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## IRPA Guiding Principles for Establishing a Radiation Protection Culture

### *Purpose and scope*

IRPA has recognised the importance of establishing a sound radiation protection culture. The objective of this document is both to foster a belief in the success of cultural approaches, and to provide guidance to help equip radiation protection professionals to promote a successful RP culture in their organisation and workplace. The term 'organisation' refers to any place where there is work with radiation, encompassing hospitals and medical facilities, nuclear plants, university and research laboratories and all other users of radiation sources. The purpose of 'IRPA Guiding Principles for Establishing a Radiation Protection Culture' is to capture the opinion and standpoint of RP professionals on what a radiation protection culture must be.

At this preliminary stage, it is necessary to establish the difference between the terms "radiation protection culture" and "safety culture". Depending on the sectors and countries, radiological safety is included either in an overall safety culture or it is a standalone concept. However, there is clearly no opposition between both approaches where the only difference can be seen through a historical background. For instance, in the nuclear industry, plant safety has always been set as the priority in order to avoid a nuclear accident, which means that the word "safety" currently encompasses industrial, nuclear, radiological and even environmental safety, with a view to contribute to safety overall. Conversely, in the medical sector, protection of both professionals and patients has invariably been put forward as a priority.

Where safety focuses on the system design to permit hazardous equipment to be used without harming the worker, protection focuses on people and behavior (culture) to prevent harm to the worker and others when hazardous equipment is being operated. We need to keep in mind that the hospital sector worldwide is not familiar with the term "nuclear safety", which belongs more to the industry, whereas it has a good knowledge of what "radiation protection" means. IRPA being an international body, the target here is to make sure the concept is understood and shared by all, without any desire to place both terms in opposition.

Consequently, IRPA has decided to use only the term "radiation protection culture" throughout this document, which will encompass a combination of state-of-the art approaches including those related to the wider safety culture (such as for instance the NRC approach in the US, or IAEA guidelines).

The decision was made to enhance radiation protection (RP) culture among the RP professionals worldwide because embedding safety and protection at a cultural level within an organization is by far the most effective way of delivering the performance to which we all aspire. As the international voice of radiation protection professionals, IRPA initiated a process which provided a medium for discussion on this topic throughout the world.

This document is targeted at RP professionals rather than the public at large. The interface between professionals and the public is clearly addressed in these guiding principles in the chapter entitled 'Stakeholder's engagement' but it is also visible in RP professionals' communication to the public and regulatory requirements.



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## **2 Introduction**

At a time of significant developments in the use of ionizing radiation in the medical field as well as in the revival of nuclear industry, the radiation protection profession is facing the challenge of enhancing radiation protection culture throughout the world. The generation who developed radiation safety and radiation protection as applied today is gradually retiring.

Embedding RP at a cultural level within an organization is by far the most effective way of delivering the performance to which we all aspire, in order to:

- give visibility to the fundamentals of RP (science and values),
- promote radiation risk awareness,
- promote shared responsibility among practitioners, operators, management and regulators,
- maintain the RP heritage,
- facilitate its transmission,
- improve the quality and effectiveness of RP.

The RP culture programme must impact on all the actors who can affect workplace exposure, including RP experts, directors and senior managers, middle level managers and supervisors, the workforce including contractors, Medical Physicists, Doctors and Physicians and, where appropriate, designers and suppliers of equipment. IRPA can only reach this wide audience by working through the RP practitioners and the Associate Societies (AS) – ie our members. The RP professionals have to achieve the most difficult of leadership roles – that of indirect leadership of their non-RP colleagues who in many cases may be their business leaders or managers.

## **3 Elements and traits of a radiation protection culture**

Culture can be considered a system of endurance and continuation through education, and transfer of knowledge and expertise to the next generation, but it is also a combination of conservation and innovation accepted by the group. Culture comes from three sources: (1) beliefs, values, and assumptions of the founders of an organization, (2) learning experiences of group members as the organization evolves, and (3) beliefs, values, and assumptions brought in by new members and leaders. Organizational culture, therefore, is the pattern of basic assumptions invented, discovered or developed by a group who have shared significant problems, solved them, and observed the effects of their solutions. If the solutions have worked well enough, they then are considered valid. Once considered valid, the assumptions are absorbed and accepted by new members as the correct way to perceive, think, and feel in relation to those problems, which, in turn, will contribute to the enrichment of the culture. The longer we live in a given culture and the older the culture, the more it will influence our perceptions, thoughts, and feelings.

