



**IRSN**

INSTITUT  
DE RADIOPROTECTION  
ET DE SÛRETÉ NUCLÉAIRE

# Security culture in the nuclear field

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# IRSN

## // in brief

The French Institute for Radiological Protection and Nuclear Safety (IRSN) was founded by Act No.2001-398 of May 9, 2001. Its tasks and organization were defined by Decree No.2002-254 of February 22, 2002. The IRSN is a public establishment that carries out both industrial and commercial activities. It is jointly supervised by the Ministers for Defence, Environment, Industry, Research and Health.

IRSN employs over 1,700 specialists, including engineers, researchers, doctors, agronomists, veterinarians and technicians, experts in nuclear safety and radiological protection and in the control of nuclear and sensitive materials.

The Institute performs expert assessments and conducts research in the following fields:

- nuclear safety;
- safety relative to the transportation of radioactive and fissile materials;
- protection of human health and the environment from ionizing radiation;
- protection and control of nuclear materials;
- protection of facilities and transports dealing with radioactive and fissile materials against malicious acts.

### Documents de référence

Editions Property of IRSN  
31, avenue de la Division Leclerc  
92260 Fontenay-aux-Roses  
Tel.:+33(0)1 58 35 88 88

Website: [www.irsn.fr](http://www.irsn.fr)

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IRSN  
Odile Lefèvre  
BP 17  
92262 Fontenay-aux-Roses cedex  
Fax:+33(0)1 58 35 79 62

[doc.syn@irsn.fr](mailto:doc.syn@irsn.fr)

# Foreword

The Institute for Radiological Protection and Nuclear Safety develops research programs and conducts studies on nuclear and radiological risks. It is responsible for public service initiatives aimed at prevention and provides technical support to the public authorities in charge of ensuring nuclear safety and security, together with radiological protection. In fulfilling these various duties, the Institute is called upon to define its position on certain scientific and technical issues.

In line with its policy of transparency and its desire to make quality information available to all partners and stakeholders for use in developing their own views, the IRSN publishes "reference documents", which present the Institute's position on specific subjects.

These documents are drafted by IRSN specialists, with the help of outside experts if necessary. They then undergo a quality assurance validation process.

These texts reflect the Institute's position at the time of publication on its [Website](#). It may revise its position in light of scientific progress, regulatory changes or the need for more in-depth discussion to satisfy internal requirements or external requests.

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**Jacques Repussard**  
**Director General**

[www.irsn.fr](http://www.irsn.fr)

**Documents de référence**

IRSN  
B.P.17  
92262 Fontenay-aux-Roses cedex  
Fax: +33 (0)1 58 35 79 62

[doc.syn@irsn.fr](mailto:doc.syn@irsn.fr)

# //Members of the **working group**

---

**Denis Winter**

Submitter

---

Jacques Aurelle  
Bruno Autrusson  
Eric Gosset  
Jean Jalouneix  
Robert Venot

Document produced by the  
nuclear defence expertise division of IRSN

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## 1/

# Introduction

The Board of Governors of IAEA has acknowledged **12 fundamental principles** of physical protection for **nuclear materials**<sup>[1]</sup> and **nuclear facilities**<sup>[1]</sup>. These principles will be integrated into the forthcoming revision of the International Convention on Physical Protection. Fundamental principle F proposes a definition of security culture and recommends that its implementation and its maintenance are made a priority in the organisations concerned. It thus appears necessary to specify the concept of security culture.

Note that the other 11 fundamental principles mentioned above have more or less links with the security culture. They will thus appear in various terms in the remainder of the text. References will be made implicitly on various occasions in the text.

This document is also complementary to INSAG-4<sup>[2]</sup> which presents a concept of **safety culture**. One specific chapter also makes the necessary comparisons (common points and specificities) between safety culture and security culture.

