The Nonproliferation Review
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rnpr20

The Importance of Safeguards Culture

Stephen V. Mladineo & Sarah L. Frazar
Published online: 02 Dec 2013.

To cite this article: Stephen V. Mladineo & Sarah L. Frazar (2013) The Importance of Safeguards Culture, The Nonproliferation Review, 20:3, 509-523, DOI: 10.1080/10736700.2013.853937

To link to this article: http://dx.doi.org/10.1080/10736700.2013.853937

THE IMPORTANCE OF SAFEGUARDS CULTURE

Stephen V. Mladineo and **Sarah L. Frazar**

International safeguards is the system of measures put in place by the International Atomic Energy Agency and states to ensure nuclear programs remain dedicated to peaceful purposes. This international safeguards system consists of agreements, inspections, and evaluations that have never considered the safeguards culture of a state or facility. Neither a common definition nor an understanding of safeguards culture is internationally recognized. This article provides an analysis of the concept of safeguards culture and gauges its value to the international safeguards community. The authors explore distinctions among safeguards culture, safeguards compliance, and safeguards performance, and suggest possible indicators of safeguards culture and methods to promote a strong, positive safeguards culture.

KEYWORDS: Safeguards culture; international safeguards; International Atomic Energy Agency; nuclear energy; peaceful uses

There is increasing interest around the world in using nuclear power to meet growing energy and desalination needs. In addition to the thirty states with operating reactors, more than twenty-six countries have expressed interest in pursuing nuclear power, and three of these have already started construction.[1] When a similar expansion of nuclear capabilities occurred after World War II, the international community feared the expansion could lead to an unmitigated spread of nuclear weapons.[2] Within eight years after the end of the war, the Soviet Union and the United Kingdom had conducted their first nuclear tests, demonstrating that the nuclear genie was indeed out of the bottle. To preclude the seemingly inevitable outcome, President Dwight D. Eisenhower in 1953 proposed international control over the atom as well as an international agreement to pursue the peaceful uses of nuclear energy.[3] In response to his proposal, the International Atomic Energy Agency (IAEA) was created to facilitate assistance in peaceful uses of nuclear energy and to serve as an independent inspectorate of states' nuclear programs. Over the decades, this organization has grown in size and scope, conducting inspections of state nuclear programs and implementing international safeguards measures to assure the international community that nuclear materials and facilities would not be misused to develop nuclear weapons.

In the decades following its establishment, the IAEA used a criteria-based approach to verify that states' nuclear programs remained dedicated to peaceful purposes. This approach used technical information to determine the scope and frequency of inspection activities at each type of facility.[4] The discovery of Iraq's clandestine enrichment facilities in

Nonproliferation Review, 2013
Vol. 20, No. 3, 509–523, http://dx.doi.org/10.1080/10736700.2013.853937

1991 demonstrated the weakness of the IAEA's authority, eliciting widespread recognition that the IAEA needed more information and greater access to state nuclear programs.[5] Subsequent efforts to strengthen the system coalesced into the Additional Protocol (AP), a voluntary, additional agreement that gives the IAEA broader access and information about states' nuclear activities, beyond that provided in state declarations and inspections.[6]

Specifically, the IAEA began using a wide variety of technical and nontechnical information to determine safeguards objectives and organize training and assistance needed by states and nuclear facilities to meet their safeguards obligations.[7] Despite this increasing use of nontechnical information, the IAEA has not considered a state's safeguards culture as part of these activities because cultural indicators could be perceived as subjective or discriminatory when used to draw safeguards conclusions. Recognizing this limitation, the authors believe there may be ways for the IAEA to incorporate evaluation of a state's safeguards culture into its activities. For example, the IAEA may find that such an evaluation could help define priorities for its training and technical assistance resources.

To explore these ideas, this article introduces proposed definitions for safeguards culture to better understand how the international safeguards community perceives the concept. Next, it discusses the concept of organizational culture to provide theoretical underpinnings for evaluating culture in light of the suggested definitions. The analysis then explores the meaning of safeguards culture and identifies potential indicators of its status. The authors argue that a better understanding of the type of safeguards culture that exists in a state will enable the IAEA to optimize its training and technical assistance efforts by focusing on the areas that are most likely to improve the effectiveness and efficiency of IAEA inspections. Based on this premise, the analysis concludes with an examination of how safeguards culture might be developed or promoted.