Generally speaking, the concept of culture relates to the ideas, beliefs and customs that are shared and accepted by people in a society. It is also a complex whole, which includes knowledge, belief, art, morals, law, customs, values, symbols, rituals and any other capabilities and habits, acquired by people as members of society that determine appropriate attitudes and behavior.

Culture is learned, passed on and changed by a pattern of basic assumptions, cultural paradigm, and by groups of people who have shared significant problems, solved them, observed the effects of their solutions, and who have taken in new members. When taught to new members, culture has a stabilizing function and basic cultural assumptions serve to stabilize a group.

We have endeavored to define elements and traits of a radiation protection culture, which encompasses a pattern of knowledge (scientific, technical, ethical, historical, practical...) and behaviors (questioning attitude, personal accountability, integrity, modesty, engagement with stakeholders, openness, and adaptable, transparent, and exemplary behavior). Radiation protection



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culture is a combination of science, values and ethics (i.e equity), as well as experience. The radiation protection culture principles are justification, optimization, dose limits and sharing of competence by training and education. Ionizing radiation applications can indeed be divided into medical, industrial and research and third-party services.

However, at this level, there are no differences between sectors (medical, nuclear, industry) whereby radiation protection culture can be understood as a combination of habits and knowledge of RP in all its aspects for patients, workers, population and environment, and in all exposure situations, combining scientific and social dimensions. Despite the variety of cultures worldwide, and independently of the specific context and activities considered, all the actors involved share common beliefs about the need to care for people and the natural environment. Such beliefs are essential to a sustainable future.

The power of addressing safety at a cultural level within an organisation is widely recognised across many sectors. Many respected international and national organisations and academics have developed models of safety culture, and how to influence it. These models have many common themes and approaches, and it is clear that these common components are broadly applicable across all work sectors, including radiation protection. For example, the US Nuclear Regulatory Commission has identified nine behavioural elements of a general Safety Culture. The elements are given in the table in Appendix 4, with short notes on their associated behaviours.

## 4 Developing a radiation protection culture and criteria of success

### 4.1 Evolution of radiation protection culture

There are several possible models of radiation protection culture. One such model can be said to include three main developmental stages:

- Stage 1: Basic compliance system – safety training programs, work conditions, procedures and processes comply with regulations. This is passive compliance.
- Stage 2: Self-directed safety compliance system – workers ensure regulatory compliance and take personal responsibility for training and other regulatory provisions. This emphasizes active compliance with the regulations.
- Stage 3: Behavioral safety system – teaching individuals to scan for hazards, to focus on potential injuries and the safe behavior(s) that can prevent them, and to act safely.

The following table shows a five stage culture development model, with traits of various types of radiation protection cultures:

Pathological	Reactive	Calculative	Proactive	Generative
Compliance but little else	Worry about costs	Focus on current problems	Benchmark and adapt	Benchmark and involve all organizational levels
Audit after accidents	xxx	Regular audits of know hazard areas	Audits are positive & provide help	Continuous informal search for non-obvious issues
No safety planning	Safety planning based on past issues	Emphasis on hazard analysis	Planning is standard practice	Planning based on anticipation of problems and review of process
Training is necessary evil	Training as consequence of accident	Testing of knowledge	Ongoing OTJ assessments	Development is a process not an event



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Punishment for failure	Disincentives for poor performance	Lip service for positive safety performance	Some rewards for safe behavior	Strong safety performance is in itself rewarding
Employee fired after accident	Accident reports not forwarded	Management goes ballistic when hear of accident	Management disappointed in accident	Top mgmt seen on the floor after an accident to make sure workers okay
Safety costs money	Can afford preventive maintenance	Safety and profitability juggled not balanced	Money counts but safety is right up there	A safe environment makes money

\* Source : Excerpt from 'Safety and radiation protection culture' - K. Classic<sup>1</sup>, B. Le Guen<sup>2</sup>, K. Kase<sup>3</sup>, R. Vetter<sup>1</sup>,  
<sup>1</sup>Mayo Clinic, <sup>2</sup>EDF France, <sup>3</sup>International Radiation Protection Association  
 Adapted from Parker 2006.