## 12 Fundamental principles

- A. Responsibility of the State
- B. Responsibilities during International Transport
- C. Legislative and Regulatory Framework
- D. Competent Authority
- E. Responsibility of License Holders
- F. Safety Culture
- G. Threat
- H. Graded Approach
- I. Defence in Depth
- J. Quality Assurance
- K. Contingency Plans
- L. Confidentiality



**Document GOV/2001/41**  
2001/08/15, IAEA  
[www.iaea.org](http://www.iaea.org)



**Safety Series n°75, INSAG-4**  
*Safety Culture, - a report by the international nuclear safety advisory group, IAEA, 1991*



See the glossary at the end of the document

2/


# Definition of security culture

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Security culture includes characteristics and attitudes in organizations and of individuals which establish that the issues relating to protection against the loss, theft and other unlawful taking of nuclear material on one hand and deliberate malicious acts in nuclear facilities or during transport of nuclear materials on the other hand, receive the attention warranted by their significance.

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The malicious acts in question refer to anything that may directly or indirectly have radiological consequences for man and the environment.

This definition is more complete than given in IAEA document <sup>1</sup>, which relates only to the physical protection of nuclear materials and nuclear facilities. In addition, INSAG-4 only refers to **nuclear power plants**, whereas the current definition extends the field to all nuclear facilities and the **transport** of nuclear materials.

The **protection** of **radioactive substances** is not, however, considered explicitly in this document. An extension could be proposed later on.



**Document GOV/2001/41**  
2001/08/15, IAEA  
[www.iaea.org](http://www.iaea.org)



## 3/

# Universal features of security culture

Security culture has three major components. The first concerns the policy that the State wishes to put into practice, in particular given the national and international contexts. The second is the organisation introduced within each organisation concerned, particularly to apply the policy fixed by the State: in this component, distinction must be made between what comes under the organisation in itself and what concerns its managers. The third domain is the attitude adopted by the various individuals at all levels to implement this policy within the framework of the structure in which it is operating and to incorporate it into their work. These aspects are examined separately under the headings of Role of the State (Paragraph 3/1), Role of Organisations (Paragraph 3/2), Role of Managers in Organisations (Paragraph 3/3) and Attitude of Individuals (Paragraph 3/4). **Erreur ! Source du renvoi introuvable.** illustrates the main components of security culture and links the chapters to the overall diagram.

All these components must, nevertheless, be considered as part of a whole, to develop a security culture through overall coordination and dialogue between them.

Security culture must not remain confined simply within the organisations concerned and their personnel; each one in its activity

must make an effort to raise public and media awareness to security culture in the nuclear field.

The general public should view security culture as a sign of professionalism, skill and responsibility by all actors (organisations and individuals) involved in the protection of nuclear materials, nuclear facilities and transport of nuclear materials. It must help strengthen the confidence of each one in security within the nuclear field.

3/1

## Role of the State

In any major activity, the manner in which individuals act is conditioned by requirements set at a higher level. Legislation is the highest level with an influence on protection against loss, theft or unlawful taking of nuclear materials and malicious acts in nuclear facilities and during the transport of nuclear materials; here are laid the national foundations for security culture.

In the very first instance, the State is responsible for compiling the legislative and regulatory framework used to define the general objectives for protection, division of responsibilities and protection of information. This framework is discussed fully with all stakeholders when being developed.

3/1/1

### Definition of general protection objectives

The State fixes the security policy. It develops this policy around identified threats, the international context and specific aspects of the national context. The State uses these elements in particular to define the **design basis threat**.

The design basis threat must be revised periodically to take account of the constant evolution in risks and technologies. Thus, the protection implemented to face up to the design basis threat must be constantly adapted to maintain a permanent, acceptable level.

3/1/2

### Division of responsibilities

State commitment is given concrete expression in national legislation and regulations, by setting up a **competent authority**,

possibly supported by a technical support body. This authority has the personnel, financial resources and supervisory powers in terms of security. In particular, provision is made for declaring any event affecting or likely to affect the protection of nuclear materials, nuclear facilities and the transport of nuclear materials to the competent authority without delay.

