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# **Nuclear Security Culture and Self-Assessment: BATAN's Experience**

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## **Abstract**

Organizations should increase safety to minimize the harmful effects of nuclear materials. Additionally, organizations should take measures to protect security culture within the organization itself. This paper covers the National Nuclear Energy Agency of Indonesia's (BATAN's) promotion of nuclear security culture and self-assessment projects, which is based on the International Atomic Energy Agency's (IAEA) methodology.

**Keywords:** security, security culture, self-assessment

## **I. Introduction**

Nuclear reactors that use nuclear materials for research or power generation run the risk of introducing nuclear materials to the environment accidentally or maliciously. In order to prevent this, organizations that run nuclear reactor operations should establish safety, security, and safeguards.

Those three aspects are:

- **Safety-** Achieving proper operating conditions, preventing accidents or mitigating consequences of accidents, resulting in protection of workers, the public, and the environment from undue radiation hazards[1]
- **Security-** Preventing, detecting, and responding to theft, sabotage, unauthorized access, illegal transfer, or other malicious acts involving nuclear material, other radioactive substances, or their associated facilities[1]
- **Safeguards-** Monitoring nuclear materials through nuclear material accounting, containment, and surveillance. These measures must ensure timely detection of a fissile material's deviation from the process[2]

All three of these aspects protect workers, the environment, and the public from any harmful effects of nuclear materials.

The National Nuclear Energy Agency of Indonesia (BATAN) operates three research reactors and several supporting facilities, including nuclear fuel and radioactive waste treatment facilities. Since those facilities involve nuclear materials, BATAN takes safety, security, and safeguards seriously. This paper will focus on nuclear security and will describe BATAN's endeavors to enhance security through promoting nuclear security culture and self-assessment of nuclear security culture within BATAN's organization.

## II. Elements of the Security System and the Human Factor

The security system should be put in place in order to achieve a high level of security effectiveness. Five basic elements of the security system are:[3]

- Deterrence – A strong defense would prevent would-be attackers
- Detection –the security system alerts the facility of either covert or overt attacks
- Delay –the security system prevents the adversary's progress towards the intended target. A successful delay will allow time for a response.
- Response – the actions taken by security personnel stops the adversary from being successful.
- Recovery – the ability to resume normal operations after an incident or attempted incident.

In general, the more advanced the security system, the more important its human factor is. Security incidents are always connected with people or their activities.. Human behavior is influenced by culture, so, it is important that security is effective and continues to be strengthened. In other words, developing security culture within an organization is about encouraging the staff to respect common values and standards towards security whether they are inside or outside the workplace [4]. In other words, the nuclear security culture makes human factors as an asset within nuclear security.

## III. Nuclear Security Culture

Nuclear security culture has been important to security experts for many years. For example:

- At the June 2000 meeting of the working group of informal open-ended expert meeting to discuss whether there is a need to revise the Convention on the Physical Protection of Nuclear Material (CPPNM), Meeting stated that due priority should be given to security culture. This has been endorsed by IAEA BG and welcomed by IAEA GC 45 (GC(45)RES/14) in 2001.
- Amendment of CPPNM (2005) to include Security Culture (Fundamental Principle F):  
*“Security Culture: All organizations involved in implementing physical protection should give due priority to the security culture; to its development and maintenance necessary to ensure its effective implementation in the entire organization”*
- The IAEA Code of Conduct on the Safety and Security of Radioactive Sources (2004) states:  
*“Every State should, in order to protect individuals, society, and the environment, take appropriate measures to ensure...the promotion of safety culture and security culture....”* [Basic Principle 7(b)].

- In March 2005, the IAEA International Conference on Nuclear Security: Global Direction for the Future stated: *“The fundamental principles of nuclear security include embedding a nuclear security culture throughout the organizations involved...”*

Finally, in 2008, IAEA published the Nuclear Security Series No. 7 on Nuclear Security Culture. In this document, Nuclear Security Culture is defined as:[5]

*“The assembly of characteristics, attitudes and behavior of individuals, organization and institutions which serves as means to support and enhance nuclear security”*

Based on the IAEA document on nuclear security culture (see Fig. 1), the model of an effective nuclear security culture was developed and derived from a model of organization culture. This model consists of three layers:

1. The first layer is recognition. This is the belief that credible threats exist; therefore, nuclear security is important. People should develop and remember this over time. This is not easily assessed, but it effects how people respond to security issues and events.
2. The second layer is a set of principles the managers in an organization could instill to guide decision and behavior. These principles should be known by staff and applied consistently for entire workforces within the organization.
3. The third layer is the management system, which covers the behavior of leaders and personnel. This layer can be monitored by assessment of nuclear security culture based on a set of characteristics and indicators.

In order to evaluate nuclear security culture, IAEA has been developing a methodology to conduct a self-assessment (IAEA-NST026).[6] The methodology is a multi-stage process as shown in Fig. 2. This process is started when leadership decides to conduct self-assessment and finishes when the results are reported. These results become the foundation for the next assessment.