Definitions

The international safeguards community has not established an official definition for safeguards culture. However, some experts, and this article's authors, have proposed definitions for consideration by the international community:

- "A shared belief among individuals, organizations, and institutions that strict attention to international safeguards requirements and affirmative cooperation with safeguards authorities will enhance their nonproliferation stature and benefit their missions."[8]
- "A unifying commitment by an organization and its members to the effective and continuously improving implementation of material control and accounting practices; the prevention of misuse of facilities; and prevention of the dissemination of sensitive technology. It also includes not just the establishment and enforcement of strong regulatory requirements but also voluntary adherence to standards, best practices, and self-evaluation aimed at non-tolerance of mistakes or deliberate disregard. Therefore, safeguards culture has to be inherent in the

thoughts and actions of all the individuals at every level in an organization and must be supported by top management."[9]

- "The assembly of characteristics, attitudes and behavior of individuals, organizations and institutions which serves as a means to support and enhance safeguards or to achieve effective and efficient safeguards."[10]

Each definition addresses individuals, organizations, and institutions, either explicitly or implicitly. Each considers aspects of organizational culture and emphasizes beliefs, attitudes, and behaviors or activities. While each author may have slight preferences for one word or phrase over another, the definitions all get at the crux of the issue: a strong safeguards culture is one in which the beliefs, values, and attitudes toward international safeguards encourage behavior that promotes acceptance of, and adherence to, national and international laws, regulations, and requirements.

With this in mind, the authors propose the following definition as a starting place for the international community to negotiate and agree upon a formal definition of safeguards culture: "A shared belief, as manifested in decisions and actions, by individuals, organizations, and institutions that affirmative cooperation with IAEA safeguards authorities will benefit their missions."[11]

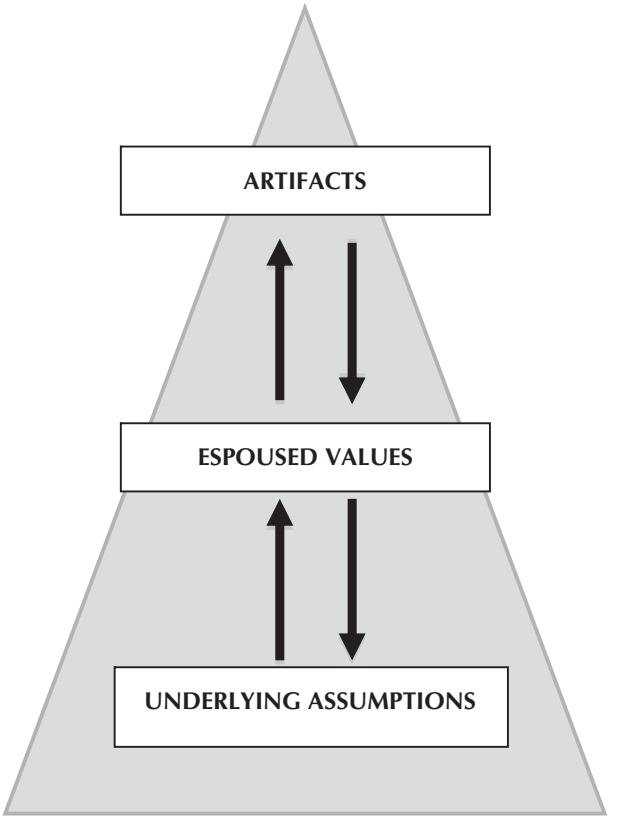
Having stipulated this definition of safeguards culture, this article introduces the concept of organizational culture to provide theoretical underpinnings for a more comprehensive assessment of this definition and the concept in general.

Organizational Culture

Culture is generally defined as the behaviors and beliefs characteristic of a particular group. Characteristics of culture include shared beliefs, values, knowledge, and attitudes that characterize the functioning of a group or organization. While some of these terms may be imprecise, scholars have attempted to quantify some of these characteristics. Organizational culture literature is extensive, and there are numerous models that describe or attempt to analyze organizational culture. For example, Vanderbilt University Professor Terrence E. Deal and Allan A. Kennedy, a business consultant, define organizational culture as "the way things get done around here."[12] Other scholars measure characteristics such as innovation, stability, respect for people, outcome orientation, attention to detail, team orientation, and aggressiveness.[13] Each organizational culture model has utility to describe different types of organizational culture. This analysis highlights the model of Massachusetts Institute of Technology's Edgar Schein because it has proven useful in illustrating the results of similar analyses about safety culture and security culture.[14] Schein provides the following definition of organizational culture: "A pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way you perceive, think, and feel in relation to those problems."[15]