The objective of any culture development programme is to move the organizational and individual behaviours towards the highest stage.

## 4.2 Culture development and improvement

Creation of a positive radiation protection culture encompasses the entire organization, from the top down and needs to be integrated throughout the organization. This is why successful sustained positive radiation protection culture takes a comprehensive effort. These efforts will vary from discovering any problems with your radiation safety program, maintenance of rules and a regulation, testing to make sure education is retained and promoting positive reinforcement. Audits must be designed to fit the particular industry you are in.

There are at least three ways to impact radiation protection culture:

- by educating and training the people involved in RP applications;
- by creating positive and total awareness about RP at working places;
- by establishing adequate and proper communication processes among all the actors involved in RP applications.

As a general rule, it can be assumed that the usual ways to raise and to establish certain levels of culture are continuous educational processes, access to multimedia, and effective communication among workers, directors with workers, and workers with patients and public, but in the area of radiation protection we need to be more specific in implementing all the above activities.

The following listings are steps suggested to create, measure, train and sustain a radiation protection program.

Organizational goals are achieved through leadership where executives talk the talk by:

- making sure safety is important, not just a word.
- actively participating in quality assurance programs organization-wide (use of image wisely, image gently approach) and promoting this participation to community.
- participating in and training on appropriateness criteria.
- recognizing good radiation practices organization wide, and making radiation protection culture a part of everyday life from the top down.
- celebrating positive achievements such as positive inspection, no accidents for a time period, and dose decrease over all employees.
- allowing employees to train during work hours and when applicable, allowing employees to attend workshops and conferences.
- purchasing needed safety equipment,
- having no tolerance of poor behavior, and actively supporting radiation safety officials who are trying to do a good job,



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- not letting politics influence radiation safety decisions.
- going for clear, concise and sound policies fostering universal compliance with all safety items,
- promoting good health using correct equipment and properly trained workers,
- emphasizing organizational and worker certifications, advanced degrees and other appropriate professional stature.
- actively participating in quality assurance programs organization-wide (use of image wisely, image gently approach, WHO global initiative, IAEA, etc.) and promoting this participation to the community.
- participating in and training on referral or appropriateness guidelines/criteria. Promote use of current national or international sources for these guidelines/criteria (ACR,IRQN,NIRS,IAEA, etc.)

Within the medical field there are additional factors to take into account:

- use of non-ionizing radiation imaging where practical for children
- accreditation of all medical equipment – emphasis to patients that their doses are as low as reasonably or practically achievable.
- reduce radiation for follow-up exams, especially CT.
- promote weight-based Nuclear Medicine dosing.
- participate in national or international dose registries.
- medical radiation dose or equipment error reporting to national or international incident databases
- require clinical audits from internal and external sources.

Among the criteria of success, there is also a need for the RP sector to:

- promote and create a positive work environment based on mutual respect, shared understanding and adequate communication among workers, professionals by creating the conditions for enthusiastic and effective participations to meetings open not only to the workers and professionals involved in a RP service, but also to public and other sectors, via for instance, Local Information Commissions that are held in the vicinity of nuclear power plants or in awareness campaigns to medical exposure and lower doses in radiology (Image Gently / Image Wisely in the US).
- create the conditions for the professionals to apply the Guiding Principles for Stakeholder Engagements;
- offering access of all RP results to the public, for instance via various websites, for better involvement of the community in radiation safety,
- develop better capabilities and methodologies to assess the public concern and to listen to it;
- collect and take into account requests and suggestions emerged during such meetings and collecting and elaborating level of satisfaction forms;
- pay particular attention to the application/compliance of Code of Ethics by professionals.
- encourage RP professional, directors and workers to ask for help when confronted with new or unfamiliar RP situations.
- provide a systematic feedback through a decision making review system; (provide the system)
- set a procedure of errors and near misses communication, by reviewing it on a regular base and by encouraging workers to examine the cases without fear of reprisal;
- give specific trainings to improve how, collectively and individually, the professionals improve their communication with the public or different publics, by both listening and providing information;
- have a common/ national language used in oral and written communication;