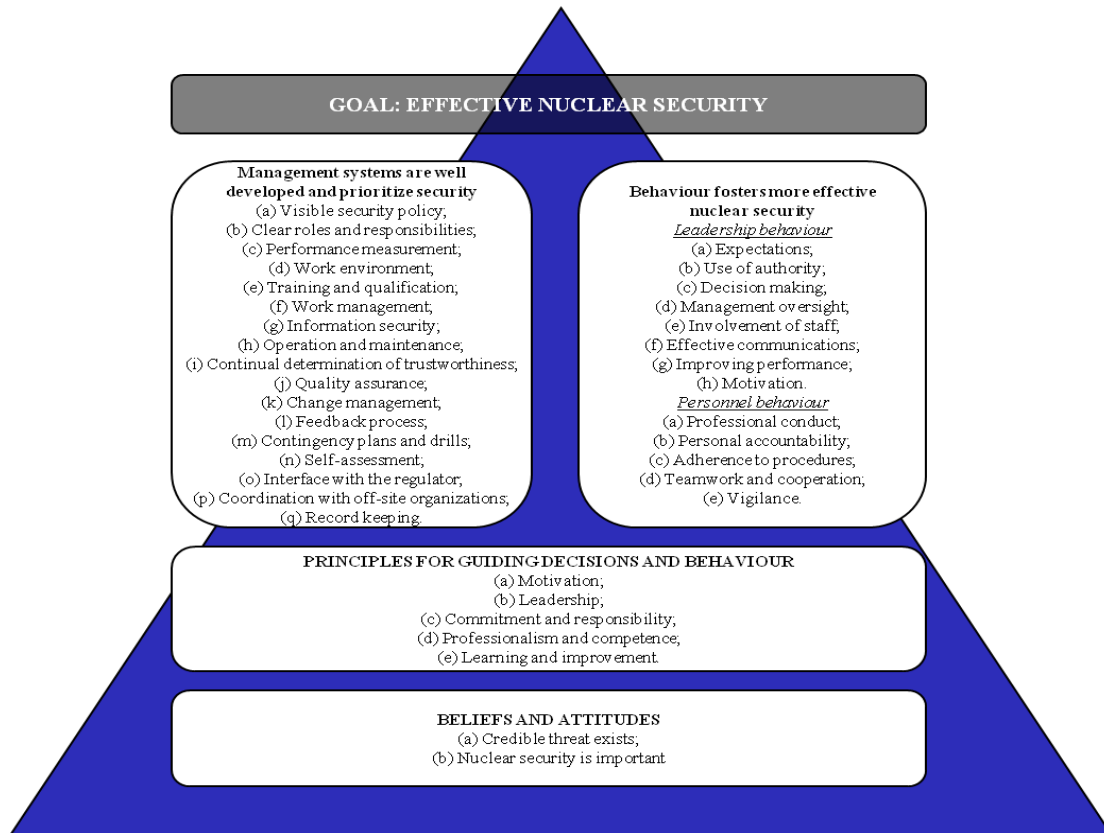


Figure 1. Characteristics of Nuclear Security Culture[5]

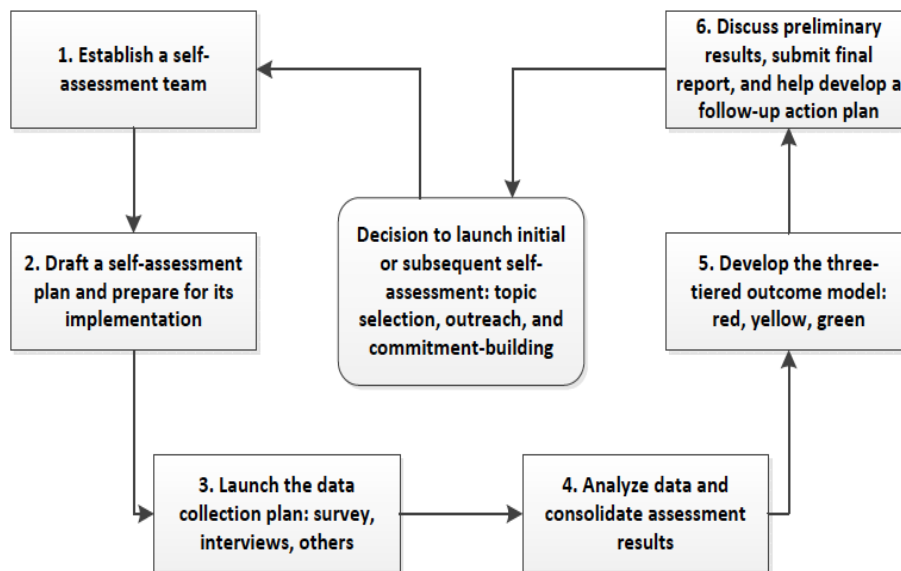


Figure 2. Multi-stage process of self-assessment of nuclear security culture

## IV. Milestones of Activity for Nuclear Security Culture in BATAN

After IAEA published the NSS No. 7 on nuclear security culture – implementing guide, in 2010 BATAN started to promote the nuclear security culture with help of IAEA and the Center for International Trade and Security (CITS) at the University of Georgia (UGA) in the United States. The promotion was originally led by BATAN and several stakeholders involved in security. A regional workshop was also held in BATAN in December 2011.