Schein's model of organizational culture is often depicted as a triangle with artifacts at the top (see Figure 1), espoused values in the middle, and underlying assumptions at

FIGURE 1
Schein's model of organizational culture.



the base.[16] The underlying assumptions and beliefs of the organization enable staff to understand the organization's rationale, its mission, and their individual roles within that organization. These assumptions and beliefs are reflected in the espoused values, which are passed down within the organization in the form of policy documents, instructions, guidelines, and orders, and reinforced through qualification certificates, performance evaluations and praise, self-audits, and training workshops. The resulting artifacts are the statements and activities communicated and performed by the organization and its staff, telling others about the espoused values and underlying assumptions and beliefs of that organization.

In short, people's statements and actions are demonstrations of things outsiders might only guess about, that is, the individual and shared assumptions, values, and beliefs of that organization's culture. The section below on indicators extrapolates this insight,

along with Schein's model, to the context of safeguards culture to help illustrate the concept.

A second model also contributes to this analysis. Existing documents defining safety and security cultures have been framed around a hierarchical structural model.[17] In this approach, the actions of the individuals in an organization are assumed to be influenced by the policies established at the top political level, and affected through the actions of management and organizations. This model is used to help describe safety culture in the IAEA's International Nuclear Safety Advisory Group (INSAG) series of documents and nuclear security culture in the IAEA "Nuclear Security Series Implementing Guide No. 7, Nuclear Security Culture."[18] INSAG deals with the safety culture hierarchy of management and staff by defining three levels of requirements: at the organizational policy level, for the managerial level, and the individual level. For nuclear security culture, the IAEA document adds an additional layer of responsibility to that of safety culture, the responsibility of the state. The application of the hierarchical model to safeguards culture also suggests that the fourth tier—the state—has a role to play.

Evaluating Safeguards Culture Within a State

These models of organizational culture provide a useful conceptual underpinning for investigating safeguards culture. To frame this investigation, the analysis explores four central themes and fundamental questions:

- What does safeguards culture mean?
- What are the indicators of its existence within a state?
- How does it contribute to the international safeguards system?
- How might a strong positive safeguards culture develop or be promoted?

What Does Safeguards Culture Mean?

Existing literature on the topic of safeguards culture offers some observations about the meaning of safeguards culture and how safeguards professionals perceive its potential applicability to the international safeguards system. These observations provide the foundation for the analysis.

First, there is frequent use of the term safeguards culture by experts such as members and former members of the Standing Advisory Group on Safeguards Implementation (SAGSI), by IAEA officials, and by other safeguards professionals, even though the IAEA has never formally considered culture to have a role in its verification responsibilities. Moreover, most references seem to recognize safeguards culture as a valuable idea (phenomenon) that should be advanced or strengthened. One can infer that those who use, and promote, the term assume an intuitive understanding of the meaning of safeguards culture and its contribution to international safeguards.

For example, the report from a 2005 workshop organized by the Institute of Nuclear Materials Management/European Safeguards Research and Development Association titled "Changing the Safeguards Culture: Broader Perspectives and Challenges," recognized

that "changing the safeguards culture requires commitment and change at all levels: state, organization, management and individual. Cultural change has to come from good leadership. Beliefs are not sufficient; behavior is what counts. … change in safeguards culture (is) underway, and … with sufficient efforts and the right incentives, the change can be accomplished quickly."[19]

Subsequently, in her presentation at the 2010 Safeguards Symposium, a former SAGSI member and current official of the Argentine Nuclear Regulatory Authority suggested that the international community needs to work toward establishing a safeguards culture.[20]

In June 2008, a National Nuclear Security Administration (NNSA) official discussed the importance of: "…[promoting] a safeguards culture through infrastructure development."[21] Two years later, an official from the Tajikistan Nuclear Radiation Authority commented: "Exclusive importance for IAEA safeguards agreement is high safeguards culture. IAEA should regularly conduct seminars on advanced assessment of safeguards culture—exactly as recommends [sic] to nuclear sites regularly to assess safety culture, and to undertake steps on elimination of any revealed shortcomings."[22]

The literature on safeguards culture also reveals a simultaneous, and therefore imprecise, reference to two different usages of the term. Some perceive safeguards culture as encompassing the attitudes and beliefs within the IAEA, particularly as international safeguards evolve from a criteria-based approach to an information-driven approach. Others refer to the concept when assessing a state's commitment to nonproliferation obligations and its cooperation with safeguards authorities. Still other authors invoke the term when referring to the culture of domestic material control, accounting, and physical protection within a state. This paper only addresses the state's commitment of nonproliferation obligations and its cooperation with safeguards authorities. The following analysis, therefore, focuses on the type of safeguards culture that exists within a state.

