ANNEX I

EXAMPLES OF TSOS AND THEIR INTERACTIONS WITH KEY STAKEHOLDERS

1.1. VTT Technical Research Centre of Finland Ltd, Finland

- **Legal or regulatory basis to the establishment of the TSO**

VTT Technical Research Centre of Finland was established January 16, 1942. In January 1, 2015 VTT was transformed into a limited liability company by the Act on the Limited Liability Company Called VTT Technical Research Centre of Finland Ltd (8761/2014). VTT is a non-profit research and technology organisation. The Ministry of Employment and the Economy is responsible for state ownership steering.

- **Legal status of the organization**

VTT Technical Research Centre of Finland Ltd is a Finnish state-owned limited liability company. The liabilities and obligations of the company's governing bodies are as defined in applicable Finnish law. VTT Technical Research Centre of Finland Ltd as the parent company together with its subsidiary companies forms the VTT Group of companies.

- **Source of budget for TSO support to the Regulatory Body**

The tasks carried out by VTT to the Finnish Regulatory Body Radiation and Nuclear Safety Authority (STUK) or any other Regulatory Body as support to their licensing or any other regulatory function are 100 % funded by the Regulatory Body as a customer to VTT.

The Finnish national research programmes on reactor safety (SAFIR2018) and on waste management (KYT2018) are based on the Finnish Nuclear Energy Act. The function of SAFIR2018 and KYT2018 is to create and maintain expertise, experimental facilities as well as computational and assessment methods for solving future safety issues in support to the regulatory body. Thus, they enhance the capabilities of the Finnish TSOs to provide services to the Regulatory Body. The R&D projects carried out by VTT alone or with partners in the SAFIR2018 are funded up to maximum of 67 % from a separate fund of the Finnish State Waste Management Fund (VYR) and at least 33 % of VTT's own funding or other external funding as required. The R&D projects of SAFIR2018 and KYT2018 are selected annually on the basis of a public call for project proposals.

- **Statutory relations with the Regulatory Body**

The relation of VTT and STUK is formed always via a formal contract. Previously the contracts between VTT and STUK were primarily based on public calls for tender on specified tasks in the Finnish public procurement register (HILMA). More recently STUK has provided public calls for tender for Framework Contracts in specified areas via the procurement system HILMA typically for 4+1 year duration.

In 2015 VTT obtained a Framework Contract with STUK on deterministic safety analyses of Finnish nuclear power plants for 4 years with an option of additional 1 year based on EU-wide call for tenders in the Finnish public procurement register HILMA and in the European TED (Tenders Electronic Daily). In waste management VTT and STUK have made in 2012 a 4+2 years Framework Contract that will end in March 2018. In some cases (usually only one possible service provider and/or relatively low economic value) the regulatory body may also

use direct procurement without a tender or a limited call for tenders based on prior call for expression of interest.

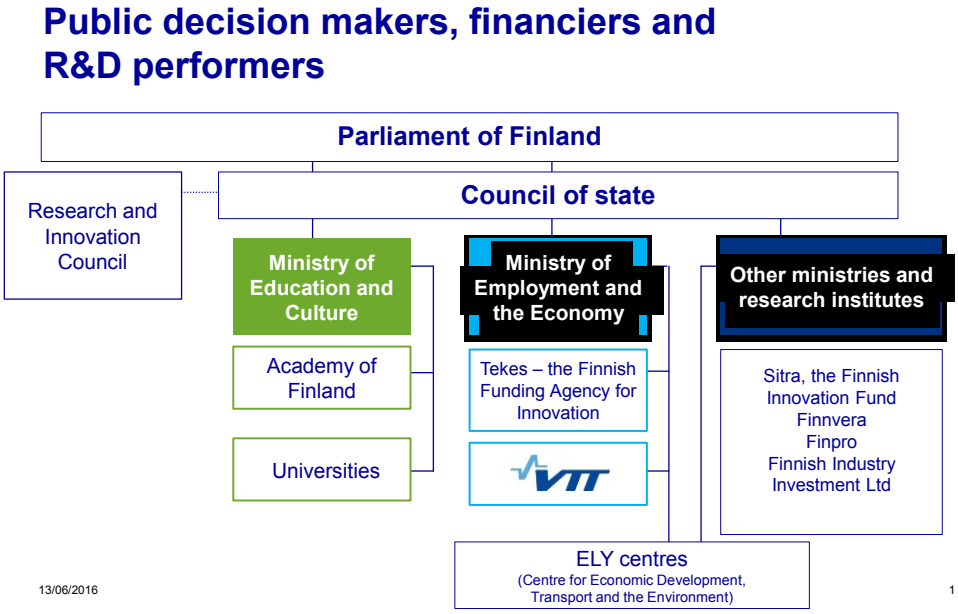


FIG. 1.1.1. Relationships of TSO with other governmental or public authorities.

- **Internal organization of the TSO**

VTT has approximately 200 experts in the research areas relevant to the functions of VTT as a TSO for a Regulatory Body operating in the field of radiation and nuclear safety. Approximately 150 of these experts are in the Research area Nuclear Safety inside the business area Smart industry and energy systems, as indicated in the organizational chart below. The remaining experts, many of them serving both nuclear and non-nuclear fields (e.g. CFD-analysis, Automation, Control and IT, Human and organisation, Fire safety) are placed in several other research areas of VTT.

FIG. 1.1.2. VTT organizational chart.

1.2. Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) gGmbH, Germany

- **Legal or regulatory basis to the establishment of the TSO**

The State, Federal States and TÜVs signed the Shareholders Agreement for the Company for Reactor Safety (GRS) mbH on 26th of May 1976.

- **Legal status of the organization**

GRS is a private non-profit, non-governmental organization, established as a private limited company with shareholders.

- **Source of budget for TSO support to the Regulatory Body**

The main contracting authorities of GRS are:

- The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB);
- The Federal Ministry for Economic Affairs and Energy (BMWi);
- The Federal Ministry of Education and Research (BMBF);
- The Federal Foreign Office (AA);
- The Federal Office for Radiation Protection (BfS);
- The European Commission is also an important international customer.

- **Statutory relations with the regulatory body**

All services of GRS to the regulatory authorities are provided through projects based on both long term and task specific contracts within framework agreements.

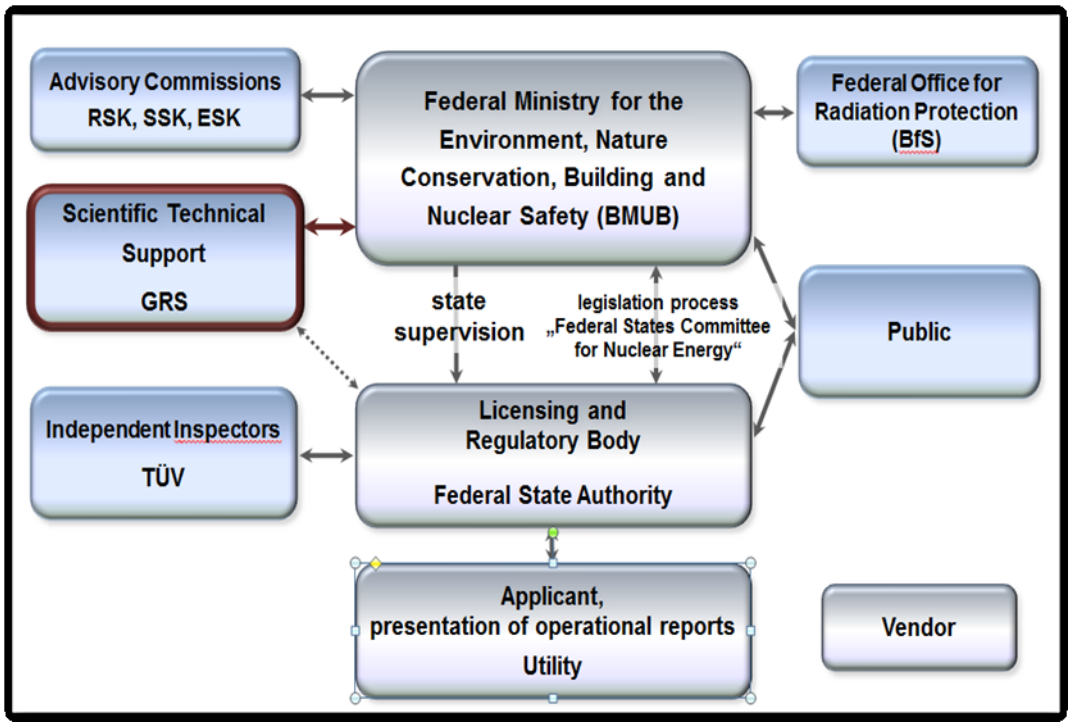


FIG. 1.2.1. Relationships of TSO with other governmental or public authorities.

- **Internal organization of the TSO**

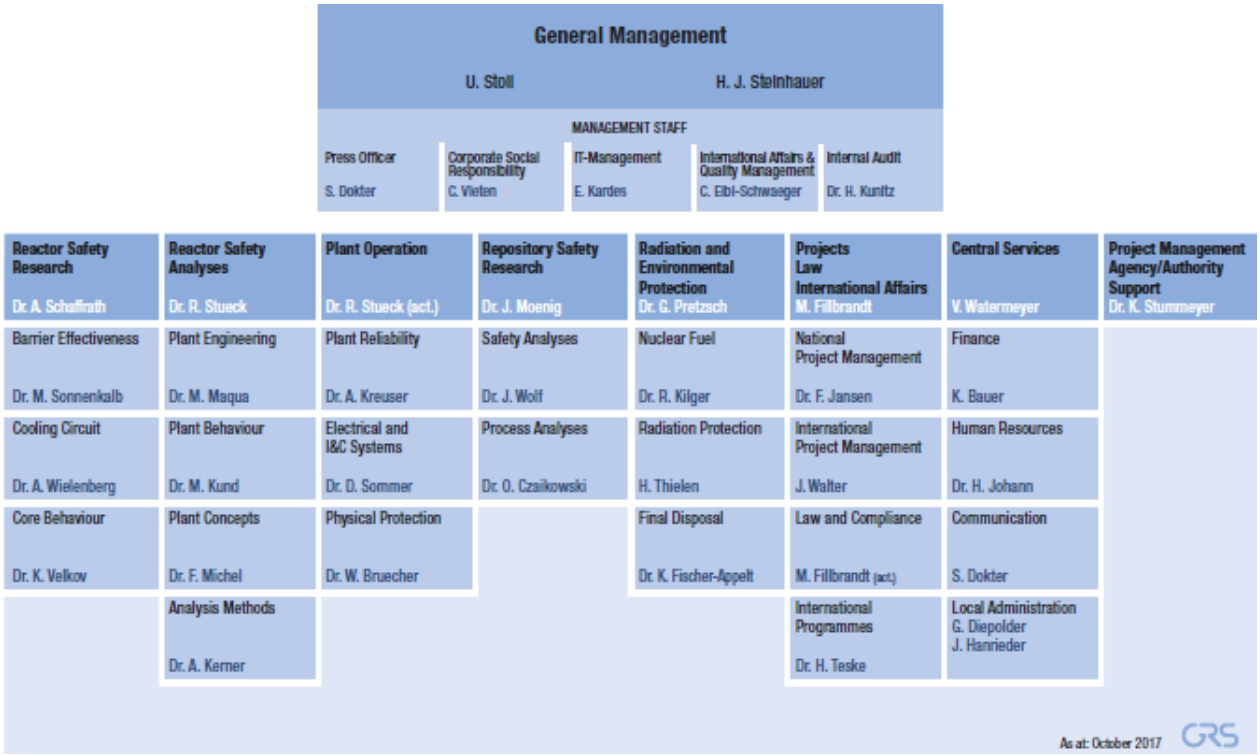


FIG. 1.2.2. GRS organizational chart.

1.3. Scientific and Engineering Centre for Nuclear and Radiation Safety (SEC NRS), the Russian Federation

- **Legal or regulatory basis to the establishment of the TSO**

In pursuance of the Resolution of the USSR Council of Ministers Gosatomenergonadzor of the USSR established Scientific and Engineering Centre on Safety in Nuclear Energy on May 12, 1987.

By the Order of Rostechnadzor the federal budgetary enterprise Scientific and Engineering Centre for Nuclear and Radiation Safety was included into the list of federal budgetary organizations subordinating to Rostechnadzor on October 28, 2010.
By the Decision of Rostechnadzor SEC NRS was legally assigned to organization of scientific and technical support to Rostechnadzor on June 10, 2013.

SEC NRS was established aiming to collect and apply new scientific knowledge for scientific and technical support of nuclear and radiation safety regulation, including analysis and substantiation of criteria and requirements for nuclear and radiation safety at nuclear energy use for peaceful and military purposes.