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Lastly, education and training contribute to a high level of RP culture by:

- continued updating, with a proactive approach (not only the professionals, but also the general staff) about the evolution of scientific knowledge and related judgments of relevance in RP. Information on RP evolution by different means i.e. newsletters;
- raising an adequate awareness among the people directly or indirectly involved in RP.
- making sure that all radiological aspects are well known to workers and everybody have the correct training to take care, prevent, and evaluate RP aspects;
- underlining that radiation protection culture is not an established area of knowledge, but one in continuous change and update, not only in its contents, but also in its approaches.

In their duty to communicate to the public, either through regulatory requirements or through demands by the community, it is in the radiation protection practitioners' interest to factor in the results of major yearly surveys (for instance by national organisations) on the perception of risks, including those of radiation, by the community, and adjust their communication accordingly.

Learning from events and incidents is an important part of culture development. Problems need to be prioritized according to significance: patient, public and personnel safety take priority.

When identifying root causes for all problems, feedback is sought from all parties and results are given to all parties. The pace of (non-penalty) retraining is based on problem severity and lessons learned are used for future training. There should also be an expectation from employees to take ownership of problems and help with the solution through their pride in the organization. Workers have to be included in problem solving sessions and asked for suggestions on how to solve these problems. Workers may also be asked to help train others, which will promote individual expertise.

Incentives for safe behaviors could be inexpensive, individual or group based and include clear rules. Rewards should be granted immediately after good practice is noticed or identified, for instance by setting initial modest dose reduction goals (easy win). This implies tracking radiation exposure and rewarding people who achieve goals.

There are however some concerns about radiation protection culture in any and different locations and situations where RP is applied and in order to have more general and more widely applicable parameters to assess and to evaluate the level of radiation protection culture and its improvements in time. Amongst other things, these areas of concern relate to:

- the level of consciousness that we are dealing or working with a physical agent that could be dangerous for oneself and the others;
- the level of information about the harms of the ionizing radiation;
- the level of knowledge of how the low doses can be harmful to the health;
- the level of knowledge of the objectives of the personnel dosimetry system;
- the presence of an effective communication between the personnel and the RP expert (RSO or equivalent) or between the workers and the directors;
- in the medical sector, the facts and the aspects which should be inspected and considered while evaluating the radiation protection culture status in a given facility (radiotherapy, nuclear medicine, diagnostic x-rays, for instance);

## **5 Assessment of radiation protection culture**

This section focuses on the identification of the best and optimal tools required and needed to assess the level and quality of radiation protection culture achieved in all areas of activities where RP is involved. The criteria identified in Section 4 are the elements to be assessed with proper tools in order to identify issues and problems opposing the improvement in radiation protection culture or just to measure the level obtained by radiation protection culture in a given situation.



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The assessment tools should also be a combination of quantitative and qualitative tools so as to not only measure the identified criteria of success, but also to stimulate judgments and observations about positive or negative trends for such a given criteria of success or even to modify them. As such, they should be structured in such a way as to not only obtain a picture of radiation protection culture at a given time, but also to help in finding trends and improvements or negative drifts in radiation protection culture. By crossing the areas of use of RP with the ways of impacting radiation protection culture as described above, a list of different tools can be identified as the correct and proper tools to measure and assess the degree of success in establishing and developing radiation protection culture.

Assessment of radiation protection culture can be done in several ways. It relates both to internal and external rules for which regulations need clear, concise and available policies. Training is held and updated periodically, while testing is done to evaluate training efficacy.

The licensee's safety tracking means quality assurance through internal radiation safety audits, inspections, audits and mandatory periodic equipment tests held to industry standards and performed by competent individuals. Analysis is made of radiation incidents (i.e. spills, wrong injections, wrong patients, dosimetry) and the results of external audits performed periodically) are accessible to all personnel while deficiencies are addressed quickly and external vs. internal identification is trended at specific intervals. Repetitive problems and the percentage of external issues are identified on a regular basis. Self identification and external identification has to be immediate, accurate and fully detailed, with all information available to affected areas.