So that all organisations and individuals feel involved at their respective levels, the State lays out its own responsibilities in terms of the protection of nuclear materials, nuclear facilities and the transport of nuclear materials clearly as well as those entrusted to other bodies.

The **operator** has full responsibility for protecting his nuclear materials, protection equipment, transport means and installations and for the information he holds. The State, however, with responsibility for the law enforcement agencies, may be called on to intervene on or off site. It is also justified in intervening when an event occurs during the transport of nuclear materials, particularly on the public highway. Lastly, the potential risk from dysfunctions in the protection of nuclear materials, nuclear facilities or the transport of nuclear materials may involve the entire national territory or even spread to other countries.

It is essential for this division of responsibilities to be clearly defined and well understood by all individuals within the organisations.

Given the need for coordination between the public authorities and other organisms - as required by such a division of responsibilities -, the State introduces mechanisms for the exchange of knowledge and data, particularly, in terms of intelligence and intervention. It organises exercises regularly on the protection of nuclear materials, nuclear facilities and the transport of nuclear materials involving operators and State departments.

3/1/3

## Protection of information

Security culture is different from the culture of secrecy. It must make it possible for all individuals to be aware of the sensitive nature of a piece of information. To ensure sufficient protection against estimated risks, some information may not circulate freely in the public domain since it could be used for malicious purposes. Thus, given the division of responsibility discussed earlier and the

resultant necessary exchanges, the State lays down general principles for authorising access to facilities and information that could compromise the protection of nuclear materials, nuclear facilities and the transport of nuclear materials, and checks that they are applied.

3/2

## Role of Organisations

The policies defined at high level of each organisation concerned are based on the principles laid down by the State. They condition the work environment and influence the behaviour of individuals. These policies differ depending on the nature of the organisation and the activities pursued by its staff, but also show significant common characteristics, as described in the following paragraphs.

3/2/1

### Commitment

Any organisation with activities relating to the protection of nuclear materials, nuclear facilities and the transport of nuclear materials makes its responsibilities known and understood publicly in a statement of security policy issued by its Managing Director. The aim of this statement is to demonstrate the commitment of its management and to provide guidelines to the staff as well as to set out the organisation's security objectives.

It varies according to the function of the organisation. For public authorities, the commitment focuses more particularly on the promotion of the security culture. Operators undertake to apply the regulations and seek on-going improvement in the protection of nuclear materials, nuclear facilities or the transport of nuclear materials. Lastly, the support bodies (design, manufacture, maintenance, research, response force, etc.) basically show their commitment in the quality of their services and compliance with information access rules.

In addition, this commitment covers all the various levels of the **defence in depth** concept. It must firstly cover prevention systems before addressing the provisions for detection, early warning, reaction and limitation of consequences required to protect nuclear materials, nuclear facilities and the transport of nuclear materials.

3/2/2

## Management structures

Implementing pre-defined policies requires the clear definition in all organisations of their responsibilities in terms of protection of nuclear materials, nuclear facilities and the transport of nuclear materials and methods of controlling its effectiveness. Regardless of the role of the organisations, strong hierarchical links are forged that are used for direct exchanges on matters of security.

Operators appoint dedicated internal units to monitor security-related activities. These units report to a high level in the hierarchy.

In addition, within each organisation, responsibility for the protection of nuclear materials, nuclear facilities and the transport of nuclear materials may be entrusted to individuals not directly involved in the security field. The internal organisation must, therefore, foster exchanges and establish structures for dialogue, to analyse and resolve any difficulties caused by a potential conflict of interest between the safety and security provisions.

3/2/3

## Resources

The organisation allocates adequate resources to protecting nuclear materials, nuclear facilities and the transport of nuclear materials and to making sure it is effective. The personnel thus has the necessary equipment, facilities and support to fulfil its assignments. Adequate resources are also made available for staff training.

The resources made available match the expected response with respect to a particular risk presented by the facility or the transport. In particular, operators set up sufficient protection to face up to design basis threats defined by the State.

In addition, operator resources complement those provided by the State departments, particularly the law enforcement agencies, by taking into account the division of responsibilities mentioned in the previous chapter.