Its major functions relevant to nuclear safety regulation are as follows:

- Drafting of regulatory legal acts;
- Safety assessment of nuclear facilities and types of activities;
- Conducting of scientific research in the sphere of nuclear and radiation safety;
- Safety review in respect to facilities and (or) types of activities;
- Software certification;
- Technical and information support to Rostechnadzor Headquarters, its Regional Departments and Technical Emergency Center;
- International cooperation.

- **Status of the TSO**

SEC NRS is a non-profit organization, Federal Budget Enterprise and of Federal property. It is legally subordinated to the Regulatory Body.

- **Source of budget for TSO support to the Regulatory Body**

SEC NRS is mostly state budgeted by the Regulatory Body (Rostechnadzor).

- **Internal Organization of the TSO**

SEC NRS with the authorized staff size of 350 people provides full-fledged scientific and technical support to Rostechnadzor.

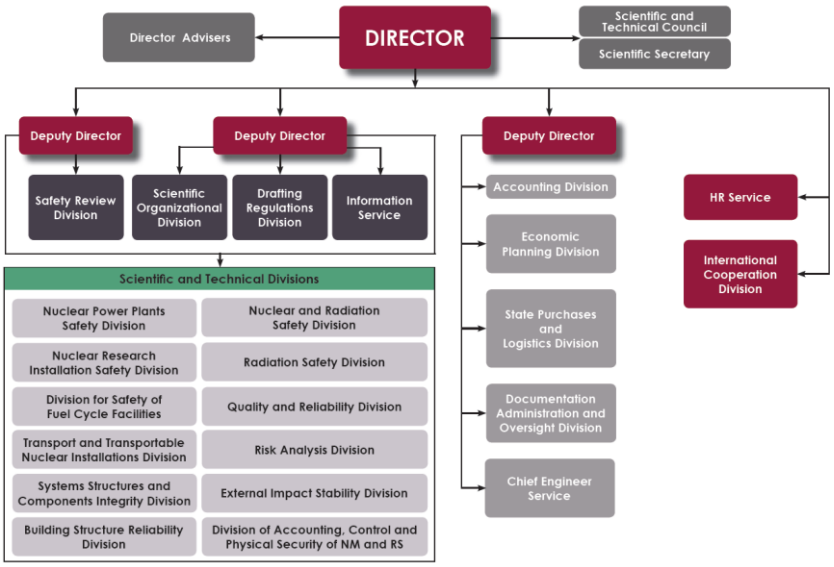


FIG. 1.3. SEC NRS organizational chart.

1.4. Korea Institute of Nuclear Safety (KINS), Republic of Korea

- **Legal Framework**

The Act on the Establishment and Operation of the Nuclear Safety and Security Commission defines the objectives and duties of the NSSC, the nuclear regulatory body. The Korea Institute of Nuclear Safety (KINS) was established as an independent technical support organization in February 1990, according to the enactment of the Korea Institute of Nuclear Safety Act to conduct nuclear safety regulation as entrusted by the Nuclear Safety Act and the Act on Physical Protection and Radiological Emergency.

Its major functions relevant to nuclear safety regulation are as follows:
• matters entrusted by Article 111, Item 1 of the Nuclear Safety Act and Article 45, Item 1 of the Act on Physical Protection and Radiological Emergency,
• research and development for nuclear safety regulation,
• technical support for development of policies and systems for nuclear safety regulation,
• technical support for radiation protection,
• management of information on nuclear safety regulation,
• monitoring and evaluation of environmental radiation,
• education on nuclear safety regulation, and
• support of international cooperation for nuclear safety regulation.

- **Status of the TSO**

KINS is a non-profit state/governmental organization.

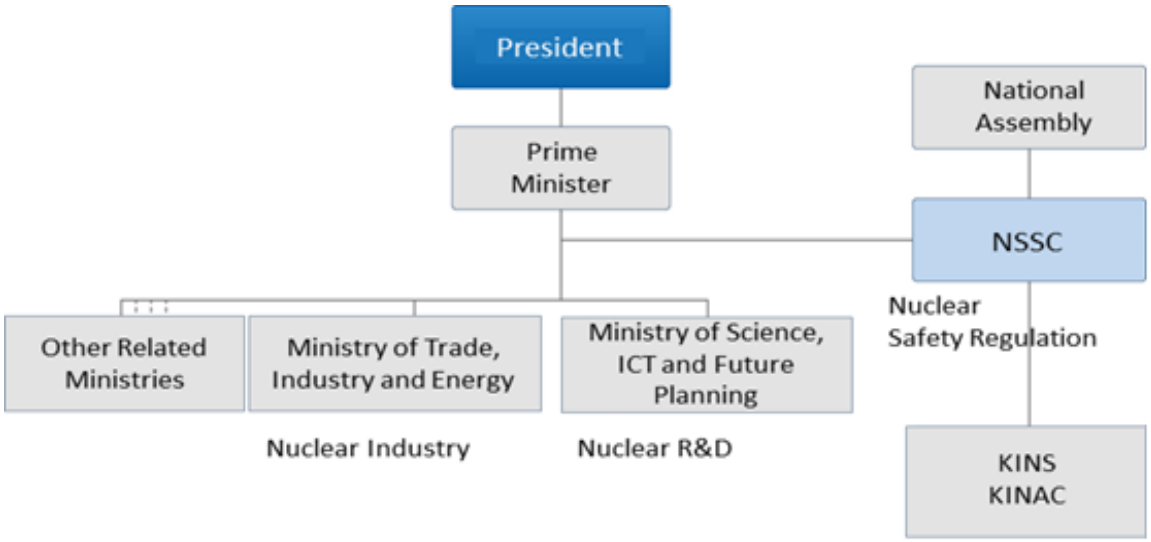


FIG. 1.4.1. Government Organizations concerning Nuclear Safety and Energy.

- **Internal Organization of the TSO**

As of June 2016, KINS consists of two offices, eight divisions, and 44 departments/teams with 523 persons.

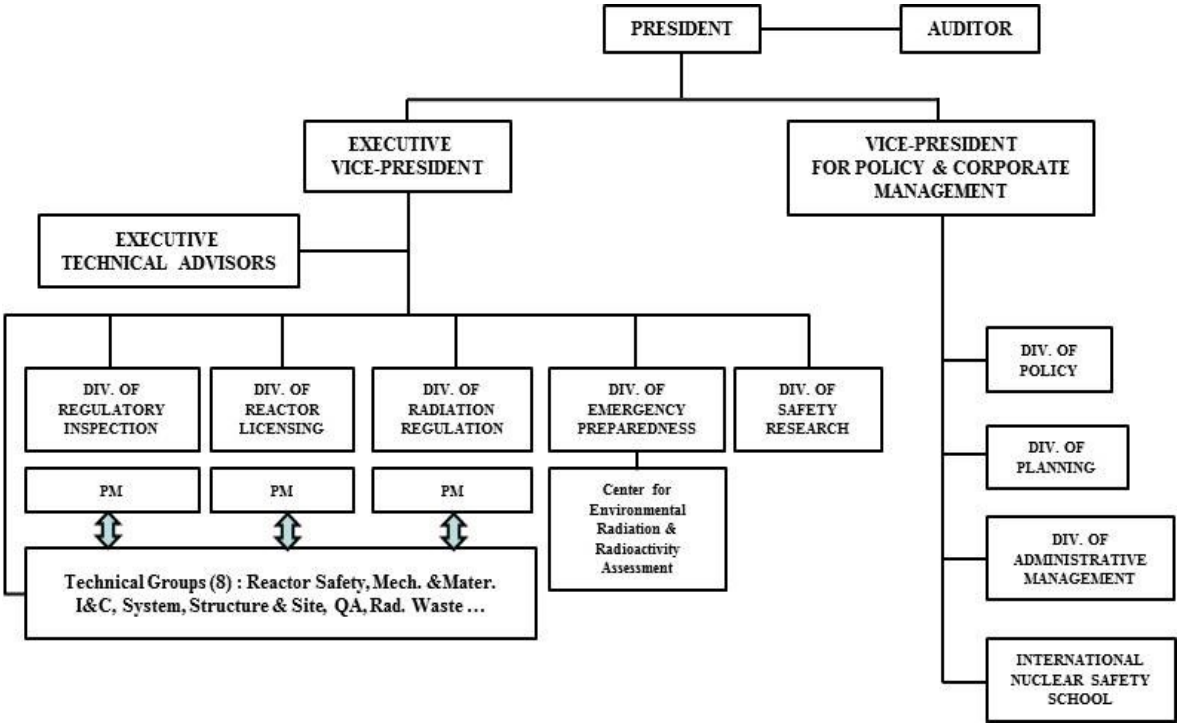


FIG.1.4.2. Organization of KINS.

- **Source of budget for TSO support to the regulatory body**

The financing of KINS, which is required for nuclear safety regulation business and relevant research projects, consists of government contribution, regulatory fees and R&D project expenses, etc. The regulation fees by relevant licensee or nuclear users are collected in Nuclear Safety Regulation Fund and they cover most of the financing of KINS.

1.5. Joint Research Centre (JRC), European Commission

- **Legal status of the organization**

The Joint Research Centre (JRC) is the European Commission's science and knowledge service which carries out research in order to provide independent scientific advice and support to EU policy. It serves European citizens by providing scientific and technical support to European policy-makers.

The Joint Research Centre was originally established under the Euratom Treaty (1957). It comprises several Directorates which carry out technical support and customer-driven research of direct concern to Europeans. The Directorate for Nuclear Safety and Security emerges from the need to support the European Commission in fulfilling its obligations set by the Euratom Treaty.

Euratom's role is to promote nuclear safety, safeguards and security in Europe (European Union) and the JRC has been contributing to this aim with its research and technical support activities ever since. Over the years, the JRC has developed special skills and unique tools to use science for providing and assessing policy options. JRC benefits from a wide network of international relations and collaborates also beyond Europe.

The European Commission (EC) is the executive body of the European Union responsible for proposing legislation, implementing decisions, upholding the EU treaties and managing the day-to-day business of the EU. It is divided into several departments and services. The departments are known as Directorate-Generals (DGs). Each DG is classified according to the policy it deals with. The JRC is a Directorate-General of the European Commission, and strives to act as a reference centre for research-based policy support in the EU.

- **Source of budget (for tasks related to the support of the RB)**

The JRC's nuclear work is funded by the Euratom Research and Training Programme. It has as its objective the pursuit of research, knowledge management and training activities with an emphasis on nuclear safety, safeguards and security.
Further income is generated by the JRC through performing additional work for Commission services, and contract work for third parties such as regional authorities or industry (Council resolution of 29 June 1988(1) and Council resolution of 29 April 1992(2)).

(1) OJ No C 197, 27. 7. 1988.
(2) OJ No C 118, 9. 5. 1992.

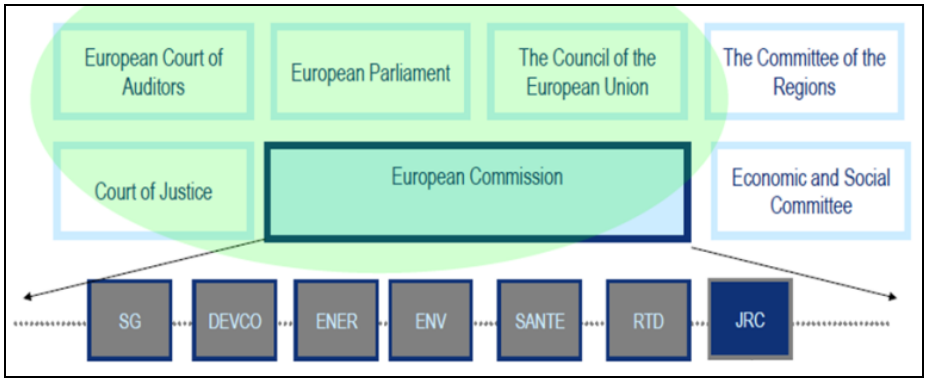


FIG. 1.5. Relationships with other EU institutions.

- **Relations with regulatory bodies**

While most of the JRC scientific work serves the policy Directorates-General of the European Commission, it also shares know-how with and provides technical support to the Member States, their organisations and institutions, the scientific community and international partners. The JRC collaborates with over a thousand organisations worldwide whose scientists have access to many JRC facilities and services through various memoranda of understandings, collaboration agreements or contracts.

After the Fukushima Daiichi accident the European Council invited the European Nuclear Safety Regulators Group (ENSREG) and the European Commission to develop the scope and modalities for stress tests of all European nuclear power plants. This comprehensive safety and risk assessment was complemented by a peer-review process. The JRC was strongly involved in all parts of the exercise. The European institutions in cooperation with national regulators and others demonstrated successfully that the global character of nuclear safety requires a multi-national management.