Some further possible assessment tools for application at national level are given in Section 8.

An RP application could for instance provide for the following at local level:

- A formalized procedure to assure that the workers know the principles of RP at the moment of the job contract or to have a training organized for it. This can be a measurable indicator: the number of workers following initial training in RP;
- A process to check if there is an established internal procedure for refreshing and for updating courses and training provided to workers and professionals. The number of trainees and their active participation as indicated by suggestions, critical assessment and opinion can be seen as tools to assess the level of radiation protection culture;
- Formally entrust the position of the RP expert (RSO or equivalent) with the responsibility to teach and refresh theoretical and practical knowledge and RP related duties;
- Formalized routine questionnaires or self-assessments to evaluate the workers' radiation protection culture and random checks via questionnaires filled in by the patients about radiation protection culture;
- Integrate face to face interviews with RP workers and professionals into the education and training process, and as a means to evaluate their actual understanding and to collect their suggestions and opinions;
- Formalized method to capture (beside the training and courses cases), analyze and possibly implement suggestions and ideas coming from workers (conventional suggestion box);
- Check first the existence of a blame-free policy to report and track errors and near misses in an open and constructive way. In case such an approach is not already in place, it should be implemented with the support of an external independent auditor.

Lastly, at the level of industrial third parties involved in the supply of RP equipment, the following tools can be applied:

- Measure the level of radiation protection culture among vendors of ionizing radiation facilities for nuclear medicine, radiotherapy, diagnostic imaging or industrial applications. It is essential to ensure that facilities are designed under the conditions of radiation protection culture. This point may imply the involvement of a regulatory body;
- Establish a procedure requiring that vendors of ionizing radiation facilities or service providers in this area (maintenance, transportation of sources and other third-party services) should



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undergo an external independent audit to establish the existence of an appropriate level of radiation protection culture among the staff directly involved;

- Review relevant documents in order to provide information on the level of radiation protection culture.

The assessment tools presented and listed above can be considered for general use and, when applicable, extended to other conditions and situations.

An example of an assessment tool developed by the Spanish Society is given in Appendix 3

## 6 *The role of RP professionals*

RP professionals within an organization must take the central role to drive and embed radiation protection culture throughout the organization. The development of radiation protection culture must take its place alongside other aspects of radiation protection culture relevant to that organisation, but since there is a common basis across all radiation protection culture aspects there should be good intrinsic alignment. Where existing radiation protection culture improvement programmes are taking place, the RP professional should seek to ensure that they adequately embrace the RP aspects identified in this paper.

The RP professional must identify all the stakeholders who need to be engaged within the improvement program. Key players which should be considered (depending on context and workplace) include:

- The workforce (at all levels)
- Senior managers and Directors
- Contractors
- Equipment manufacturers, vendors and suppliers
- Regulators and other authorities
- Medical and health professionals, especially but not exclusively those who are using ionizing radiation,
- Functional leaders and risk managers
- Patients

It is widely recognized that radiation protection culture improvement is heavily dependent on the support and leadership behavior of managers at the highest level within an organization. Ensuring engagement at this level should be high on the RP professional's agenda. Securing inclusion and collaboration across all players will help achieve success. In pursuit of this, the RP professional will need to:

- Display strong personal leadership and motivation
- Develop a narrative on radiation protection in all exposure situations
- Develop relationships with management, the workforce and the regulators
- Consider following the NRC-style approach to develop a policy statement on radiation protection culture

In 2008 IRPA issued Guiding Principles for Radiation Protection Professionals on Stakeholder Involvement which comprises 10 principles (see Annex 2). From these principles number 2-5 and 7-9 are especially relevant for the purpose of stakeholder involvement with regard to promulgating Radiation protection culture. Those who are engaged in the Radiation protection culture process should be aware of this IRPA guidance.