Lastly, all organisations adapt the resources to be allocated to changes in short- and long-term threats. They are especially in a position to react rapidly and put in place the necessary resources to respond to specific situations.

3/2/4

## Vigilance

All organisations make arrangements for a regular review of their **practices** that form part of the protection system against the loss, theft or unlawful taking of nuclear materials and against malicious acts in nuclear facilities or during the transport of nuclear materials.

This covers especially the nominations, the access authorisations, the staff training and, in addition to, the practices linked to the quality of tasks and the protection of information. This regular review of necessity takes into account lessons learned from feedback and changes in the design basis threats. The organisations make sure in particular that all detected discrepancies relating to the protection systems are comprehensively analysed and corrected.

3/3

## Role of managers in organisations

The work environment has a strong influence on the attitudes of individuals. Developing and maintaining a true security culture in individuals lies in the practices conditioning this environment and encourages the attitudes that contribute to the protection of nuclear materials, nuclear facilities and the transport of nuclear materials. The general management is responsible for fixing policies and protection objectives; managers are then in charge of initiating practices that comply with them.

3/3/1

## Definition of responsibilities

The exercising of individual responsibilities is made easy by clearly-defined chains of command. The responsibilities allocated to each individual are established and documented in sufficient detail to avoid all ambiguity; their scope is specified. Thus, are clearly indicated in particular restrictions on the exchange and circulation of information. The definitions of responsibility are approved by the highest possible level in the chain of command. Provision is made for a process to monitor authorisations issued and to put allocated responsibilities into practice.

3/3/2

## Definition and supervision of practices

The managers make sure that activities relating to the protection of nuclear materials, nuclear facilities and the transport of nuclear materials are strictly carried out.

All the updated documents listed in order of importance from general directives to detailed work procedures, form the foundation for good working practices. These reference documents comply with the organisation's quality policy and include, in particular, a **quality assurance** plan for the activity concerned.

The managers ensure that activities are executed as defined and set up a verification system.

The managers make sure regular contact between their organisations be maintained, complying with the rules governing information confidentiality. Relationships of this type are necessary when coordinating intervention resources between State departments and operators. In this context, exercises are organised to test the organisations and the planned liaisons, train teams and generally to draw on the lessons learned to improve the intervention system.

3/3/3

## Qualifications and training

Managers ensure that temporary and permanent staff and any self-employed service provider are made aware of the importance of protecting nuclear materials, nuclear facilities, the transport of nuclear materials and sensitive information. These individuals are systematically informed of rules to be respected on the subject.

Managers make sure that their staff has all the skills and authorisations required to perform their tasks linked to the protection of nuclear materials, nuclear facilities and the transport of nuclear materials.

Recruitment, training and authorisation procedures are established for this purpose. Exercises and retraining courses are carried out periodically. The suitability appraisal of individuals relies on both physical and psychological considerations.

Training is not restricted to acquiring technical qualifications or becoming familiar with the detail of procedures to be followed strictly. It encompasses a far broader spectrum and, whilst meeting previously mentioned requirements, it is sufficiently instructive for individuals to understand the importance of their tasks in terms of security and the possible consequences of an error.

3/3/4

## Rewards and sanctions

Apart from organisational provisions and resources, the behaviour of individuals, influenced by both independent and group motivations and attitudes, dictates whether a practice is satisfactory or not. Managers encourage and congratulate and attempt to provide tangible rewards for particularly commendable attitudes towards the protection of nuclear materials, nuclear facilities and the transport of nuclear materials.

Managers encourage the personnel especially to report any event affecting or likely to affect the protection of nuclear materials, nuclear facilities and the transport of nuclear materials. This involves inciting the personnel to provide the security staff with any information that could improve protection that they might otherwise be inclined to keep to themselves through fear of sanction or ignorance of the issue at stake.

Nevertheless, managers assume their responsibilities and impose sanctions in the event of repeated deficiencies or serious negligence, in particular by withdrawing the authorisations given.