- **Organization**

An organizational chart is available online at the below address:
https://ec.europa.eu/jrc/sites/jrcsh/files/jrc-organigramme_en.pdf

ANNEX II

PROCESS TO AVOID CONFLICT OF INTEREST, EXAMPLE FROM AMEC FOSTER WHEELER RSD

A major TSO to the Office of Nuclear Regulation, the UK regulatory authority, is the Regulatory Support Directorate (RSD), a division of the large engineering company Amec Foster Wheeler. As Amec works on a regular basis for the industry, it has established RSD as a separate entity within the company, with specific independence arrangements.

RSD INDEPENDENT REGULATORY SUPPORT

amec foster wheeler

Amec Foster Wheeler's Regulatory Support Directorate (RSD) Independence Arrangements

Introduction

Amec Foster Wheeler's Regulatory Support Directorate (RSD) is an independent organisation providing regulatory support services to the UK's statutory and defence nuclear safety regulators. RSD's sole business is the provision of independent technical and nuclear safety regulatory support. We are a stand-alone, ring-fenced, autonomous organisation owned by Amec Foster Wheeler – a global engineering, science and project management company. RSD is totally separated from operations and business activities within the broader Amec Foster Wheeler organisation. This paper summarises our arrangements to ensure that conflicts of interest, associated with RSD support activities, do not occur.

Background

In order for nuclear safety regulators to discharge their role appropriately and with absolute integrity, regulation must be undertaken in an unbiased and objective manner. This applies equally to an organisation providing support to regulatory activities and decision making. It is therefore essential that such an organisation is both demonstrably independent and is seen to be independent.

Amec Foster Wheeler is Europe's largest independent project management and engineering consultancy, employing in excess of 3,300 nuclear engineers and scientists, providing services that include direct and indirect support to UK defence and civil nuclear operators and Dutyholders, Requesting Parties associated with UK Civil New Build, as well as to the UK and foreign regulatory communities. Given the size and diversity of the customer portfolio, potential for conflicts of interest exists. However, RSD understands the absolute requirement for independence associated with regulatory support activities and has developed, over many years, the organisation, management arrangements and regulatory and safety culture to deliver support services to meet customer and other stakeholder expectations.

Regulatory Services Provided by RSD

All our support services to UK Regulators are managed by RSD. We provide support across the full plant and facility lifecycle against the entire range of regulatory activities including:

- Regulatory Assessment
- Regulatory Inspection
- Regulatory Policy and Guidance
- Support to Authorisation/Licensing activities
- Research and Development
- Emergency Preparedness and Response
- Training, Assurance and Knowledge Management
- Assessment of Operational Experience

Organisational Architecture

RSD is a stand-alone ring-fenced, autonomous organisation within Amec Foster Wheeler's Clean Energy business. Independence is fundamental to our business activities and we will not compromise on this position. Our independence is assured by organisational and functional separation, a strong regulatory culture, robust management arrangements and bespoke commercial arrangements. RSD is totally separated from operations and business activities within the broader Amec Foster Wheeler organisation. Our Independence Management Arrangements build upon our organisational architecture and robust culture to ensure that conflicts of interest are avoided. Our multi-level independence arrangements are applied to all our activities and we operate against the guidance provided in IAEA Safety Standard GSG-4, Use of External Experts by the Regulatory Body. These arrangements are routinely reviewed to ensure that actual, potential or perceived conflicts of interest are avoided. In depth audits of our arrangements have been carried out many times since our formation by various stakeholders. No issues have been identified.

RSD's Operating Model

Fundamental to our arrangements is the fact that RSD provides a segregated and ring-fenced stable organisation to carry out work in support of the UK regulatory community. This core team consists of RSD staff and identified associates, supported by reach-back into Amec Foster Wheeler's vast pool of technical specialists on an as-needed basis.

RSD's core team of about 60 people provides a complete regulatory support service to our customers with continuity and consistency of advice, efficient focus of training effort and access to a pool of technical experts who specialise in nuclear safety regulation. The totality of the RSD resource supporting the UK regulatory community is identified in the RSD Training Policy and Qualifications Register. We also operate a bespoke Regulatory Competency Framework and supporting Knowledge Management System against which our staff are developed. All work is managed against our Regulatory Management System arrangements.

Occasionally, specific additional technical support is needed for an individual activity, and we are able to select appropriate, high quality resource from the Amec Foster Wheeler resource pool, ensuring independence by implementing our robust arrangements. Hence we are able to deliver a cost effective and efficient service from a single organisation. It is important to note that in general, we do not subcontract regulatory support activities to other organisations, since we believe that delivery by a single organisation is essential in order to manage independence and to address the actual, potential or perceived conflict test described in IAEA Safety Standard GSG-4. The ability to use reach-back into the Amec Foster Wheeler broader organisation is therefore vital to implement our operating model, shown in Figure 1 below. We are also able to use the broader resource pool as 'feed-stock' to support RSD succession plans and growth. This allows us to provide high quality, enduring, coherent and competent regulatory support to our customers.

To further ensure that independence and confidentiality risks are avoided, a 'Task Appointment and Independence Form' is completed for all resource nominated for a particular RSD task. This is done by the relevant RSD Supervising Manager and details the task description, responsibilities, SQEP assessment and confirmation of independence. The form is agreed and signed by the appointee, the appointee's line manager and the Supervising Manager. When completing the form, the appointee also considers if any work carried out for previous employers could potentially give rise to a conflict of interest. The process of engaging support to RSD is shown pictorially below.

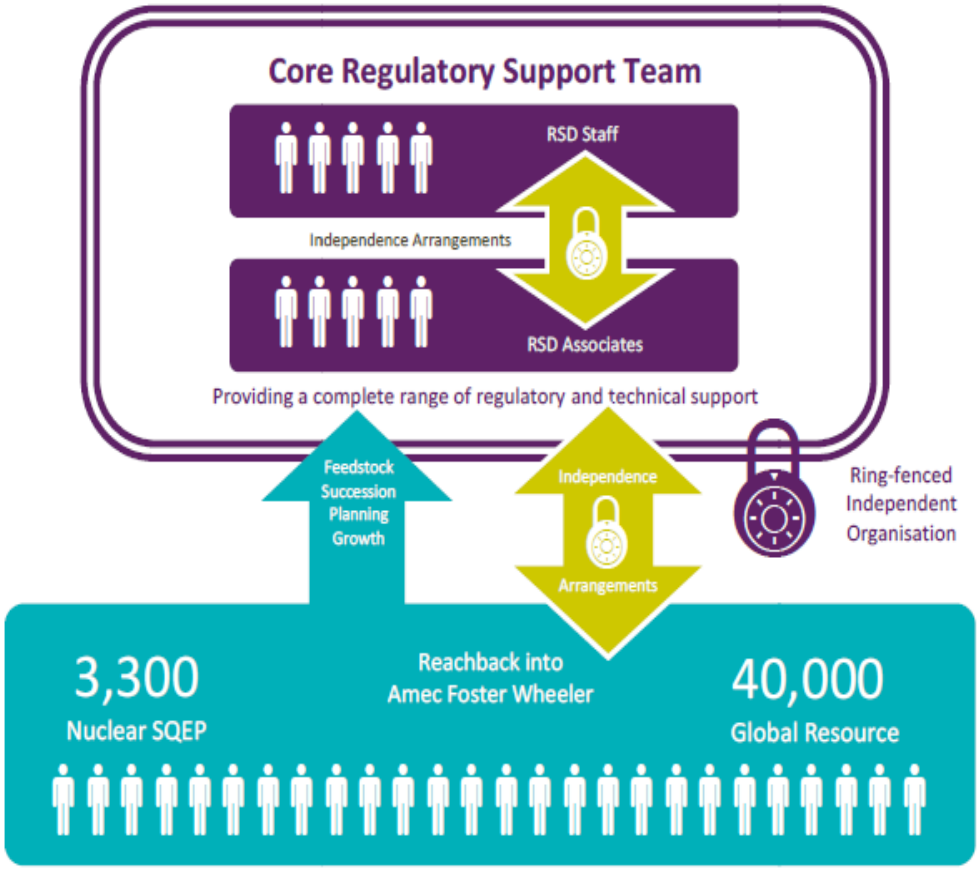


Figure 1 – RSD's Operating Model

RSD's Independence Management Arrangements

The basis for the identification and management of conflicts of interest is our Independence and Confidentiality Procedure. This set of arrangements is reviewed and maintained in accordance with our ISO9001 accredited management system to ensure they remain fit for purpose. The procedure includes the identification of independent resource to support regulatory work. Our operating model (shown in Figure 1) is based upon the provision of regulatory support services using the RSD core team, supplemented as necessary by independent resource selected from Amec Foster Wheeler's vast technical resource pool. Consideration of past and current experience is made when identifying potential resources to be proposed for regulatory support. The process also requires individuals and their line manager to formally confirm their independence.

Our Independence and Confidentiality Procedure includes the RSD arrangements in place to ensure that the following issues are appropriately managed:

- Staff independence
- Company loyalty
- Customer confidentiality

To ensure that independence risks are avoided, a 'Task Appointment and Independence Form' is completed for all resource nominated for a particular RSD task. This is done by the relevant RSD Supervising Manager and details the task description, responsibilities, SQEP assessment and confirmation of independence. The form is agreed and signed by the appointee, the appointee's line manager and the Supervising Manager. When completing the form, the appointee also considers if any work carried out for previous employers could potentially give rise to a conflict of interest. The process of engaging support to RSD is shown pictorially in Figure 2 below.

Any actual, potential or perceived conflicts of interest are clearly identified. If there is any doubt that a person identified to undertake work in support of our regulatory customers may have a potential conflict of interest, then an 'Independence Justification Statement' is raised which captures the nature of the relationship, any work previously undertaken, the work proposed to be carried out and a statement detailing the potential conflict of interest. The statement is then reviewed by the relevant RSD Supervising Manager and discussed with the individual's line manager to confirm understanding. If it is agreed that an adequate justification has been made, the statement is signed by the Supervising Manager.

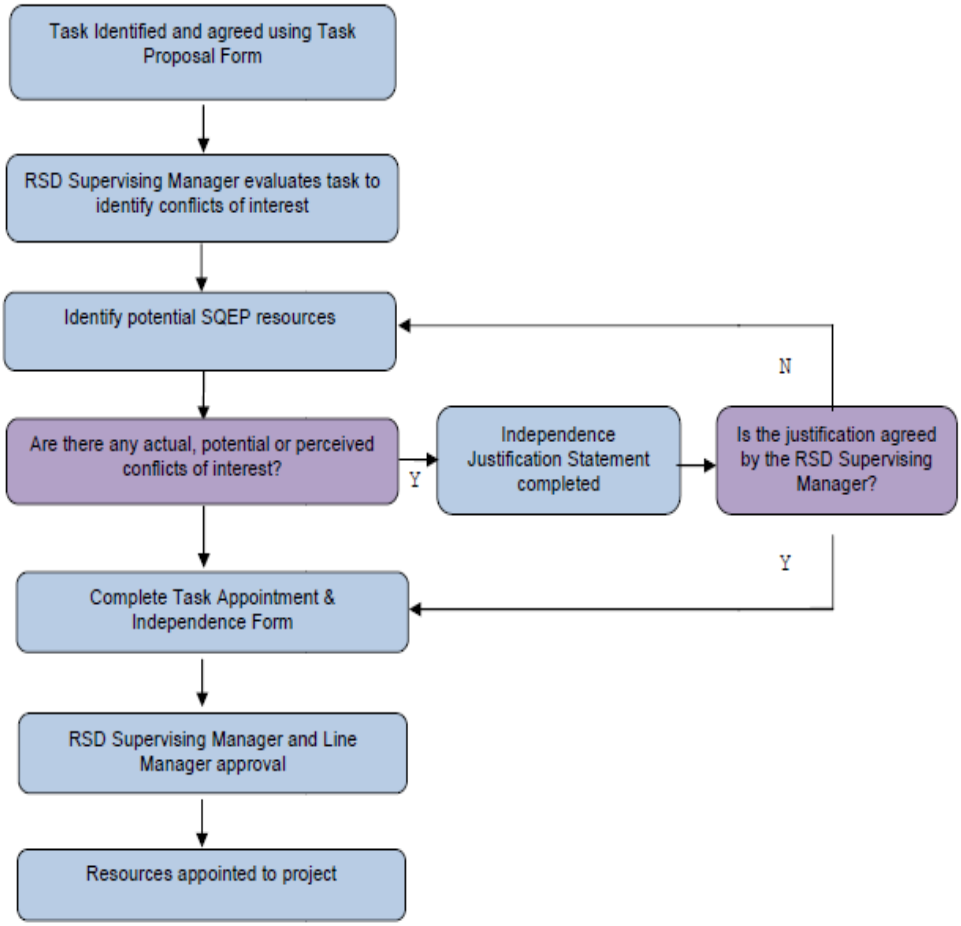


Figure 2 – Extract from Current RSD Independence and Confidentiality Arrangements

Our Regulatory Support Heritage

RSD has successfully provided independent regulatory support services to the UK defence sector since 1995 although our track record of continuous support to defence regulation through previous contracts dates back to 1965. We have also provided support to the UK statutory regulator since 2007. In addition to internal audits, many external audits of our independence arrangements have been undertaken by our customers and third party organisations on behalf of our customers, during this time. Additionally, our independence arrangements were an area of focus during a recent review of the Defence Nuclear Safety Regulatory Framework and have been scrutinised by the defence stakeholders. All audits and reviews have concluded that our independence arrangements are robust with no issues raised. Our arrangements have been accepted by our regulatory customers.