The Type of Safeguards Culture Within a State

All but twelve non-nuclear weapon states have brought into force a Comprehensive Safeguards Agreement (CSA) with the IAEA.[23] The provisions of these agreements are codified in the state's national laws and regulations, which prescribe or restrict certain types of behavior. The national regulatory authority enforces compliance with these national laws and regulations. Questions, discrepancies, and anomalies identified during IAEA inspections and investigations can be raised in written notices or reports to the IAEA Board of Governors. Despite this oversight, there are variations in how safeguards functions are performed at various facilities. Even the most robust regulatory systems may not be enough to ensure adequate attention to safeguards requirements. The staff at one facility may meet the highest international standards, while the staff at another may perform at the minimum level or worse. These measurable variations in performance can serve as useful indicators of the type of safeguards culture that exists in the state. Armed with a better understanding of each state's safeguards culture, the IAEA would be in a better position to optimize its training and technical assistance efforts by focusing on the areas that are most likely to improve the effectiveness and efficiency of IAEA inspections.

For example, because of a shortage of resources or a belief that there are higher priorities that need to be addressed, a facility might choose not to provide advanced training to staff on safeguards techniques, such as conducting high-quality measurements of nuclear material. Another facility might perceive self-assessments to be an unnecessary drain on resources. At a third facility, management might see international safeguards as an affront to state sovereignty. In each of these cases, beliefs and values may lead staff to place a low priority on activities that enhance their ability to comply with laws and regulations effectively and efficiently. These beliefs translate to a weakened safeguards culture and consequent poor compliance with what might otherwise be a robust nuclear regulatory system. On the other hand, there are positive drivers such as international prestige, technological sophistication, customs, mores, leadership, fears, and values, among others, that induce staff to perform safeguards functions well. These negative and positive incentives influence staff performance.

To reflect these various differences, four categories of performance can be used to characterize the safeguards culture that exists at a facility: 1) strong, positive; 2) weak, positive; 3) weak, negative, and 4) strong, negative. Parsing a state's safeguards culture into these four categories and exploring them in the context of Schein's model, specifically, enables the identification of indicators or artifacts for each category of performance.

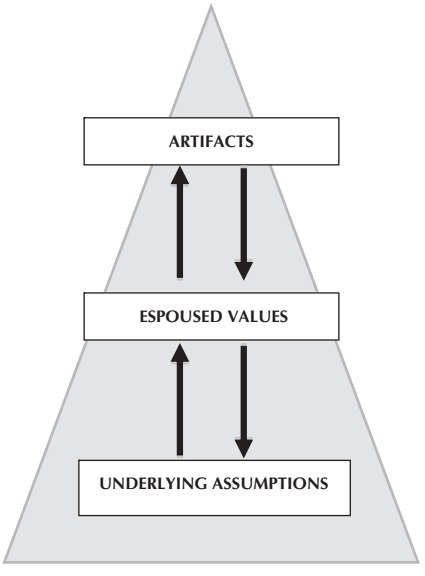
Indicators of a Safeguards Culture

The staff of a facility with a *strong, positive* safeguards culture would share an underlying assumption that compliance with international safeguards requirements is an important undertaking (see Figure 2). They would believe that the quality of their efforts towards international safeguards compliance was important to the mission of their facility. These beliefs would likely translate to improved performance. High-performing facility and regulatory staff are less likely to generate discrepancies (e.g., errors, inaccuracies, or inconsistencies) in their reporting to the IAEA. With fewer discrepancies to address, IAEA inspections and evaluations—and therefore safeguards implementation—could be more effective and efficient.

Based on these high-level characterizations, a state with a strong, positive safeguards culture might demonstrate some of the following characteristics or artifacts of their values, beliefs, and assumptions about the importance of safeguards (the list is not exhaustive):

- A CSA and an AP are in force;
- The state regulatory authority (SRA) conducts independent inspections and demonstrates authority to enforce compliance with requirements;
- The state implements an effective domestic safeguards program to protect against losses and unauthorized use;
- The state and facilities perform regular self-assessments to identify and resolve issues and inconsistencies prior to official IAEA inspection;
- Corrective action mechanisms or organizational improvement mechanisms exist and are used;

FIGURE 2
Using Schein's model to identify indicators of a strong, positive safeguards culture.