3/3/5

## Audit, review and comparison

Managers are responsible for implementing a certain number of monitoring practices, including regular review of training programmes, staff nomination and authorisation procedures, working methods, document control, the **quality assurance** system and access to facilities and information.

Managers ensure that events inside or outside the organisation liable to have an impact on security are analysed and enlarged upon. Events outside the organisation will be examined and taken into account if appropriate. It may be relevant to call on specialists from outside the organisation under this approach.



3/3/6

## Exemplarity

Managers are expected to ensure that their staff comply with established security practices and take advantage of them and to incite them continuously through attitude and example to achieve higher levels of individual performance in performing tasks relating to the protection of nuclear materials, nuclear facilities and the transport of nuclear materials.

3/4

## Attitudes of individuals

The previous chapters have indicated how the necessary elements on which to build a true security culture are set in place and emphasises the responsibilities of the State, organisations and their managers. As indicated in the introduction, it is up to individuals at all levels to take these elements into account and make the most of them. Nevertheless, distinction must be made between the expected reaction of individuals working in the protection of nuclear materials, nuclear facilities and the transport of nuclear materials and those not directly involved.

3/4/1

## Individuals directly involved in security

The behaviour of individuals involved in security is characterised by:

- a rigorous, prudent approach;
- a constant vigilance and a questioning attitude;
- a speed of reaction when faced with an unexpected situation.

Amongst other things, this category of individuals can be expected to apply procedures and official rules strictly. They should be aware that security systems must be compatible with the performance of other activities in the organisation. In addition, they must operate a prudent, considered approach towards research and divulgation of confidential information.

They must also have a steady motivation, with no slackening as regards the protection of nuclear materials, nuclear facilities and the transport of nuclear materials. They must also be ready to be

receptive and critical of any event or action regarded as suspect. In such circumstances, the information is sent immediately to the hierarchy, even if it appears to be of minor importance.

Lastly, in the event of a breach of security rules, whether deliberate or through negligence, reaction is immediate using the resources matching the estimated risk. When faced with immediate danger, the operator's staff must act rapidly to counteract or delay the malicious act in progress and request assistance from the public authorities without delay.

3/4/2

## Individuals not directly involved in security

Security culture concerns us all. Any individual involved directly or indirectly in the protection of nuclear materials, nuclear facilities and the transport of nuclear materials must be totally immersed in it. A duty of vigilance is essential for all.

The expected attitude of these individuals is characterised by:

- a knowledge of the principles of protection and taking them into consideration;
- a compliance with rules and procedures;
- a questioning attitude to abnormal acts or events with regard to the protection of nuclear materials, nuclear facilities and the transport of nuclear materials. In this case, people in charge of protection are warned systematically.

4/

# Safety culture and security culture

It seems relevant to identify the links between security culture and safety culture. It is clear that these two cultures interact and complement each other in the nuclear field, even if they present their own specific attributes in certain areas.

This paragraph addresses the similarities and differences in terms of culture only, ignoring the application of the safety and security approaches.

4/1

## Similarities

Security and safety cultures are normally based on the same principles in the main. In safety or in security, the same types of organisations are concerned; for the operators, each organisation must also ensure that these two cultures live side by side. It seems logical that the two cultures can only develop and be maintained if they are promoted at State level and by managers of the organisations concerned, as individuals clearly play a role in their application. Lastly, the same type of requirements is found in the introduction of one or other of these cultures.

4/2

## Differences

In terms of human behaviour, safety culture normally revolves around the risk of human errors whilst security culture takes also deliberate acts with the intention of causing harm into consideration. It is therefore important to integrate notions of deterrence and confidentiality in the security culture of all organisations concerned.

Differences in involvement can be highlighted for organisations and individuals. For reasons of division of responsibilities and confidentiality of information, a security culture can only be developed with extensive State intervention. Taking into account the external or internal threat to any one country plus the definition of scope of responsibility and access to information is the exclusive remit of each individual State.

In addition, the competent authorities in the fields of safety and security may differ, have different structures and a different type of supervisory power.