The robustness of our Independence and Conflict of Interest arrangements is also demonstrated by our successful application to become a Technical Safety Organisation (TSO) within the European Technical Safety Organisation Network (ETSON). Demonstrable independence of RSD was fundamental to membership acceptance by the ETSON General Assembly.

Summary

Amec Foster Wheeler's independent Regulatory Support Directorate, RSD, is a stand-alone, ring-fenced, autonomous organisation totally separated from operations and business activities within the broader Amec Foster Wheeler. RSD is the only organisation providing the full range of regulatory support services to both the UK's defence and statutory nuclear safety regulators. RSD's sole business is the provision of independent technical and nuclear safety regulatory support. Independence is fundamental to our business activities and this is assured by robust management arrangements that meet international relevant good practice and build upon our organisational architecture and strong regulatory culture. We have successfully provided independent regulatory support services to the UK defence sector since 1965 and to the statutory regulator since 2007. Our arrangements have been audited many times by various organisations with no issues raised.

ANNEX III

KNOWLEDGE MANAGEMENT AND TRAINING FOR TSOS, EXAMPLES FROM CNSC, CANADA, ENSTTI, AND EUROPEAN SAFETY ORGANIZATIONS (NUSHARE)

A. Knowledge Management in CNSC, Canada

Knowledge management (KM) is the means by which an organization purposely and systematically collects the right information to ensure that it is effectively transferred to the right individuals within the organization at the right time. Effective knowledge management and transfer ensures that processes and tools are in place within an organization such that essential information is made available, now and in the future, to allow individuals to make well-informed decisions to fulfil organizational mandates and achieve desired results. It requires sound business practices that support knowledge sharing, transfer and capture on a day-to-day basis.

The Canadian Nuclear Safety Commission (CNSC) has adopted a distributed (i.e., non-centralized) approach to the establishment of a knowledge management structure. Broad initiatives that impact upon more than one directorate are centrally managed via a program called the Harmonized Plan. They are championed by a member of the senior management team and approved and overseen by a steering committee that represents management from all work units, including regulatory affairs, human resources and communications in addition to operations (scientific and technical work units). These initiatives are monitored and reported to the executive members (most senior level management team at the CNSC). Work units themselves may also have in place their own informal KM strategies that are used as per their needs. These include the use of videos, face-to-face lessons learned meetings after completion of projects, documentation created for the sole purpose of KM, and exit interviews for departing employees.

The following table outlines some of the key KM initiatives underway at the CNSC:

Human Resources	Documented Processes	Knowledge Repositories
Alumni Program	Management System/Regulatory Framework	Tribunal as a Court of Record
Transition Funding	Harmonized Plan	CNSC website
Technical Cooperative Student Program	Inspection Procedures	Nukipedia
Internal Assignments		International Trip Report Repository
		CanTeach CANDU

Nukipedia is a novel approach adopted by the regulatory body and its TSO in Canada within the context of a larger government of Canada initiative to leverage the Wiki concept by populating and maintaining a living, evolving and electronic encyclopedia of thematic areas important to a regulatory body and TSO. This web-based knowledge management repository

is available to all employees of the federal government including the regulatory body and its TSO. More specifically, Nukipedia:

— Provides a living forum for knowledge transfer, retention, and dissemination;

— Captures and preserves knowledge of soon-to-retire and recently retired staff;

— Is a balanced one stop repository of nuclear regulatory knowledge, captured from multiple perspectives from across the organization;

— Provides topics revised without erasing earlier content;

— Presents topics important to the regulatory body and TSO organized within familiar categories;

— Is organized such that topics are linked to each other and to related documents, sites, and other references.

Current examples of a few of the many topical subjects contained within Nukipedia include the following: the grouping concept for systems important to safety in the CANDU plant, a detailed description of the concept of the single failure criterion and detailed technical summaries of hydrogen generation and propagation behavior in the case of severe accidents in a CANDU plant.

CanTeach is a knowledge repository that provides high quality technical documentation relating to the CANDU nuclear energy system. This information is public and is intended for use in various aspects of education, training, design and operation.

The CanTeach Project aims to provide an information exchange network for people interested in the CANDU energy system. Contributors are industry experts who hold valuable knowledge and experience in diverse aspects of CANDU technology and its applications, and unique expertise in the areas of science and technology, nuclear power design and construction, project management and development of engineering tools.

Contributors include people working in organizations that produce electrical power utilizing nuclear energy, CANDU power plant vendors, educational institutions, regulatory agencies and other CANDU-related organizations interested in freely exchanging educational and training materials.

B. The European Nuclear Safety Training and Tutoring Institute (ENSTTI)

ENSTTI is an initiative of members of the ETSON. It was created in 2010 to put in place a high quality training mechanism to meet the training needs of experts at nuclear regulatory authorities and TSOs; to ensure the continuous development of qualified experts in this area; and to foster harmonization of technical practices in nuclear safety, nuclear security and radiation protection. This is achieved through the regular provision of vocational training and tutoring exclusively delivered by senior professionals of European TSOs that take into consideration the latest technical developments and is continuously up-dated and improved by applying a systematic approach to training.

It is ENSTTI's ultimate goal to provide initial training and continuous qualification programmes that will ensure that personnel at nuclear regulatory authorities and Technical Safety Organisation acquire and maintain the high-level competences needed in their current positions and that they have the opportunity to get prepared in time to take on emerging tasks or assignments.

The overall pedagogic approach of ENSTTI is to work at three levels (see figure):

1. Basic training to improve the skills of young professionals and newcomers to nuclear regulatory control by providing all the basic knowledge required;

2. Advanced training to strengthen the competence of experienced professionals by way of a graded series of specialist courses presented by experts with extensive career experience in nuclear safety assessment and regulation;

3. Tutoring: training is complemented by customized tutoring in order to provide both young and experienced experts with exposure to the real practice of day to day assessment and regulatory work in large and highly experienced nuclear safety organizations. Thus, the level of competence and knowledge of trainees is significantly increased and their networking opportunities are substantially enhanced.

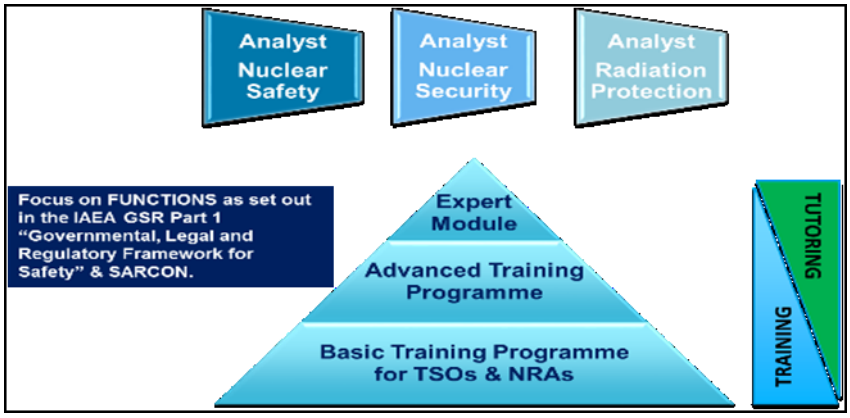


FIG.3.1. ENSTTI pedagogic approach.

With respect to the harmonization of training and curricula, ENSTTI has conducted for the European Commission a feasibility study in support of the development of common bases for nuclear safety assessment by Regulators and Technical Safety Organisations in the EU. The objective was to foster and evaluate the potential of a pilot training in establishing a harmonised set of skills and competences for safety assessment by Regulators and TSOs.

ENSTTI's training and tutoring offering goes on expanding year after year to cover the diversity of the clients' needs in nuclear safety, nuclear security and radiation protection. Joining ENSTTI training also allows trainees to be part of a worldwide network of experts at the frontline of operational responsibility who are eager to share their questions, observations and experience. This peer-to-peer relationship is a highly valuable opportunity to benefit from best practices, compare technical approaches and draw inspiration from experience.

Each year, ENSTTI provides more than 900 days of training, welcomes over a thousand trainees and uses a pool of lecturers counting more than 250 international experts. Training and Tutoring are delivered in English, French, Spanish and Russian.

ENSTTI can provide customized training programmes and sessions to address specific needs. It has also experience in training and certifying Radiation Protection Officers (RPOs), based on the services it provides to its French Member, the IRSN, for the training and certification of French Radiation Protection Officers (RPO).

In addition to inter-company sessions given at ENSTTI members' facilities, intra-company programs are offered in response to specific requests.

More information can be obtained at ENSTTI International training, www.enstti.eu or contact@enstti.eu.

C. Information On Training Practices In European Safety Organizations

In 2013, as part of the European Commission project NUSHARE, a study was carried out in order to obtain a solid understanding of nuclear regulatory functions, related fields of activities and training of nuclear regulatory authorities as well as the role of their Technical Safety Organizations (TSOs) in the 28 Member States of the European Union.

The results of the study were expected to contribute to the design and development of harmonized training programmes for regulators and TSOs in performing their assigned duties. Some main findings of the study are summarized below.

Performance of regulatory functions and roles of TSOs

Overall, the study determined that all nuclear regulatory authorities are assisted, to a greater or lesser degree, by TSOs in performing their functions. The study confirmed that review and assessment, authorization, inspection and enforcement, development of regulations and guides are carried out by nuclear regulatory authorities in all analysed countries.

Nuclear regulatory authorities in the EU carry out these functions with the support of their TSOs.

However, research and development is carried out by less than 40% of the nuclear regulatory authorities and is mainly performed by their TSOs.

Further, the study showed that other functions are carried out by nuclear regulatory authorities and their TSOs, such as:

- Monitoring of Human Exposure and Environmental Radioactivity;
- Regulating Information Security at Nuclear Facilities;
- Management of Inventory and Register of Radioactive Sources;
- Management of State Record System of Nuclear Material;
- Provision of Training.

This highlights that nuclear regulatory authorities and TSO experts need to be highly competent in many disciplines and need to continuously maintain and up-date their expertise in order to keep up with new developments and technologies in the various areas.

Training of nuclear regulatory authority and TSO staff

Regarding training, the results of the study showed that 90 % of the organizations surveyed offer training to their staff; 75% of them provide initial training for new staff and 80% provide continuous training to existing staff. In addition, 70% perform competence analysis and customize the training action plans of individual experts according to the identified gaps in knowledge and skills. However, they lack a clear framework to define the contents of the training activities offered or how much time each staff member is required to dedicate each year to the maintenance of professional competences. Regarding the training contents, it can be summarized that more than 60% of organizations surveyed address technical aspects in their staff training activities and more than 30% also train on legal issues.

Fifty percent of the organizations surveyed send their experts to external training, such as training provided by the IAEA, NEA or recognized training providers. As a result, the study concluded that half of them do not have sufficient resources or the necessary capability to ensure the maintenance of required competences through internal training. This conclusion highlighted the vital role of international organizations and training institutes that offer training programmes supporting nuclear regulatory authorities and TSOs in their efforts to build-up and maintain the competences of their professionals. As a result, the study recommended that a mutually recognized training programme fostering excellence of regulatory practices at the European and international level could be of benefit for all nuclear regulatory authorities, their TSOs and other providers of external expert support.

The study also highlighted that a number of organizations have made substantial efforts during recent years to develop and provide training activities based on competence analysis of their staff and to establish knowledge management and information systems to preserve experience gained in the past. However, when comparing various training efforts in different countries, there was no harmonized approach to training for nuclear regulatory authorities.

When it comes to training for TSO experts or providers of external expert support, although internal staff training is organized within European TSOs, a clear and harmonized framework for the definition of training was likewise lacking. The study highlighted that TSO staff contributing to regulatory functions - notably through performing safety assessments - need to be trained beyond their specific fields of scientific and technical expertise, to cover the non-technical aspects in their work (safety culture, ethics…). This enables them to better understand their contribution to the performance of regulatory functions and the role of their assessments in the regulatory process.