Artifacts that reflect priority on performance:
- Self-inspection program
- Corrective action mechanisms
- Corporate governance best practices
- Proactive anomaly resolution
- Meticulous measurement and reporting processes

Performance Values:
- Accurate and complete reporting enhances facility's mission
- Cooperation with the IAEA leads to effectiveness and efficiency

Underlying Assumptions:
- Compliance with safeguards requirements is necessary
- Quality of effort is important to mission

- Facilities meet all of their safeguards requirements through accurate and complete safeguards reporting, generating few or no discrepancies in their reporting;
- Facilities and the state consistently support IAEA activities through issuance of multi-entry visas and full support for IAEA inspection activities;
- International inspections run smoothly, questions are addressed promptly, and the IAEA can reach a safeguards conclusion without spending resources beyond the expected budget;
- Regardless of whether an AP is in force, the state's nuclear suppliers and facilities proactively share nuclear export/import information with each other and with other states to ensure all sales remain dedicated to peaceful use; industry follows good corporate governance and self-regulation practices; and
- Staff use mechanisms for reporting wrong-doing, as evidenced by clear reports. High-level management takes action based on the reports and provides protection from retaliation.

The staff of a facility with a *weak, positive* safeguards culture might share an underlying assumption that compliance with international safeguards is important, and they take steps to fulfill their requirements. However, limited resources, insufficient training, or competing priorities may undermine the quality of their efforts to meet these

requirements. As a result, despite a desire to be compliant with safeguards regulations and to cooperate with the IAEA, inspectors waste resources investigating discrepancies in the state's reporting that result from clerical errors or other mistakes, stressing allocated budgets. To perform at a higher level, staff may need additional technical training, better equipment, or more information about the importance of safeguards implementation. Such a state might demonstrate some of the following characteristics or artifacts of these underlying values and assumptions:

- A CSA is in force. An AP is signed or in force;
- The state meets its safeguards requirements but with frequent discrepancies in reporting because of clerical errors;
- AP declarations are submitted on time with limited errors and complete information; there is an outreach program to ensure all declarable information is reported;
- The state performs some functions to protect against loss or unauthorized use;
- The SRA performs periodic inspections but requirements are not regularly enforced;
- Facilities are allowed to amend adverse information in reports before they are submitted to the IAEA;
- Facilities and the state provide support for IAEA inspections by accompanying inspectors, answering requests for clarification, and correcting discrepancies in a timely fashion;
- The state's nuclear suppliers and facilities sometimes share nuclear export/import information with each other and with other states to ensure all sales remain dedicated to peaceful use; industry pays limited attention to their role in the nuclear supply chain; and
- The state has no history of noncompliance.

The staff of a facility with a *weak, negative* safeguards culture might assume that compliance with international safeguards is important, but competing priorities often take precedence over safeguards activities. As a result, although the state does not take active steps to hinder safeguards implementation, it also does not take the necessary steps to address fundamental safeguards functions and responsibilities. With more attention, resources, training, equipment, and support from the IAEA and others, a state with a weak, negative safeguards culture might be more willing and able to make safeguards a high priority. Such a state might demonstrate some of the following characteristics:

- If a CSA is in force, the state fails to submit accurate, complete, and timely reports to the IAEA;
- If the AP is in force, declarations are incomplete or inaccurate; there is no outreach program to field organizations to ensure all declarable information is reported;
- The SRA conducts irregular national inspections;
- The SRA enforces only the most egregious violations of license conditions or safeguards regulations;

- The SRA has limited staff with multiple roles and responsibilities; safeguards functions compete for staff attention and organizational resources; and
- Facility and SRA staff try to facilitate IAEA inspections but are not always able to support them efficiently due to limited resources.

Finally, there is a thin line between a state with a *strong, negative* safeguards culture and a noncompliant state. A state with a strong, negative safeguards culture could be characterized as apathetic toward safeguards. Safeguards staff do not recognize the importance of safeguards compliance and do not acknowledge when their actions are hindering safeguards implementation. On the other hand, a noncompliant state does not believe in the importance of safeguards compliance and its statements and activities demonstrate this belief. A noncompliant state takes intentional steps to undermine safeguards inspections or violate the terms of its safeguards agreement.