To be successful with the process of developing Radiation protection culture and the involvement of the stakeholders, the following points must be taken into account:

- exhibit accountability,
- recognize the purpose of stakeholder involvement,





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- understand stakeholder issues and concerns from the beginning,
- build trust,
- practice openness and transparency,
- recognize the evolving role of and methods for stakeholder involvement.

In a total radiation protection culture, employees not only feel responsible for their own radiation protection, they feel responsible for their peers' safety, and the organizational culture supports them acting on that responsibility

To lead the development of radiation protection culture the RP professional must develop a program to address the following items:

- strategy,
- implementation plan,
- define tools and resources and process ownership,
- evaluation and adjustment of the plan.

In the medical sector, the influence of RP professionals is indicated by the increasing consideration for image-gently and image-wisely equipment compared to the facilities installed a couple of decades ago. Here again, it shows that as early as the design stage, RP is factored in, for the overall benefit of the patients and radiation protection culture. Thanks to this positive cooperation with vendors, the emissions of state-of-the-art scanners have decreased by a factor of 10 over the last 20 years and currently expose patients to a dose below 1 mSv.

The goal of the strategy is quite clear: to achieve a positive development of radiation protection culture among all involved parties. However, this general goal has to be underlined by more concrete objectives such as coming up with a definition of radiation protection culture in a way that all people can easily understand.

## **7 Involvement with other stakeholders**

As part of radiation protection practitioners' involvement, regulatory evolution on transparency in the industry and the communities' request of lower radiation risk in the medical sector, it has become necessary to enhance public understanding and awareness of radiation risks and protection. In addressing their wider responsibilities, the radiation protection practitioners must be aware that some interaction with wider stakeholders can assist in the development and application of workplace culture. For example, obtaining the confidence and support of stakeholders identified below can help to develop a pride in the workplace and hence assist in embedding an effective radiation protection culture.

In the medical field special attention should be given to patients, who are members of the public but who have a close involvement in the radiation practice. Action to engage, explain and obtain informed consent for patients is crucial to a full radiation protection culture in this sector.

In this case, the wider interested parties are normally all those that are involved in nuclear and radiation affairs, such as:

- authorities of different levels, regulatory bodies, competent authorities for special fields of application of ionizing radiation,
- local or national politicians,
- news media,
- academic/researcher,
- medical and health professionals, especially but not exclusively those which are using ionizing radiation,



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- designers and vendors,
- citizens,
- special and public interest groups, consumer groups, other non-governmental groups,
- informal opinion makers.

### **8 The role of Associate Societies**

The IRPA Associate Societies (AS) have a key role in supporting the RP professional who is in the front line in the promotion of RP culture. RP professionals have traditionally been focussed on technical and procedural issues, and are not necessarily well equipped with the 'soft skills' necessary to act as a Change Agent for leading a culture change programme.

Hence the roles of the AS could include:

- Helping to make RP professionals familiar with the idea of promoting RP culture by organizing lectures or courses, elaboration and distribution of leaflets and other explaining material,
- Fostering the cooperation of the IRPA AS and exchange of experience with their national implementation of RP culture development.
- Promoting joint information and exchange meetings with all players (operators, regulators, decision-makers, etc.) expressing their point of view.
- Giving visibility to the IRPA RP culture initiative (meetings, media, web site,...), and in particular assisting in the adaptation of the generic guidance so that it aligns with national cultural characteristics.
- Having the various RP associations involved at different levels (medicine, industry, environment...) and with specific attention to different field, to contribute to the creation of one central national contact point (web site?) to disseminate information at national level in mutual agreement.
- Taking the opportunity to participate to provide an environment that promotes dialogue, and disseminates information among its members
- Developing guidance on the type of education and training appropriate for non-RP specialists who need to be engaged on RP culture improvement (eg senior managers, non-RP medical staff etc).
- Disseminating information on the latest development, strategies and future direction for proper RP.
- Holding public events and meetings with capabilities to attract the public;
- Conducting surveys:
  - At national level for professionals and directly involved people
  - A program to identify number, types and activities of the different Professional Associations and to collect the specific activities done for RP culture improvement;
  - The creation of a single web or multimedia point of contact in common with all the different Associations with the aim of developing RP culture among professionals;
  - The creation of a questionnaire to check minimum RP culture requirements in order to be member of an Association;
  - Yearly survey on numbers and types of trainings organized at national level on RP culture by the Associations or by professionals;
  - A specific questionnaire on knowledge and comprehension of the RP ethical code, to be distributed by the associations among their subscribers.