After a series of promotional activities on nuclear security culture, IAEA proposed BATAN lead a pilot project in nuclear security culture; this offer was accepted and the project began in 2012. It was the first project of its kind in the world. It was a survey conducted several months after the 2<sup>nd</sup> Nuclear Security Summit was held in Seoul, South Korea, in March 2012 and finished in 2013 with the support of IAEA and experts from CITS-UGA. The result of this initial self-assessment was presented at the IAEA Technical Meeting and International Conference on Nuclear Security in April 2013.

Based on the results, BATAN established a Center for Security Culture and Assessment (CSCA) on September 29, 2014. CSCA's mission is to promote and foster nuclear security culture in BATAN, conduct self-assessment, develop the security culture model, self-assessment methodology, and increase collaboration with other institutions dealing with security culture. CSCA became the premiere training hub for this regionally, nationally, and internationally along with the IAEA and CITS-UGA. This initiative was presented by the Indonesian delegation of the National Progress Report of Indonesia at the Nuclear Security Summit 2014 in Hague. In order to continue CSCA's endeavors in promoting nuclear security culture and self-assessment, BATAN decided to conduct second self-assessment in 2015 used four tools (survey, interview, document review and observation) to evaluate the progress of the first assessment. This second self-assessment is applying the final draft of IAEA self-assessment methodology (NST026).

## V. Conduct of Nuclear Security Self-Assessment

Since 2012, BATAN has conducted two nuclear security self-assessments. The results are summarized in Table. 1.

**Table 1. Summary of Self-Assessment Conduct in BATAN with survey statement validation**

|            | 1st Self-assessment                                  | 2nd Self-assessment  |
|------------|--|--|
| Period     | : August 2012-March 2013                             |  |
| Method     | : Three research reactors                            | Multi-purpose reactor, nuclear fuel cycle technology and radioactive waste centers |
| Team       | : 41 members with less various scientific background | 32 members with various scientific background, incl. psychology                    |
| Respondent | : 624 surveyed, 128 interviewed                      | 277 surveyed, 43 interviewed   |
| Others     | : Without survey statement validation                | With survey statement validation   |

Results of the two self-assessments are presented in three categories: weakness, potential weakness, and strength. The results from self-assessment are used to improve security culture and the security system within BATAN.

From the first self-assessment, 624 surveys were entered into the database and 87 histograms of the evaluations were plotted; with more than 500 total pages of data. These histograms generally indicated good security culture in adhering to procedures, but some weaknesses were found in the reward system.

In addition, the 35 written comments amplified the fact that the reward system was not well understood and that rewards in the security area should be emphasized over punishments.[7] The personal interview sessions confirmed that in fact the reward system was not well known. In addition, a number of other interesting security culture issues surfaced such as: “Standard Operating Procedures on Security are only available to security personnel”; “The importance of the use of the badges was not well understood”; “The role of non-security personnel in the security function was not well understood”; and “Non-security personnel do not generally apply their orientation security training.” The result from this first self-assessment has been used as the base level of security culture in BATAN to further improve the security system.

The second self-assessment is ongoing. The survey and interview portion are complete, but the observation and document assessment stages are not. Preliminary evaluations from the survey and interview portion indicate that some weaknesses discovered in the first self-assessment have already improved. Security related communication has been improved. For example, staff can easily inform leaders about security, safety, and safeguard. However, it appears that some characteristics related to leadership behavior need to be improved.

By conducting these two self-assessments, it could be expected that the capability of personnel in the nuclear security culture to self-asses is increasing. Accordingly, BATAN is ready to collaborate with other institutions on terms of promoting security culture and its self-assessment.

## VI. Conclusion

Safety, security, and safeguarding are the three most important aspects that need to be strengthened to protect workers, the public, and the environment against possible harmful effects of nuclear materials. In response to this need, BATAN has been a champion of security culture since 2010. In 2012, BATAN conducted a pilot project for personal accountability in nuclear security culture for its three research reactors. A second assessment using IAEA methodology began in 2015. The results from these self-assessments are valuable and have been used to both improve security systems and foster implementation of nuclear security culture in BATAN.

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Antariksawan earned his Doctorate degree in Thermal hydraulics in 1993 from Grenoble Institute of Technology in France. He serves as the Deputy Head of Nuclear Technology Development Division for the National Nuclear Energy Agency of Indonesia (BATAN). In 2014, the Center For Security Culture and Assessment (CSCA) was established within his division. Under his guidance, the Center has successfully conducted the second self-assessment of Batan's nuclear security.

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