A state with a strong, negative safeguards culture might have the following characteristics:

- A CSA may not be in force. The AP is not in force;
- If a CSA is in force, the state fails to submit accurate, complete, and timely reports to the IAEA;
- The SRA does not conduct national inspections;
- The SRA does not enforce facility compliance with license conditions or national regulations;
- Staff members are not required to maintain capabilities or qualifications to perform safeguards functions; and
- The facilities and state offer sporadic support for IAEA inspection—
  - facility staff arrive late to an IAEA inspection;
  - multi-entry visas are not approved in a timely fashion;
  - facilities lack the appropriate plans to support inspections; and
  - facilities do not provide adequate radiation protection training or equipment to inspectors.

A noncompliant state might have the following characteristics:

- There is no AP in force;
- The state withdraws from the NPT and its safeguards agreement;
- Environmental samples provide evidence of undeclared activity;
- Satellite imagery reveals efforts on the part of the state to cover up undeclared activities;
- Illicit shipments of nuclear-related equipment have been interdicted;
- The SRA does not conduct national inspections;
- The SRA does not enforce facility compliance with license conditions or national regulations;
- Staff members are not required to maintain capabilities or qualifications to perform safeguards functions; and
- The facilities and state hinder IAEA inspections.

Ultimately, states with weak, positive and weak, negative safeguards cultures are where the IAEA should focus most of its attention, since these are the states that offer the greatest opportunity for improvement. After all, there is little incentive to invest significant resources in a state that already has a strong, positive safeguards culture. In cases of noncompliance, the concept of promoting or strengthening a safeguards culture is moot. There is no incentive on the part of the state to alter its behavior since its underlying assumptions and beliefs do not support safeguards compliance.

How Does Safeguards Culture Contribute to the International Safeguards System?

These discussions have demonstrated the feasibility of defining the concept of safeguards culture and identified potential indicators of the type of safeguards culture that exists in a state. The next step is to consider how the international community could apply this concept to tailor its resource allocations and improve the efficiency or effectiveness of international safeguards.

Understanding the type of safeguards culture that exists in a state could provide the IAEA with helpful guidance for optimizing the nature and scope of its interactions with that state. Historically, the IAEA has relied on technical information to determine the scope of its interactions. Specifically, it has used information about the type and quality of nuclear material that exists in the state, the design of each facility, and the flow of material through those facilities to determine the number and scope of their inspections. Safeguards culture indicators would not replace these technical criteria. Rather, they would be considered as additional facts that could enable the IAEA to optimize the type and level of investment in that state.

For instance, assuming a rigorous methodology were developed that enabled the IAEA to determine Country X has a weak, positive safeguards culture, IAEA analysts and inspectors could prepare engagement plans that address specific weaknesses that have been identified (e.g., a training course on corrective action procedures). In another case, the IAEA may determine Country Y has a weak, negative safeguards culture. In this instance, a different, possibly more intensive set of interactions with the state may be warranted. These interactions could consist of a comprehensive assistance package aimed at raising awareness of safeguards requirements and functions, strengthening technical capacity of staff to meet those requirements, workforce planning to help the state balance its competing priorities, and provision of basic equipment. In either Country X or Y, the goal would be to target training and assistance in ways that have the greatest potential to improve the effectiveness and efficiency of safeguards implementation in the state.

How Might Safeguards Culture Develop or be Promoted?

The benefit of clarifying a definition for safeguards culture—and creating a framework for thinking about it—is that the framework could be used to identify methods for promoting a strong, positive safeguards culture within a state. Recognizing the challenges associated with promoting better safeguards performance, a former SAGSI member has proposed a

construct for safeguards culture that includes four tiers similar to those used in the IAEA description of safety culture. These are state, organizations, managers, and individuals, with requirements ascribed to each tier. For example, at the state level, the requirement would be establishment of a State System of Accounting for and Control of Nuclear Materials (SSAC) with the necessary legal and regulatory framework defining relevant responsibilities of each stakeholder. At the organization level, the requirement would be a clear statement of the organization's commitment to effective and efficient international safeguards. At the managerial level, requirements would include proper training to develop skills and provide tools to promote and implement safeguards culture. At the individual level, some requirements would include compliance with rules, regulations, and procedures, and a rigorous and prudent approach to their safeguards responsibilities. This official notes that safeguards culture should be fostered among those individuals who are both directly and indirectly involved in routine safeguards implementation activities. Lack of safeguards awareness might result in careless actions, such as inadvertently cutting IAEA seals, or inadvertent interference with safeguards cameras. Measures of the extent to which these responsibilities are being executed and promoted could provide another source of indicators of the character of the safeguards culture of a state or facility.[24] Table 1 lists a number of activities that could be pursued by a state (or promoted by third parties) to develop a strong, positive safeguards culture within a state.