In 2015, based on the results of the NUSHARE project, in particular a Basic Training Programme defined during the project, a concrete Pilot Test Case was implemented and a Feasibility Study was launched to foster and evaluate the potential of pilot training in establishing a harmonized set of skills and competences for safety assessments. It is expected that these actions could lead to the establishment of a set of professional development curricula that could be shared by EU safety organizations and recognized throughout the EU.

ANNEX IV

INTERACTIONS OF A TSO WITH GOVERNMENTAL AUTHORITIES IN AN EMERGENCY, THE EXAMPLE FROM THE IRSN, FRANCE

For many years, the French public authorities have considered the possibility of a severe accident occurring in a nuclear reactor in the country. The emergency response plans are supervised at the government level by the Ministry of the Interior, supported by the civilian or defense safety authorities as well as IRSN, in its capacity of national public expert in nuclear and radiological risk. A more recently updated plan was issued in 2014 using major lessons learned from the Fukushima Daiichi accident. This plan, insists on a rapid multisectoral organization between relevant ministers and regulatory, technical bodies; and on building effective relations and exchanges with the relevant international level. This plan covers the emergency phase and its aftermath including the preparation for the post-accident phase.

- **Role and mission of IRSN in the framework of the French national nuclear emergency response:**

In case of accident, the ON SITE emergency plan is implemented by the operator to mitigate the accident, stabilize the accidental situation and return the facility to a controlled state. The operator must immediately notify the competent safety regulator as well as the local government representative to be alerted (usually the departmental prefect).

The OFF SITE emergency plan is implemented by the French government to protect the population (including preparing the long term phase post-accident). Measures to alert and protect the public may be taken in part by the operator under conditions defined by the departmental prefect.

The regulatory body (ASN) is the government-appointed independent administrative authority in charge of nuclear safety and radiation protection for civilian nuclear power in France. It has a major role in managing nuclear and radiological emergencies with the technical support of the IRSN.

IRSN, as TSO and national nuclear expert, is in charge of technical expertise on radiological and nuclear risks. As such, IRSN participates in managing emergencies:

— Proposing to French public authorities technical, health and medical measures to protect people and the environment and return facilities to safe conditions. It assists the safety regulators and the ministries and cooperates with the French Met Office.

— Operating IRSN’s Technical Emergency Response Center (ERC), which is able to establish diagnosis and prognosis on the on-going situation of the damaged facility, using its capabilities of modelling environmental consequences and predicting dose assessment for the population, in coordination with authorities’ and operator’s emergency response centres.

— Deploying IRSN's mobile unit, as defined further below, which enables:

  - field measurements of the environment,

- monitoring of people in the field,
- providing local authorities with information, and
- centralizing the results of measurements.

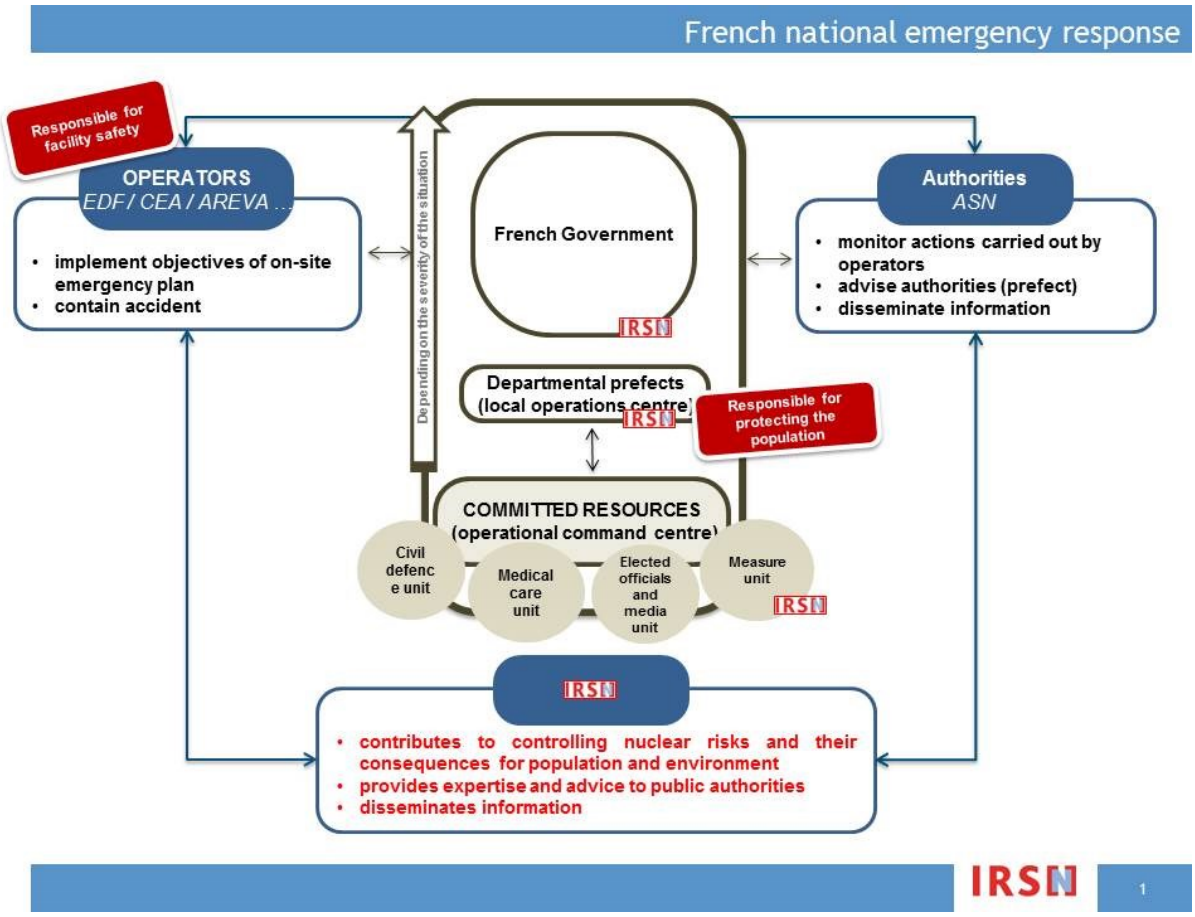


FIG. 4.1. IRSN Presentation of the National Emergency Response.

- **Means of IRSN in EPR**

In order to successfully conduct its missions in an emergency, IRSN has set up a specific Technical Emergency Response Center which allows it to provide collective expertise based on multidisciplinary skills in the nuclear field. In fact, around 400 IRSN's experts are trained to participate to the response in the IRSN crisis organization. The alert can be given by different channels and the IRSN crisis center is activated in one hour by the team of 25 experts (24/7).

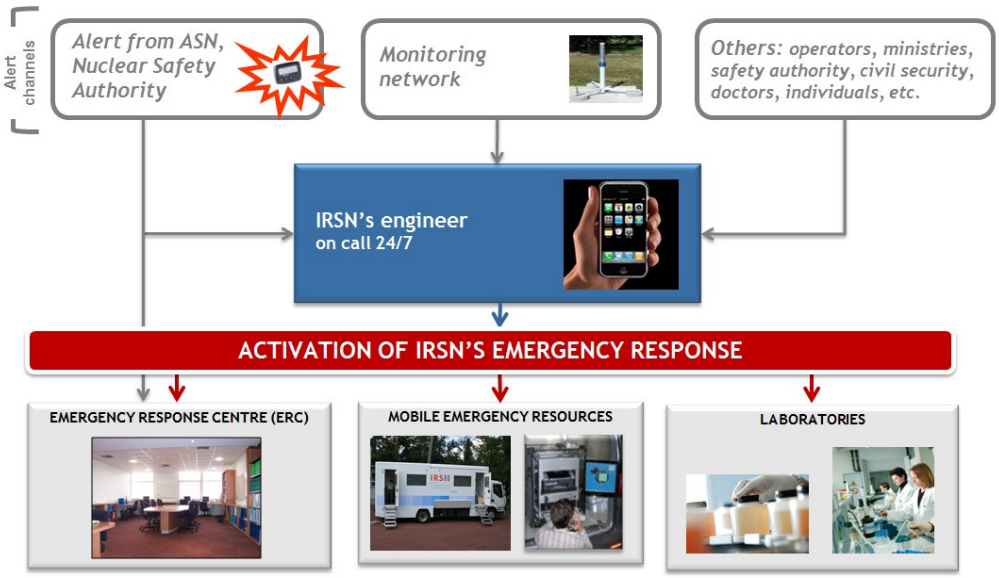


FIG. 4.2. Illustration of activation mechanisms of emergency response for IRSN.

The Technical Emergency Response Center (ERC) is operational 24/7, is the nerve center of IRSN's emergency response which provides assessment resources, methods and tools. The experts use a general assessment methodology. The purpose of this specific, structured approach is to identify the situation and its evolution over time in order to propose preventive measures to protect the population and environment.

A mobile emergency unit is dedicated to field operations and measuring environment impact, in contact with ERC (sample-preparation vehicle, trucks for operations, mobile labs). A mobile team dedicated to measurement of radiological body impact can be sent to the local area.

The IRSN laboratories are in charge of evaluation of environmental contamination (processing of samples), of evaluation of possible exposure by population and operational team members for internal dosimetry, evaluation of external doses or very high doses dosimetry.

The IRSN environment monitoring network measures gamma probes and aerosols in the French territory.

ANNEX V

THE MANAGEMENT SYSTEM OF A TSO, THE EXAMPLE OF GRS, GERMANY

Introduction

The Integrated Management System of GRS (Gesellschaft für Anlagen- und Reaktorsicherheit gGmbH) as well as its quality policy and the principles are described in the Management Manual with the current version being certified according to DIN EN ISO 9001:2015 by TÜV Rheinland Cert (Germany) and in the Organization Manual of GRS.

The Management Manual of Quality (QMM) comprises process descriptions, technical instructions, and standard documents.

The Management Manual is accessible via the intranet of GRS. The QMM as well as other information and support services can be delivered upon request to the following email-address: scc@grs.de.

The central GRS intranet website of the Integrated Management System gives all staff at GRS quick access to all internal management documents. Through the internal online news bulletin the staff of GRS is informed by the Key Quality Manager (KQM) about the release of new versions of the QMM which is structured according to the following table of contents (Fig. 5.1):

TABLE OF CONTENTS

1. BUSINESS POLICY
1.1 Quality Policy and Quality Principles
1.2 Statement of Commitment
2. CONTEXT AND COMPANY PROFILE
2.1 Interested Parties
2.2 Organisation
2.3 Mission Statement
2.4 External and Internal Issues
2.5 Principles for Leadership and Commitment
3. MANAGEMENT SYSTEM
3.1 Quality Management System
3.2 Process Map
3.3 Responsibilities and Authorisations
3.4 Documentation of the QM System
3.5 Control of QM Documents
3.6 Control of Quality Records (Electronic Project Files)
4. MANAGEMENT PROCESSES / RESPONSIBILITY OF THE MANAGEMENT
4.1 Business Strategy and Development (FP 01)
4.2 Business Planning and Management (MP 02)
4.3 Sustainability and Resource Management (MP 03)
4.4 Company Communication (MP 04)
4.5 Process Management (MP 05)
5. CORE PROCESSES
5.1 Safety Analyses, Expert Opinion, Expertise (CP 01)
5.2 Advice and Assistance (CP 02)
5.3 Research and Development (CP 03)
5.4 Programme Coordination (CP 04)
5.5 Project Management Agency (CP 05)
6. SUPPORT PROCESSES
6.1 Project Management and Controlling (SP 01)
6.2 Human Resources Development (SP 02)
6.3 Knowledge Management (SP 03)
6.4 IT Management (SP 04)
6.5 Purchasing (SP 05)
6.6 Risk Management (SP 06)
7. MEASUREMENT, ANALYSIS AND IMPROVEMENT
7.1 Monitoring and Measurement of the Work Results
7.2 Customer Satisfaction
7.3 Monitoring and Measurement of the Processes and Products
7.4 Continual Improvement
Annex 1: Correlation Matrix: Processes – Technical Instructions
Annex 2: Glossary – Abbreviations
Annex 3: Glossary – Definitions of Technical Terms

FIG. 5.1. Table of Content of the QMM with its Sections 1 - 7.

Section 1 of the QMM BUSINESS POLICY contains the Quality Policy and Principles and reflects the principles, value, attitudes and activities set and sustainably developed in compliance with the national and international standards on the management systems of nuclear organizations. The relevant IAEA documentation is one of the fundamental reference points for further development of the GRS business policy.