Worthy of note also is, that large numbers of State departments are concerned by security culture. In particular, various intervention bodies are involved in protecting nuclear materials, nuclear facilities and the transport of nuclear materials. This miscellany of actors, all with a special role to play, creates an obligation for structures and communication, information and exchange systems. Organisations must understand and complement each other.

Individuals concerned by both these cultures have potentially specific attitudes, even if appropriation of both cultures is demanded of them. For safety culture, all individuals are requested principally to demonstrate a prudent, questioning attitude and to seek to share information with others in an overriding concern for transparency and dialogue. Security culture requires individuals to show on occasion a speedy reaction to confirmed or assumed threats and that they only communicate information to other authorised people. However, whereas security clearly involves all individuals, some are more especially responsible for applying it and some information must be protected.

4/3

## Interactions

The two cultures must not be pitted against each other and one should not have ascendancy over the other.

It is impossible to envisage merging these two cultures into a single entity, they must however coexist and reinforce each other mutually.

Each of these cultures must be developed to suit the field of activity of each organisation.

Lastly, these two cultures must be mutually enriching. All possible synergy between them must be sought and developed; mechanisms must be in place to allow permanent exchange.

• Figure

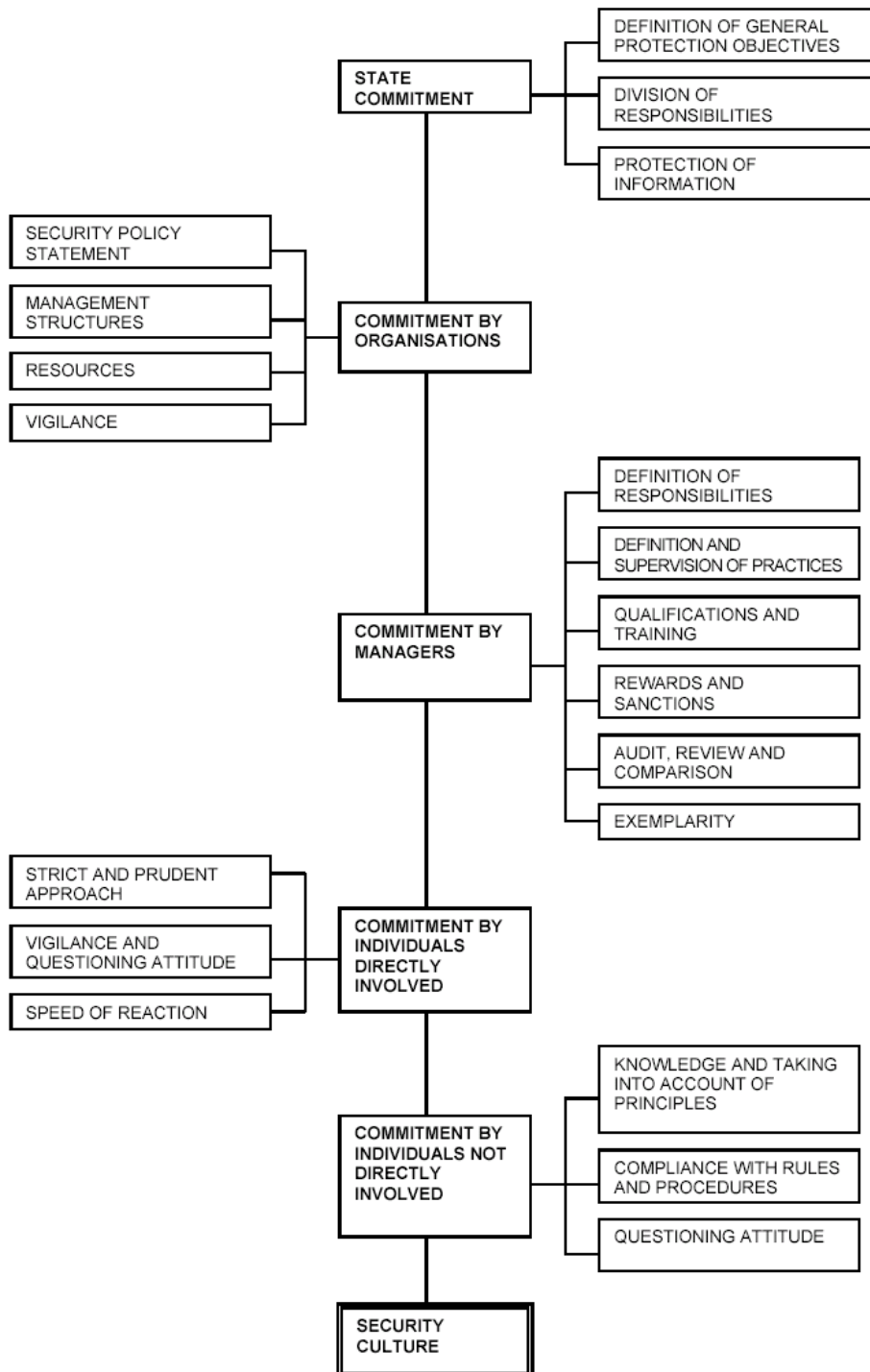


Figure 1:  
Main components of Security Culture

# Glossary

**Competent authority:** National authority designated or recognised as such by the State for a precise purpose.

**Defence in depth:** A concept used to design protection systems that requires an adversary to overcome several layers and methods of protection (structural or other technical, personnel and organizational) or circumvent in order to achieve his objective.

**Design basis threat:** Attributes and characteristics of potential insider and/or external adversaries, who might attempt unauthorized removal of nuclear material or sabotage, against which a protection system is designed and evaluated.

**Nuclear facility:** Facility in which nuclear material is produced, processed, used, handled, stored or disposed of (including associated buildings and equipment), if damage to or interference with such facility could lead to the release of significant amounts of radiation or radioactive substances.