Conclusion

The IAEA's increasing reliance on state cooperation to enhance the effectiveness and efficiency of its verification activities warrants a close examination of safeguards culture. Research into applicable concepts such as organizational culture, as well as nuclear safety and nuclear security culture, has created a strong foundation for this examination. Nevertheless, international safeguards is quite different from the concepts of safety culture and security culture. For example, the incentives for sustaining and promoting strong safeguards cultures are rooted in operational performance rather than personal safety or national security. The differences among the various disciplines suggest additional research is necessary to identify an appropriate set of indicators of safeguards culture.

Rigorous evaluation of the concept of safeguards culture will take time and concerted effort on the part of the IAEA and concerned states. By way of example, it took eight consultants' meetings and one technical meeting at the IAEA, over several years, to develop an internationally agreed-upon definition for nuclear security culture, and to produce a guidelines document on the subject. Over time, and with IAEA leadership, internationally accepted definitions of safety culture and nuclear security culture have been established, with emphasis on the characteristics, attitudes, and behavior that promote good safety and nuclear security practices. Nuclear safety and nuclear security professionals have identified indicators that link activities, beliefs, and intentions to actions, enabling inferences to be drawn about the integrity of the safety or nuclear security culture within a state or facility.

TABLE 1
Sample indicators of safeguards culture with promotional activities.

Safeguards Culture Indicators	Development/Promotion Activities
• SRA is independent from organizations responsible for promoting nuclear power.	• State: Establish an independent regulator. • Third party: Encourage establishment of independent regulator as a good practice.
• SRA conducts independent inspections. • State and facilities perform regular self-assessments to identify and resolve issues and inconsistencies before the official inspection.	• State: Conduct independent inspections and self-audits. • Third Party: Provide model self-assessment/audit tools and methodologies.
• State's nuclear suppliers and facilities share nuclear export/import information with other states to ensure all sales remain dedicated to peaceful use; industry follows good corporate governance and self-regulation practices.	• State: Promote self-regulation practices among industry companies; reward corporate commitment to nonproliferation. • Third Party: Establish working groups for sharing shipment requests.
• Mechanisms for reporting wrong-doing exist and staff personnel use them, as evidenced by clear reports generated by staff.	• State: Establish anonymous tip centers/lines; reward self-reporting. • Third Party: Encourage staff/self-reporting during training workshops.

This process of conceptual development would be a good model for the international safeguards community to follow.

Further exploration of safeguards culture should begin with achieving an international consensus on a definition for the concept. This should be followed by agreement on a rigorous methodology for identifying indicators of safeguards culture and establishing the causal link between beliefs or attitudes and safeguards actions. Indicators should be based on objective, factual information that does not discriminate among states. These indicators of a state's safeguards culture could then be used to identify the training and technical assistance needs of states and facilities, thereby improving the effectiveness and efficiency of international safeguards.

DISCLAIMER

The views expressed in the article are solely those of the authors and do not necessarily reflect the views of the Department of Energy, National Nuclear Security Administration, or any other US government agency.