This section includes a Statement of Commitment signed by the top management, which states that the QM system applies to all areas of activity and to all processes of GRS, is binding and directly applicable by all staff, and is accessible to other interested parties. This statement commits the management and all GRS staff to the QM system and its continual improvement.

Section 2 of the QMM CONTEXT AND COMPANY PROFILE contains the description of the company context and profile including its mission and vision (Fig. 5.2), and the target system (Fig. 5.3).

FIG. 5.2. GRS Mission and Vision.

Ecological, economic and social aspects are considered in all strategic actions of GRS as the basis for a sustainable development of the company. GRS is committed to adhering to socially and environmentally relevant rules and standards (such as DIN EN 16247-1). The same is expected of its subcontractors. Against this background, a target system has been developed from the mission statement, defining concrete targets and strategies as seen below (Fig. 5.3).

FIG. 5.3. Targets and Strategy.

Section 3 of the QMM MANAGEMENT SYSTEM describes the Management System structure of the GRS with integrated parts of it certified according to DIN EN ISO 9001, DIN EN ISO/IEC 17020 and DIN EN ISO/IEC 17025. It is shown in Fig. 5.4 below:

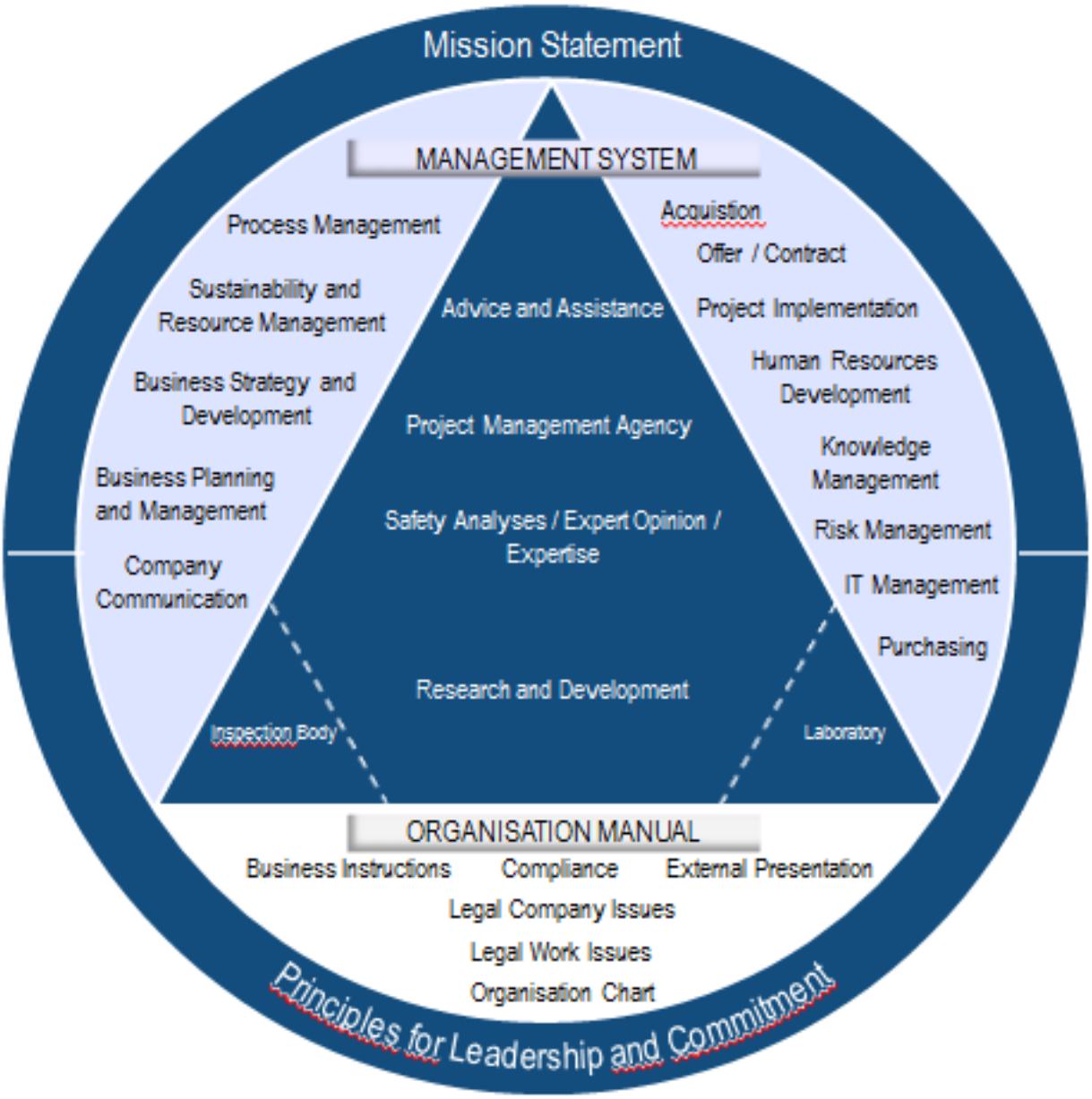


FIG. 5.4. Management System.

The quality management system (QM system) of GRS establishes the procedures and responsibilities for all processes developed from the company's mission statement which has an influence on the quality of the services and products.

The process structure of GRS comprises the three following process types: management processes, core processes, and support processes. These processes with integrated tools for their improvement are depicted in Fig. 5.5 in the form of a process map. The procedures to be applied specifically are put in concrete terms in technical instructions, standard documents, and in guidelines. **Sections 4, 5 and 6 of the QMM** contain detailed descriptions of these processes and the tools for improvement.

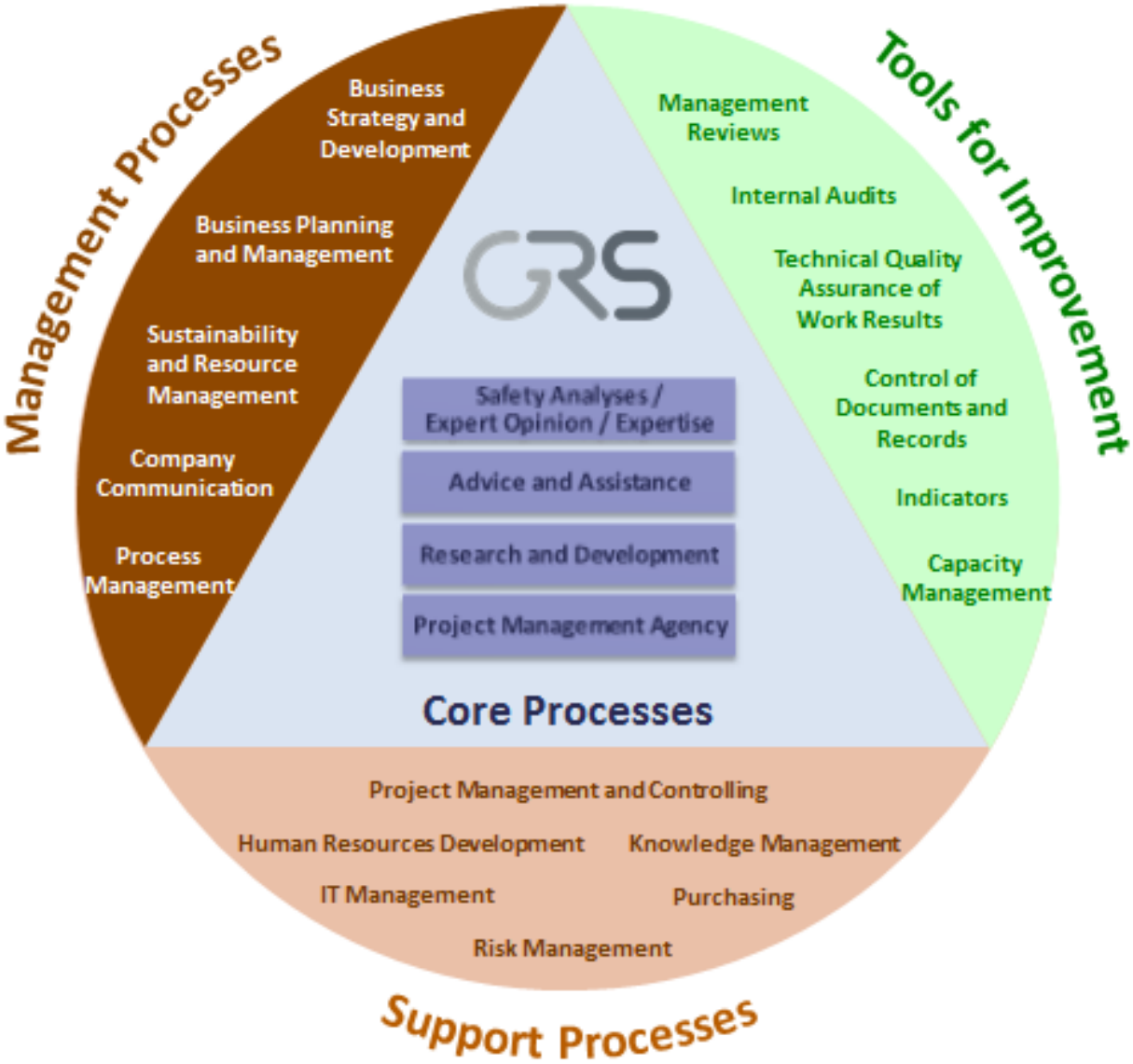
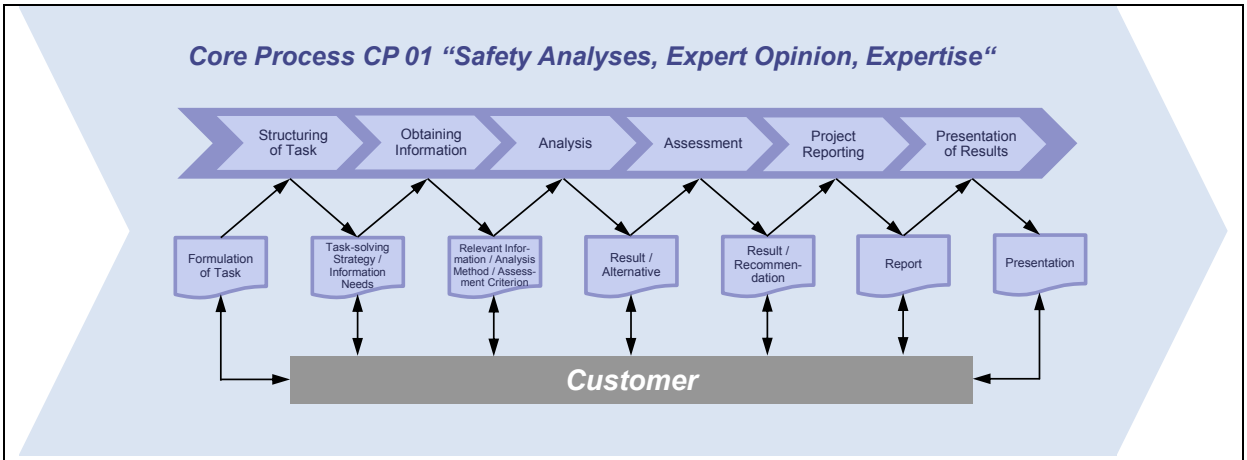


FIG. 5.5. Process structure of GRS.

The descriptions of the management, core, and support processes as well as the tools for their improvement are included in the QMM (Sections 4, 5, 6 and 7).

Since the management processes are not carried out in the framework of external contracts, the documentation on their description differs from that of the core processes.

For each core process outlined in **Section 5 of the QMM CORE PROCESSES**, a standard process description document is designed, which contains the process chart, the description of the process targets and its scope. The core processes are defined as the ones that contribute directly to the creation of added value. As an example, the process for Safety Analysis, Expert Opinion, Expertise (Core Process 01) is depicted in Fig. 5.6 below:



Target

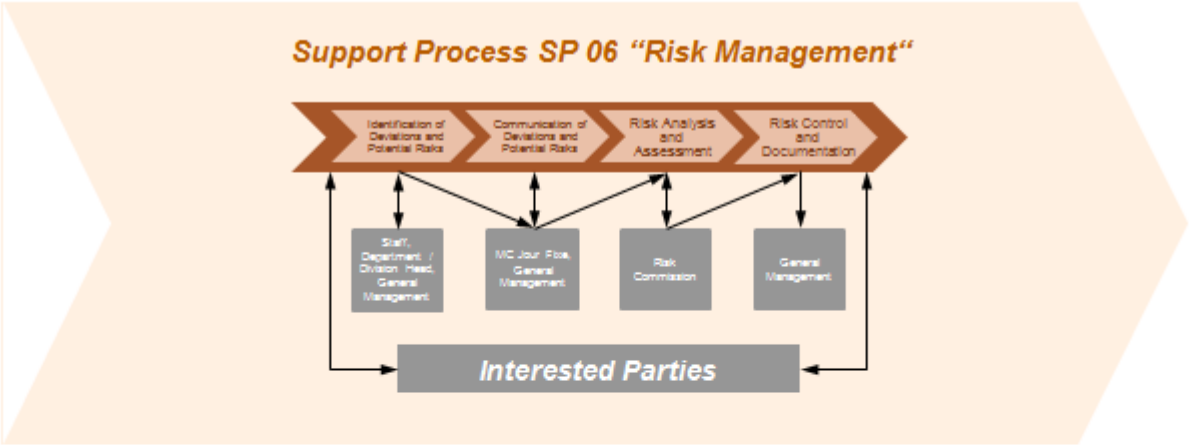
- Improvement of the safety level of nuclear installations through
  - identification of weaknesses for the purpose of monitoring and maintaining the safety level,
  - identification of approaches for optimisation for the purpose of enhancing the safety level,
  - review or specification of assessment scales and criteria (guidelines, standards, requirements),
  - early damage detection with the help of statistical methods (e.g. trend analyses etc.).
- Minimisation of environmental pollution (conventional and radiological).

