts and the new organization of the work of the Department of Safeguards.

Development of the IAEA safeguards system is regulated by the member states through the IAEA Board of Governors and General Conference. This is an important feature of the evolution of the IAEA safeguards system and of building up safeguards culture.





© Dean Calma

*IAEA inspectors conducting an on-site inspection.* 

### **Characteristics of Safeguards Culture**

It is beyond the scope of this discussion paper to detail all the elements of safeguards culture. However, some overarching principles are outlined as follows.

A shared vision. A fundamental principle of safeguards culture is that all persons involved with implementing safeguards, whether working in a facility, a national authority, other areas of government, or the IAEA, should see their work as contributing to the prevention of nuclear weapons proliferation, an international objective of the highest importance. Through their work they are contributing both to the maintenance of international peace and security and also to the national security of their own state (because nuclear proliferation threatens, directly or indirectly, every state).

A cooperative approach. Because all NPT parties share a common commitment to prevent nuclear proliferation, expressed through the NPT, it follows that all persons involved should collaborate with each other to advance this commitment. Effective implementation of safeguards agreements depends on good cooperation. Each state, and personnel of relevant institutions within each state, should cooperate fully with the IAEA to this end. It is essential that the relationship between the IAEA and states is not seen as adversarial. The focus should be on shared objectives and responsibilities rather than rights. The IAEA safeguards system provides the means for state to demonstrate to the international community that they are meeting their commitments concerning peaceful use of nuclear energy. At the same time, the states benefit through the assurance provided by the IAEA safeguards system that other states are also meeting their commitments.

**Credibility and integrity.** Key factors relating to safeguards culture include credibility, confidence-building, transparency and openness, and non-discrimination. The assurance provided by the IAEA safeguards system makes a vital contribution to international confidence in the non-proliferation regime. For the system to continue to provide such assurance, safeguards must be credible. Credibility requires the highest level of competence and professionalism by those working in the area of safeguards implementation.

Cooperation and transparency are required between states and the IAEA. This requirement is two-way; for safeguards to be credible, states must understand and support the way the IAEA exercises its responsibilities and reaches its conclusions.

**Regulatory independence.** Within each state, the national safeguards authority must be functionally independent of nuclear operators and see the upholding of international non-proliferation commitments as an essential part of its responsibilities.

A proactive approach. Implementing and maintaining effective and efficient safeguards is not the responsibility of the IAEA alone; each state is responsible for ensuring that all nuclear material and activities in its jurisdiction are used for exclusively peaceful purposes in accordance with treaty obligations and other applicable international law. All persons involved in safeguards should see this duty as a fundamental part of their professional responsibility.

An important aspect of safeguards culture is the interpretation of the fundamental safeguards documents. The safeguards terms that were defined and used in INFCIRC/26 and INFCIRC/66, which served their purpose well in those documents, were adopted in INFCIRC/153, where their meanings have changed. The issuance of INFCIRC/540 highlighted this problem and resulted in difficulties in the interpretation of the provisions of CSAs; the difficulties manifested themselves with the implementation of the strengthening measures. An example is the issue of completeness. Below is just an abbreviated list of such terminological difficulties:

- Safeguards system versus safeguards
- The completeness provision of INFCIRC/153, Paragraph 2
- INFCIRC/153, Paragraph 28 versus Paragraph 2
- Nuclear material subject to safeguards and exemption from safeguards
- Technical objective versus safeguards objective
- Formulation of safeguards conclusions

The process of building the modern safeguards culture should include resolution of the abovementioned difficulties.

These and other underlying factors should be given consideration in terms of whether and how they could be shaped to better contribute to organizational objectives, both for the IAEA and for those who should be seen, and should see themselves, as the IAEA's partners in ensuring effective safeguards, namely, national safeguards authorities and facility operators.

### Conclusions

The conceptual evolution of the safeguards system has influenced the development of safeguards culture. The old, traditional safeguards culture was associated with the facility-level concept of safeguards implementation; the modern safeguards culture is associated with the introduction of the SLC. Creation of the modern safeguards culture required conceptualization of safeguards measures and procedures; this has been a slow process, which still has not been completed. The current challenge for the safeguards system could be expressed as "development and implementation of the modern safeguards culture," with the main activity being the "conceptualization of the modern safeguards system."

Consciously or unconsciously, underlying values, attitudes, and beliefs affect the way people approach safeguards in the various organizations involved. Development of a well-designed set of cultural guidelines can be expected to have a positive effect on the application and perception of safeguards within states and internationally.

- At the international level, the safeguards culture of the IAEA should emphasize principles such as a collaborative approach with states, non-discrimination, transparency, and continuous improvement.
- At the governmental level, a safeguards culture should reflect commitment to international obligations, full cooperation with the IAEA, and regulatory independence.
- For all organizations, including facilities, a safeguards culture should reflect issues such as best practices, training and motivation of staff, and commitment to continuous improvement.
- At the individual level—for personnel at each of the three organizational levels—a safeguards culture should emphasize both professional standards and commitment to international objectives.

To date, the IAEA's approach has been to focus on the technical development of safeguards and the development of the necessary professional skills within its staff. These have been seen as the main elements of safeguards culture, with the expectation that if the procedures and skills are appropriate the culture will follow. In view of the major changes in safeguards that are still being worked through, and also having regard to the shift in modern safeguards toward a greater role for qualitative measures, such as information analysis and expert judgment, it is timely to consider whether the issue of safeguards culture should receive closer attention. The IAEA has already done much that is relevant in this regard, such as instituting the Introductory Course on Agency Safeguards for inspectors, guidance for states on implementing CSAs and additional protocols, and the state system of accounting for and control of nuclear material (SSAC) Advisory Service. The question is: How can the work being done in this area be improved, and what should be done in addition?

It is suggested that the IAEA examine the benefits of developing guidelines covering safeguards culture, determine the content of such guidelines, and consider ways the concept of safeguards culture can be best advanced. Member states, professional organizations such as the Institute of Nuclear Materials Management and the European Safeguards Research and Development Association, and NGOs such as the Nuclear Threat Initiative and the Center for Energy and Security Studies could be invited to contribute.

#### Acknowledgment:

The authors have benefited from discussions with Vladimir Kuchinov in the course of writing this paper and are thankful for his advice to transform it from the original version of describing authors' individual views to the fully consolidated product.



Nuclear Threat Initiative 1776 Eye Street NW, Suite 600 Washington, D.C. 20006 www.nti.org



Center for Energy and Security Studies www.ceness-russia.org

Center for Energy and Security Studies (Центр энергетики и безопасности) Mosfilmovskaya Str., 42, Bldg. 1 Moscow, Russia 119285 www.ceness-russia.org



💟 @NTI\_WMD 🔞 nti\_wmd 👍 Facebook.com/nti.org