NOTES

1. World Nuclear Association, "2013 WNA Pocket Guide: Nuclear Power Reactor Characteristics," 2013, <www.world-nuclear.org/uploadedFiles/org/WNA/Publications/Nuclear_Information/Pocket%20Guide%20Reactors.pdf.
2. Statement by Dwight D. Eisenhower, president of the United States of America, to the General Assembly of the United Nations, December 8, 1953.
3. Ibid.
4. Brian Boyer and Mark Schanfein, "International Safeguards Inspection: An Inside Look at the Process," in James E. Doyle, ed., *Nuclear Safeguards, Security and Nonproliferation*, (Burlington, MA: Butterworth Heinemann), pp. 97–112.
5. International Atomic Energy Agency, "The Structure and Content of Agreements Between The Agency and States Required in Connection with the Treaty of the Non-Proliferation of Nuclear Weapons," INFCIRC/153, June 1972.
6. International Atomic Energy Agency, "Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards," INFCIRC/540, September 1997.
7. Jill N. Cooley, "Progress in Evolving the State-level Concept," paper delivered at the Seventh INMM/ESARDA Joint Workshop, Aix-en-Provence, France, October 17–20, 2011, <https://esarda.jrc.ec.europa.eu/images/files/2011-workshop-aix/Working-groups/WG1/Jill_Cooley_pa.pdf>.
8. Stephen V. Mladineo and Sarah Frazar, "Safety, Security, and Safeguards (3S) Culture," paper delivered at the Seventh INMM/ESARDA Joint Workshop, Aix-en-Provence, France, October 17–20, 2011, <https://esarda.jrc.ec.europa.eu/images/files/2011-workshop-aix/Working-groups/WG3/Steve_MADLINEO_pa.pdf>.
9. Donald N. Kovacic, Anna Raffio-Caiado, John McClelland-Kerr, Matthew Van Sickle, Mo Bissani, and Kenneth Apt, "Nuclear Safeguards Infrastructure Development and Integration with Safety and Security," paper presented at the 50th Annual Meeting of the Institute of Nuclear Materials Management 2009, Tucson, Arizona, July 12–16, 2009.
10. Kaoru Naito, "Safeguards Culture: Analogies from Safety Culture and Security Culture," paper delivered at the Seventh INMM/ESARDA Joint Workshop, Aix-en-Provence, France, October 17–20, 2011, <https://esarda.jrc.ec.europa.eu/images/files/2011-workshop-aix/Working-groups/WG3/Kaoru_NAITO_pa.pdf>.
11. Karyn Durbin, Foreign Policy Specialist, National Nuclear Security Administration, e-mail correspondence with the authors, October 20, 2011.
12. Terrence E. Deal, Allan A. Kennedy, *Corporate Cultures* (New York, NY: Perseus, 2000), p. 4
13. Charles A. O'Reilly III, Jennifer Chatman, and David F. Caldwell, "People and Organizational Culture: A Profile Comparison Approach to Assessing Person-Organization Fit," *Academy of Management Journal* 34 (September 1991), pp. 487–616.
14. IAEA, "Nuclear Security Culture, Implementing Guide," IAEA Nuclear Security Series No. 7, 2008, <www-pub.iaea.org/MTCD/publications/PDF/Pub1347_web.pdf>.
15. Edgar H. Schein, *Organizational Culture and Leadership*, 3rd ed. (San Francisco, CA: Jossey-Bass, John Wiley & Sons, 2004), p. 17.
16. Ibid., p. 26.
17. International Atomic Energy Agency, "Safety Culture," Safety Series No. 75-INSAG-4, 1991.
18. International Atomic Energy Agency, "Nuclear Security Culture, Implementing Guide."
19. Institute of Nuclear Materials Management (INMM), "Report on 2005 INMM/ESARDA Santa Fe Workshop: Changing the Safeguards Culture: Broader Perspectives and Challenges" *INMM Communicator* 3 (2006), <www.inmm.org/communicator/winter_06/workshop.htm>.

20. Sonia Fernández Moreno, "Identifying the Right Skills & Expertise for the Challenges of the 21st Century, How to Find Them? How to Retain Them?" delivered at the Symposium on International Safeguards: Preparing for Future Verification Challenges, Vienna, Austria, November 1–5, 2010, <www.iaea.org/OurWork/SV/Safeguards/Symposium/2010/Documents/PPTRepository/Fernandez.pdf>
21. Adam M. Scheinman, "Next Generation Safeguards Initiative," presented at the International Forum on Nuclear Nonproliferation and Peaceful Use of Nuclear Energy in the Asia Region, Tokyo, Japan, June 24–25, 2008, <www.jaea.go.jp/04/np/activity/2008-06-24/2008-06-24-2-6.pdf>.
22. U.M. Mirsaidov, "Implementation of the Safeguards System in the Republic of Tajikistan," delivered at the Symposium on International Safeguards: Preparing for Future Verification Challenges, Vienna, Austria, November 1–5, 2010, <www.iaea.org/OurWork/SV/Safeguards/Symposium/2010/Documents/PapersRepository/090.pdf>.
23. International Atomic Energy Agency, "Factsheets and FAQs: NPT Comprehensive Safeguards Agreements," <www.iaea.org/Publications/Factsheets/English/nptstatus_overview.html>.
24. Kaoru Naito, "Safeguards Culture: Analogies from Safety Culture and Security Culture."