**Nuclear materials:** Materials that may be used to manufacture a nuclear weapon. Their definition is based on their fissile (for a fission device), fusible (for a thermonuclear bomb) or fertile (ability to produce fissile or fusible materials) characteristics.

**Nuclear power plant:** Nuclear facility including one or several reactors, with all the structures, systems and components required to ensure safety and to produce energy, i.e. heat or electricity.

**Nuclear safety:** All technical provisions and organisational measures relating to the design, construction, operation, shutdown and dismantling of nuclear facilities and to the transport of radioactive substances, intended to prevent accidents and limit their effects.

**Operator:** Any organisation or person, applying for authorization or authorized to exercise one or several activities pertaining to the nuclear field. This involves in particular the operation of nuclear facilities and the development, holding, transfer, use and transport of nuclear material.

- Glossary

**Practice:** The act of exercising a particular activity, implementing the rules, the principles of an art or a technique.

**Protection:** Set of administrative, organisational and technical provisions with the following objectives:

- protecting nuclear material in facilities and during transport against theft and other unlawful taking for the purposes of malicious use of the said materials;
- protecting nuclear facilities and transport against acts of sabotage liable to affect the environment and human health;
- mitigation or minimizing the radiological consequences of sabotage.

The provisions for protection designed to satisfy these objectives include control and accountancy of nuclear materials and physical protection systems for facilities and the transport of nuclear materials.

**Quality assurance:** Planned and systematic actions necessary to provide adequate confidence that an item or a facility will function satisfactorily.

**Radioactive substances:** Substances emitting ionising radiations and which, therefore, are governed by provisions for the protection of man and the environment against the harmful effects of this radiation.

**Sabotage:** Any deliberate act directed against a nuclear facility or nuclear material in use, storage or transport which could directly or indirectly endanger the health and safety of personnel, the public and the environment by exposure to radiation or release of radioactive substances.

**Safety culture:** is that assembly of characteristics and attitudes in organisations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.

**Transport:** International or domestic carriage of nuclear material by any means of transportation beginning with the departure from a facility of the shipper and ending with the arrival at a facility of the receiver.