Scope

- Information Notices
- Incident Reporting System and International Nuclear Event Scale reports
- Safety-related statements
- Evaluation of operating experience from Information Notices
- Probabilistic Safety Analyses (PSA)
- Expert opinions according to Section 20 of the Atomic Energy Act (§ 20 AtG)
- Expert opinions not according to Section 20 of the Atomic Energy Act (§ 20 AtG) (e.g. for BMWi, ONR or ANVS)
- Generic analyses

FIG. 5.6. Example of Core Process.

Section 6 of the QMM SUPPORT PROCESSES, consists accordingly of the description of the support processes; one of them, the support process on Risk Management (SP 06) is shown below in Fig. 5.7:



Limit of Value		Probability of Damage		
		Probability < 25 %	Probability 25 – 50 %	Probability > 50 %
		1	2	3
Low 0 – 100 000 €	1	green	green	yellow
Medium > 100 000 – 1 Mio €	2	green	yellow	red
High > 1 Mio €	3	yellow	red	red

Target

The risk management system of GRS aims to identify potential risks in time and to provide information to the general management in order to prevent damage from GRS by appropriate measures and to comply with the reporting requirements to the supervisory board. In this system, the subsidiaries of GRS are to be adequately involved, too.

Risk management also ensures the application of a uniform and systematic method of identifying and analysing as well as of assessing, controlling and communicating the risks and finally the documentation of their careful consideration.

Scope

The risk management system is addressed to the entire organisation. Every member of staff within his/her own area of responsibility is encouraged to avoid or reduce risks according to the requirements described in SP 06 and to communicate risks to his/her superiors.

FIG. 5.7. Example of Support Process.

The interrelations between the processes (Fig. 5.8) are exemplified in **Section 4 of the QMM** MANAGEMENT PROCESSES / RESPONSIBILITY OF MANAGEMENT.

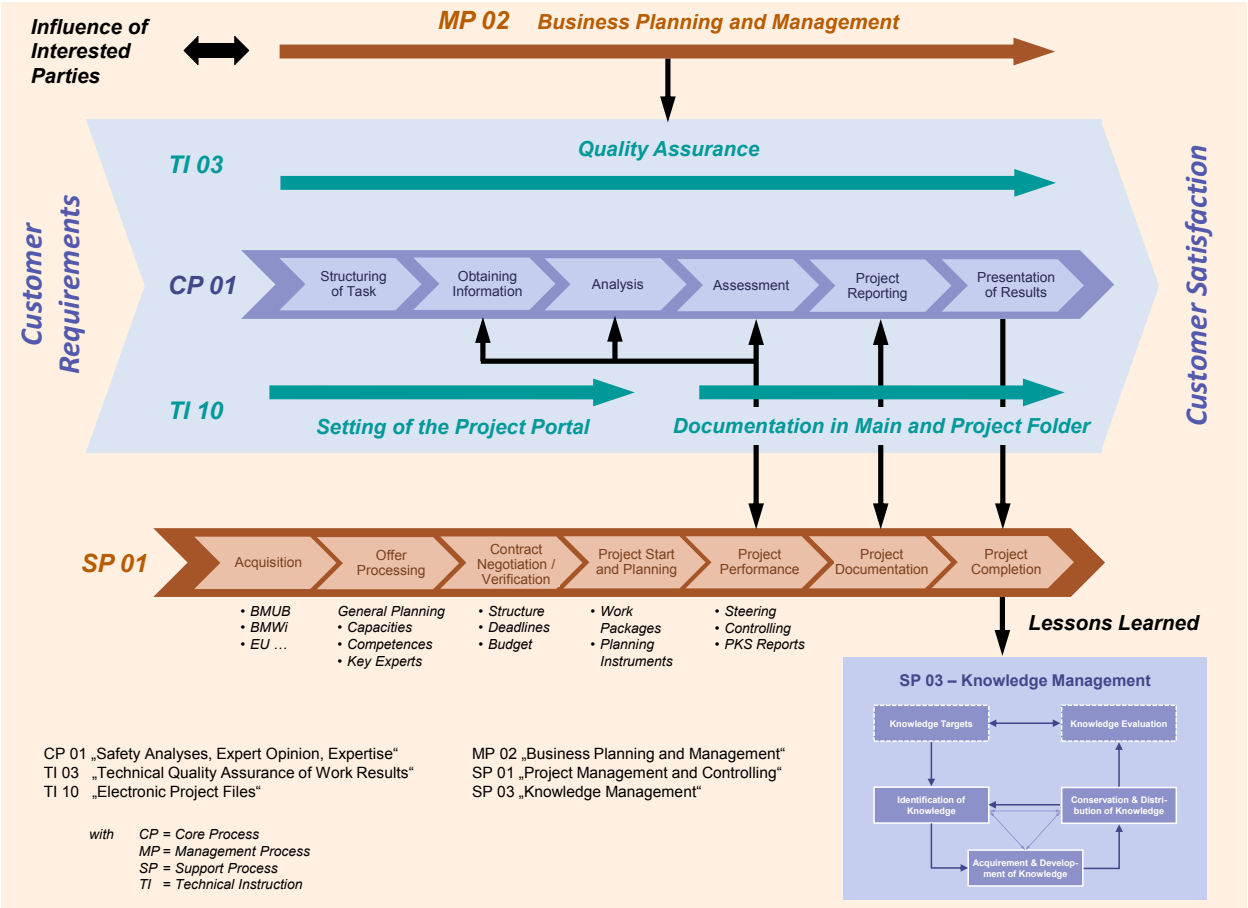


FIG. 5.8. Example of interaction between the processes.

The common feature is the application of the PDCA (plan, do, check, act) cycle as shown in Fig. 5.9, towards their continuous improvement:

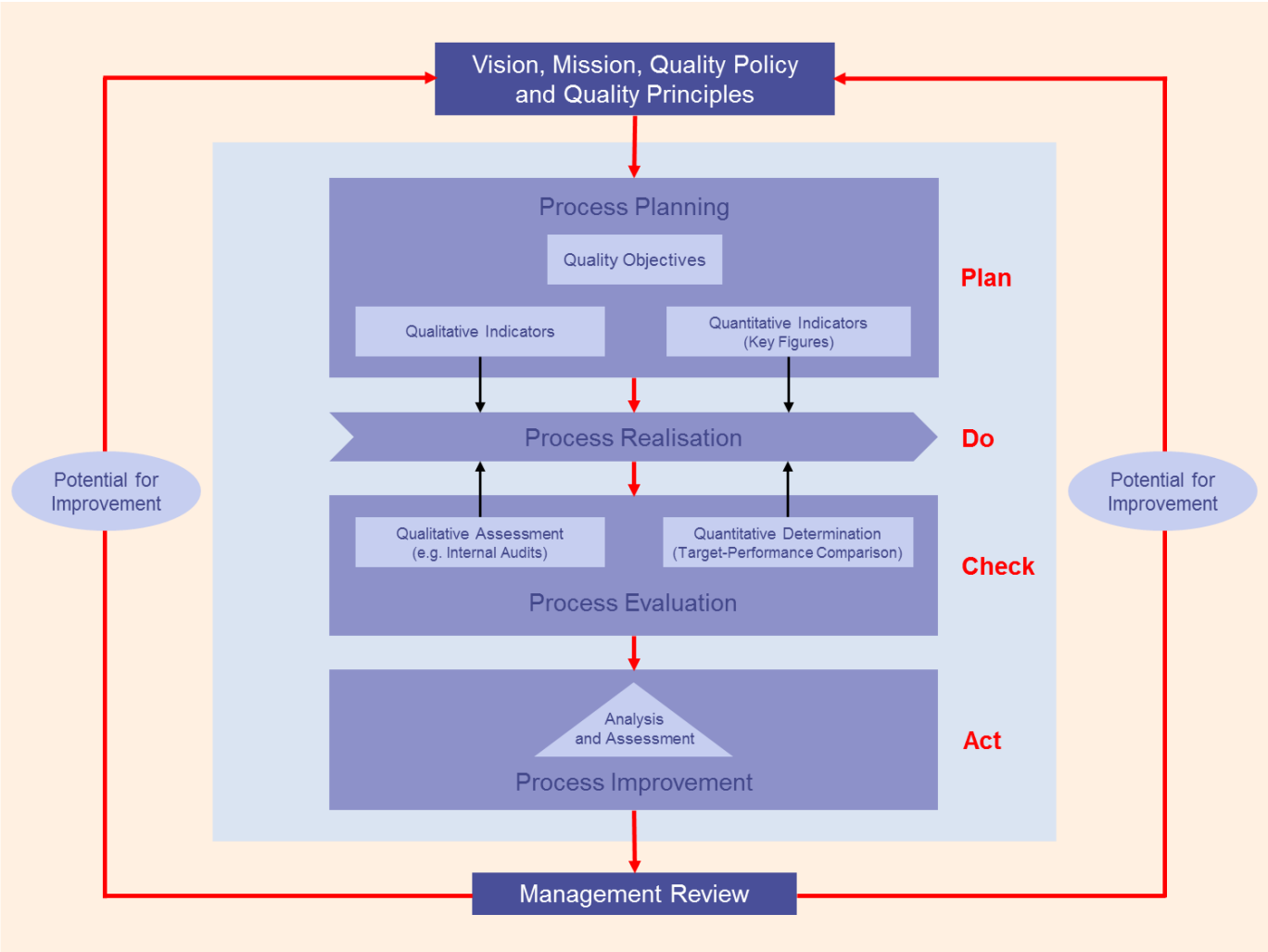


FIG. 5.9. PCDA cycle.

Regular measurements and assessments are conducted at GRS with regard to both process realization and efficiency of the processes. The results of these measurements and assessments provide indications of the quality of the work results and the degree of customer satisfaction. They are used as a basis for a continual improvement process and described in **Section 7 MEASUREMENT, ANALYSIS AND IMPROVEMENT.** The results of the analyses and assessments from project and process measurements form the basis for the establishment and implementation of improvement measures, geared to the GRS quality objectives. The Indicators Catalogue below is the one of the most explicit numerical instruments used at GRS for process monitoring.

Targets	**Further development of the safety level of nuclear installations**	**Mitigation of disposal risks**	**Contribution to achieve the objectives of environmental and radiation protection**	**Maintenance and further development of scientific expert competence**	**Efficient resource management**
Strategy	Helping to shape safety requirements and regulations, the state of the art in science and technology, nuclear safety research and collaboration in the annual work plans of the contracted parties		Application of knowledge and methods and provision of expert advice to selected environmental and radiation protection issues, use of synergy effects	Acquirement and development of knowledge, establishment of European competence networks, foresighted human resource development, scientific reputation	Efficient use of resources, improvement of capacity management, compliance with project planning, compliance with the business plan
Indicators	**A1** Number of final reports submitted		**B1** Number of environmental projects	**C1** Staff training	**D1** Productivity
	A2 Number of publications in scientific journals			**C2** Internal assessment of training programmes	**D2** Billable work
	A3 Number of presentations at conferences and workshops			**C3** Human resources development plan	**D3** (Company) capacity
	A4 Participation in international and national committees				**D4** Uniformity of capacity
	A5 Number of code transfers				**D5** Degree of fulfilment
	A6 Number of offers (new contracts, successful offers)				**D6** Non-profit factor
					D7 Adherence to deadline

FIG. 5.10. Example of the KPI (Key Performance Indicators.)

ANNEX VI

EXAMPLE OF TRAINING ON SAFETY CULTURE, THE EXAMPLE OF VTT, FINLAND

This annex is a description, by a contributor from VTT, of a training course developed and implemented by VTT for its staff, to reinforce safety culture.