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Each AS could prepare an Action Plan for the implementation of its RP culture programme. This plan corresponds basically with the road map for the IRPA Guiding Principles, but it has to be elaborated in more detail by the IRPA AS with respect to each society. The culture is always regional or national and this has to be reflected through the IRPA AS. There are many ways of bringing RP culture to the RP professionals, and they will differ among the societies. Each society will find its own, best suited way, which will also depend of the resources available.

Finally there could be an evaluation of the whole process of the development of RP culture and possibly an adaption or amendment of the implementation plan.

It is important to take into account that the implementation process will take some time. Motivation of society members may be necessary through leadership. Also the propagation of positive initiatives and best practices on RP culture from AS for the benefit of all AS could become important: the IRPA congresses should be an ideal platform for exchanges on this topic in the next years or even decades.

### **Conclusion**

Following a process as developed in these Guiding Principles, all staff and managers can be directed towards an operational focus, and more specifically, ongoing reliability, human performance, and organizational effectiveness. This will lead to the development of a “field culture” in addition to the “science, engineering or medical culture” to anticipate problems and to obtain the commitment of all employees. Radiation protection culture is a learned way of life. It must be an ongoing dialogue among safety professionals, organizational management and the workforce, and between the organization and all relevant stakeholders. Managers play a key role through their presence in the field to coach workers and focus all staff on the operational radiation protection culture.



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## APPENDIX 1: List of Working Group Members

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## APPENDIX 2: The IRPA Guiding Principles for Radiation Protection Professionals on Stakeholder Engagement

Radiological protection professionals should endeavor to:

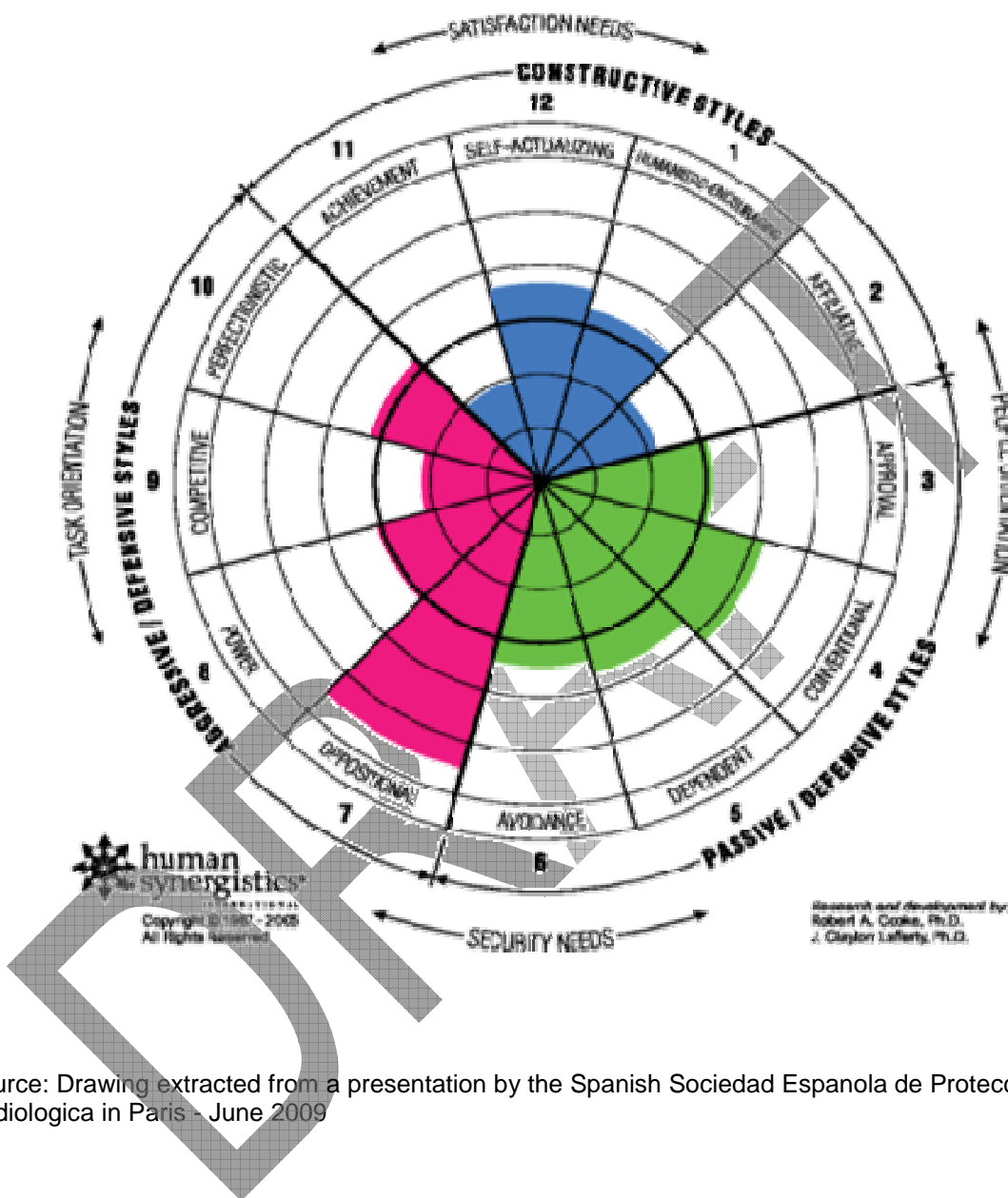
1. Identify opportunities for engagement and ensure the level of engagement is proportionate to the nature of the radiation protection issues and their context.
2. Initiate the process as early as possible, and develop a sustainable implementation plan.
3. Enable an open, inclusive and transparent stakeholder engagement process.
4. Seek out and involve relevant stakeholders and experts.
5. Ensure that the roles and responsibilities of all participants, and the rules for cooperation are clearly defined
6. Collectively develop objectives for the stakeholder engagement process, based on a shared understanding of issues and boundaries.
7. Develop a culture which values a shared language and understanding, and favours collective learning.
8. Respect and value the expression of different perspectives.
9. Ensure a regular feedback mechanism is in place to inform and improve current and future stakeholder engagement processes.
10. Apply the IRPA Code of Ethics in their actions within these processes to the best of their knowledge.





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## APPENDIX 3 Visual display of assessment tool used by Spanish AS Representation of culture and excellent results



Source: Drawing extracted from a presentation by the Spanish Sociedad Espanola de Proteccion Radiologica in Paris - June 2009



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## APPENDIX 4 Nuclear Regulatory Commission's 9 behavioral elements of a general radiation protection culture.

9 behavioral elements of a general radiation protection culture as identified by the US Nuclear Regulatory Commission. The 9 elements are given in the following Table with short notes on their associated behaviors.

<b>Leadership Safety Values and Actions</b>	<b>Problem Identification and Resolution</b>	<b>Personal Accountability</b>
Leaders demonstrate commitment to safety in their decisions and behaviors.	Issues potentially impacting safety are promptly identified, evaluated, and addressed and corrected commensurate with their significance.	All individuals take personal responsibility for radiation protection.
<b>Work Processes</b>	<b>Continuous Learning</b>	<b>Environment for Raising Concerns</b>
Planning and controlling work activities is implemented so safety is maintained or enhanced.	Opportunities to learn safety methodologies are sought out and implemented.	Personnel feel free to raise safety concerns without fear of retaliation, intimidation, harassment or discrimination.
<b>Effective communication on radiation protection</b>	<b>Respectful Work Environment</b>	<b>Questioning Attitude</b>
<p>Communications focus on safety.</p> <p>It is important to establish a common language for the work setting, taking into account the practice and the geographic area in which the practice is located.</p>	Trust and respect permeate the organization.	Individuals continually challenge existing conditions and activities so discrepancies that might result in error or inappropriate action are identified.