- **Foreword**

The type and extent of training on safety culture provided by a TSO organisation depends for example on the type, size, organisational structure and functions of the TSO and on the situation where the training is provided (a general training for the staff or a specific training after a detected lack/shortcoming in the safety culture inside the TSO). Thus, the following is merely an example on safety culture training course contents provided by a TSO for its own staff, not a pattern on how safety culture trainings are to be carried on in other TSO organisations.

The example is based on two one-day safety culture trainings at VTT for its own staff working in the area of nuclear safety and waste management. Both trainings were attended by approximately 60 persons. The actual training materials were in Finnish and are not reproduced here.

- **Mandate/ Competence of the trainer(s)**

The course entitled as 'safety culture training for persons working in the nuclear area at VTT' started with a short presentation of the VTT team and their typical assignments in the area of safety culture.

This part served as mandate or justification of the safety culture trainer(s) competence to provide the training.

- **Facts/ Background on safety culture**

The example course continued with the basics of the safety culture.

It included presentations on:

- what is safety culture,
- the importance of safety culture in nuclear area,
- IAEA definition of safety culture,
- how safety culture is created/assimilated in an organisation, and
- examples of poor safety culture in other domains.

This opening ended with the information that the interpretation of causes of accidents has changed over time, from technical reasons being the overwhelming reason with 70 % in 1960,

to human-based reasons representing over 80 % during the period from year 1990 to year 2000.

- **Importance of safety culture in the TSO's operational domain**

This part of the lecture concentrated on the importance of safety culture in the operational area of the TSO, which in the example case of VTT is nuclear reactor safety and nuclear waste management. This section included also two group discussions on nuclear reactor safety and waste management.

It was explained that safety is not reached or increased merely by investing in technology. In large accidents the challenges related to the actions of humans and organisations always have a central role. This was further discussed via examples on challenges of knowledge and understanding and challenges of values and attitudes.

Then the trainer addressed examples on major accidents with a safety culture factor involved. The first example was a citation from the Japanese parliamentary panel on the Fukushima accident stating that the crisis at the Fukushima nuclear plant was "a profoundly man-made disaster". The second example provided a short summary of the Davis Besse case. It was emphasized that good safety culture is required from an organisation operating in the nuclear domain. A citation of a paragraph of the Finnish national legislation on safety culture and the safety of nuclear power plants as of 2008 was provided.

After this information, two interactive discussions took place with the audience on the actual dangers / dangerous mechanism that are to be prevented a) at a nuclear power plant and b) in final disposal of nuclear waste. Additional information on the relevant Finnish legislation and defence-in-depth –principle was provided for the discussion.

- **Characteristics of a good safety culture in an organisation**

This section of the training example is quite specific depending on the background of the trainer(s) and the audience. In this case the trainer had a long experience as one of the key researchers of an internationally recognised research group on safety culture and most participants in the audience had a Master's or higher academic degree. For a different audience or with a different trainer profile, a less 'academic' approach with a different kind of team work may be advisable. It is important that the TSO is consistent with its safety culture application, whether a more 'traditional' or a more 'modern' model of the safety culture is used as the theoretical basis. The most important thing is that safety culture is assimilated as an essential part of the daily actions of the TSO organisation and its individual staff members.

This part of the lecture started with a reminder that according to the Finnish legislation good safety culture is a prerequisite of all organisations involved in planning, construction, operation and decommissioning of a nuclear power plant. A review of major developments and focus areas in safety culture since the Chernobyl accident up to present was provided. As a domestic case study, the challenges in development of good safety culture in the Finnish Olkiluoto 3 European Pressurized Water Reactor project were addressed. These were followed by information on the collection of features/items that are most frequently

mentioned in connection with a good safety culture and information on how safety culture is addressed in several Guides developed by the Finnish regulatory body, STUK.

As a basis for a team exercise in this section, information on the original IAEA safety culture model, its development and a safety culture model developed by the VTT research team was provided. Also information on the warning signs of deteriorating safety culture according to the IAEA was provided as well as information on a recent study carried out during the annual outage in a Finnish unspecified nuclear power plant that indicated that the most frequent item where the contractors wished to obtain more training was nuclear safety.

In the exercise, the first task was to discuss whether the course participants had been involved in a project on nuclear safety or safe disposal of nuclear waste, the effects of their own involvement and the possible effects if the quality of their own work would have been bad/low. In the second task the participants had to select either the IAEA model or the VTT model and apply it in the example cases brought up in the first part of the team work for evaluating whether the project organisation acted according to the features of good safety culture. Further, the team was asked to write up real or hypothetical examples of deficiencies in VTT's safety culture and use the selected model and see whether they could be explained and categorised according to the model.

- **Localisation of the safety culture – organisation specific messages**

The last part of the lecture focused on what each person working in VTT needs to know about safety culture'. This section's objective was to localise the safety culture with possible messages/instructions to the staff.

The specific aspects of safety culture that are relevant for a TSO organisation were discussed. It was recognised that there are different kind of organisations functioning as a TSO.

The lecture pointed out that in a multidisciplinary organisation, such as VTT, there are not similar expectation posed from the top management level to the safety culture as in a dedicated nuclear organisation and instead of safety the outspoken important values emphasize innovativeness, dedication to the client etc. In this kind of an organisation it is important when one works with nuclear assignments, that ethical values and ensuring the high quality of the work indicate appreciation/valuing of the safety. This means that in practice, it is important not to agree to carry out a task that one is not able or competent to carry out. A project team working in a multidisciplinary environment is able to adapt its way of working when addressing a nuclear task, if required.

The lecture reminded that typically some tasks carried out by a TSO are very closely connected to nuclear safety, whereas in some other tasks the connection is indirect or hard to recognise. Part of a good safety culture is to consider how the task that one is carrying out is related to safety and what are the consequences if there are errors or deficiencies in the results. It was pointed out that one is aware that even if the task/project itself is small in size/

economic value or does not address directly the plant safety systems, it may have significant effects on safety.

According to the lecture it is important to recognise that when starting a new assignment (safety analysis, test, review of documents) a TSO cannot be sure on the progress and results of the assignment. It is good safety culture to share and report also the uncertainties and limitations (also with the customer) instead of merely emphasizing the success stories and keeping of the schedule. It was pointed out that it is important to not compromise quality for the sake of meeting the given schedule or budget.

The lecture noted that typically a TSO does not have a similar juridical liability as the licensee. However, it is good safety culture to inform on all things that may pose a threat to safety.

The last part of the organization specific section concentrated on practical advice/reminders. It was pointed out that a part of good safety culture is to organize the work so that personnel with the proper knowledge and skills are used and that the way the work was carried out and its results can be tracked and identified also afterwards. The quantity and quality of personnel is in direct proportion to the quality and degree of difficulty of the work in order to avoid overloading of the TSO staff and consequent decrease of the quality of the work. Consideration of possible conflicts of interest is a part of good safety culture as well. The TSO organization staff is to be properly trained and the TSO organization needs to have necessary confidentiality/non-disclosure agreements with its clients.

It was reminded that due to the fact that organisations themselves typically become more or less blind to the characteristics of their own culture, external safety culture assessments are a crucial way to provide insights into the organisation's potential improvements to safety culture.

ANNEX VII

TSO MISSION STATEMENT AND CODE OF ETHICS, EXAMPLES FROM KINS, REPUBLIC OF KOREA AND THE IRSN, FRANCE

7.1 KINS Mission Statement

The KINS's mission is to protect public health, safety and the environment from radiation hazards that might be incidental to production and use of nuclear energy.

In order to perform our mission faithfully as a watchdog of nuclear safety, we make the following commitments directives in performing our mission:

● Recognizing that its ultimate clients are the general public, KINS shall perform nuclear safety regulatory functions objectively and in fairness, and also maintain independence from any stakeholders including the licensees.

● KINS shall open the information on the results of its work performance to the public faithfully to inspire public confidence on nuclear safety regulation.

● KINS shall carry out regulatory functions with state of the art technology and knowledge, maintain and improve its technical capability continuously, and further make a clear regulatory decision without any undue delay.

● KINS shall pursue effectiveness and rationality in safety regulation.

● KINS shall endeavor for establishment of the nuclear safety culture so as to encourage the personnel engaged in nuclear energy to put foremost priority on safety in doing their job.

● Recognizing that the nuclear safety is a matter of international concern, KINS shall maintain close cooperative relationship with international agencies and foreign institutes.

February 11, 2000

7.2 IRSN Code of ethics and professional conduct

IRSN has adopted, in 2013, a Code of Ethics and Professional Conduct, the contents of which are summarized below.

As a preamble, it is indicated that the Code, which was adopted in 2013 by the Ethics Commission of IRSN and the Board of IRSN, complies with relevant constitutional and legal requirements.

The introduction to the Code presents the role and missions of IRSN in the French system, as well as the various conditions and constraints that frame its action, in particular with respect to ethical issues. It states that the Code sets principles and establishes guidance for addressing these constraints and resolving conflicts that may arise, thus constituting references for the Institute and its staff, and helping IRSN's partners in their interaction with the Institute.

The stipulations of the Code are organized in four articles, reproduced and translated below.

ARTICLE 1 ESTABLISHING KNOWLEDGE

To accomplish its mission of assessing nuclear and radiological risks, the Institute pledges to:

1. Take a position despite the inevitably incomplete nature of knowledge;
2. Increase the knowledge it uses through research conducted on its own, in partnership with others and through experience feedback;
3. Identify research needs, taking into account discussions with all stakeholders as well as research performed at the national and international levels;
4. Draw attention to identified knowledge needs and prioritize them;
5. Create and regularly update knowledge bases derived from research and analysis of experience feedback;
6. Periodically assess the quality of its research based on independent scientific assessment
7. Identify the risks of losing critical skills and knowledge and prevent such loss by adequately managing human resources and knowledge. Professional education is one way to accomplish this.

ARTICLE 2 WORKING COLLECTIVELY

IRSN pledges to perform its work according to a set of collective working processes:

1. Engage stakeholders in order to identify their expectations and understand their point of view
2. Make teamwork a priority to bring a multifaceted view to risk evaluation by calling on knowledge from groups of generalist and specialist experts involved in preparing IRSN's positions and assessments
3. Give its staff timely access to a pool of scientific and technical knowledge
4. Examine and maintain the traceability of any internal scientific or technical controversy with due respect to the opinions of others, recognizing that internal consensus may not always be achievable
5. Establish its positions with due consideration of the uncertainties and gaps in available knowledge and of any scientific controversy and divergent opinions that may influence analysis; report on such issues if necessary when formulating its opinions; and endeavor in each case to express a conclusive position

ARTICLE 3 SHARING KNOWLEDGE

IRSN pledges to:

1. Publish the main results of the work performed by the Institute as technical and scientific support to government administrations, agencies and public authorities;
2. Give priority to provisions that authorize the publication of key results, when establishing commercial contracts for service. If this is not possible, the Institute will ensure that the reasons invoked for confidentiality are well justified and, in case of doubt, may refer the matter to the Ethics Commission. Such contracts include procedures for publishing the results and for their use in the conduct of the Institute's activities;
3. Make publicly available other results of works performed as part of its missions, in particular research and the results of national radiological monitoring activities
4. Apply the commitments of IRSN's charter on openness to society in its work with societal stakeholders;
5. Alert the responsible entity, or in its absence public authorities, about situations that in IRSN's opinion present serious nuclear or radiological risks. It shall immediately alert public authorities if it judges that the situation requires a rapid response;
6. Promote good practice with regard to safety, security and radiation protection in work involving standardization and harmonization in France and abroad, and more generally with regard to safety culture in its areas of competence

ARTICLE 4 ACHIEVING INDEPENDENT JUDGMENT

Staff members shall:

1. Comply with the requirements for declaring and updating any potential interest as set forth in the national regulations and by IRSN;
2. Be aware of their possible exposure to individual conflicts of interests, ensure that those of a financial nature are minimal and, in any case eliminate those that would be of a contractual nature.

In parallel, the Institute pledges to:

3. Inform the Ethics Commission annually of the status of its potential conflicts of interest with industry (not including standard services). It shall also inform recipients of its technical support of such potential conflicts of interest, insofar as they are concerned;
4. Ensure that funding from industry in its research activities remains limited so as not to influence the work of its laboratories;
5. Include clauses protecting the freedom of interpretation of results in commercial contracts, especially those concerning research conducted in partnership with industry
6. Organize its work processes so that potential conflicts of interest concerning the Institute, its staff or its subcontractors do not influence its judgment. The director-general shall refer the matter to the Ethics Commission when he believes that the risk of undue influence is significant;
7. Notify the customer, for any commercial service offered, that the use of the results of such service within a regulatory framework shall not in any way influence the Institute's assessment if requested by the competent authority.