



New & Old Developments on Culture and Leadership for Safety and Security

Sharing from a personal perspective

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Senior Safety Specialists



Date
25 March 2025

Agenda

- Short Bio

- IAEA History and Facts

- Safety Culture

- Operators safety work

- IAEA Safety Standards

- Safety Culture improvements

- Fukushima

- New Developments

My work experience



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Started the career in the aviation



Goals

1. Safety
2. Punctuality
3. Service

Industrial Leadership - Automation and Organizational Theory

(Two academic degrees: Engineering & Social-Psychology)



OKG Nuclear Power Plant 2003



IAEA 2009



OECD-NEA 2016



Evolving Energy Consortium 2EC Est. 2018



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We are passionate about **evolving** the energy between people, teams and organisations



From Safety Science to Easy-to-Use-Tools and Internal Capacity Building for Longevity



The International Atomic Energy Agency - IAEA



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History

The United State President Eisenhower said the following in the UN General Assembly in December 1953:

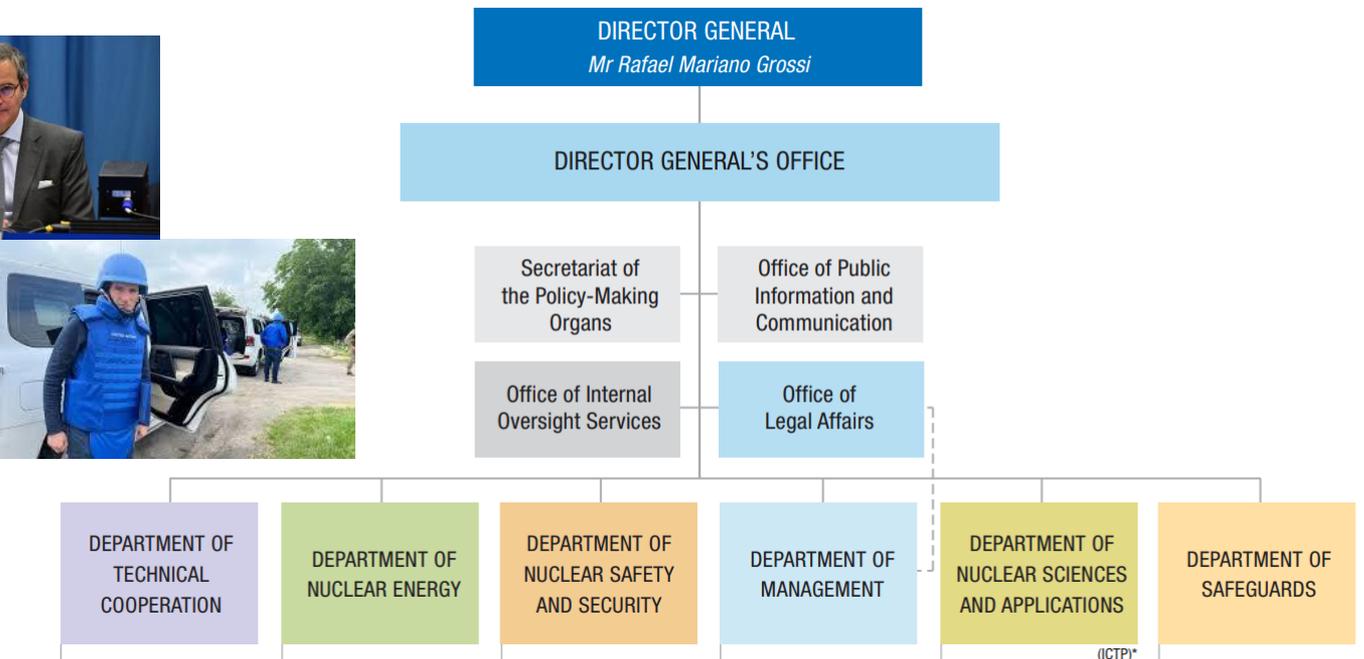
“In fact, we did no more than crystallize a hope that was developing in many minds in many places ... the splitting of the atom may lead to the unifying of the entire divided world.”

“Atoms for Peace “



Some Facts about IAEA

- An autonomous international organisation within the United Nation system
- Established 1957
- 180 Member States
- Not a “super-regulator/police”
- ~2500 employees from more the 100 countries



The concept of Safety Culture was created 1986. Why?

*What is the story behind this
worldwide concept?*



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Chornobyl 26 of April 1986 01:23





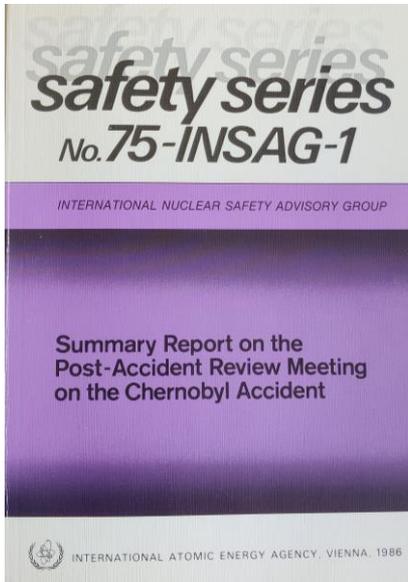


L. KONSTANTINOV
DEPUTY DIRECTOR GENERAL

H. BLIX
DIRECTOR GENERAL IAEA

R. ROMETSCH
CHAIRMAN OF THE MEETING

INSAG -1: The coining of Safety Culture



of operating rules in combination with specific reactor features which compounded and amplified the effects of the errors and led to the reactivity excursion.

A vital conclusion drawn from this behaviour is the importance of placing complete authority and responsibility for the safety of the plant on a senior member of the operations staff of the plant. Of equal importance, formal procedures must be properly reviewed and approved and must be supplemented by the creation and maintenance of a 'nuclear safety culture'. This is a reinforcement process which should be used in conjunction with the necessary disciplinary measures.

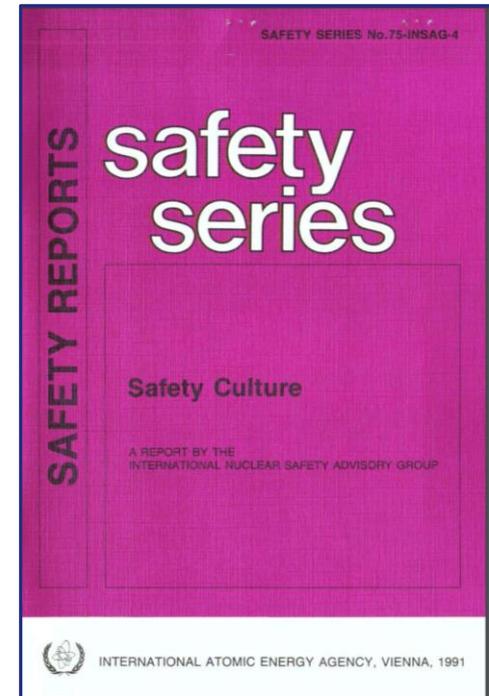
“The main causes of Chernobyl accident were the reactor design with a low tolerance to operator errors and a general lack of safety culture complemented with an inadequate regulatory control..”

INSAG – 4: Defining “Safety Culture”

Definition of Safety Culture 1991

2. DEFINITION AND CHARACTER OF SAFETY CULTURE

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



Valery Legasov

First Deputy Director of the Kurchatov Institute



“ I did not lie in Vienna”... “But I did not tell the whole truth”



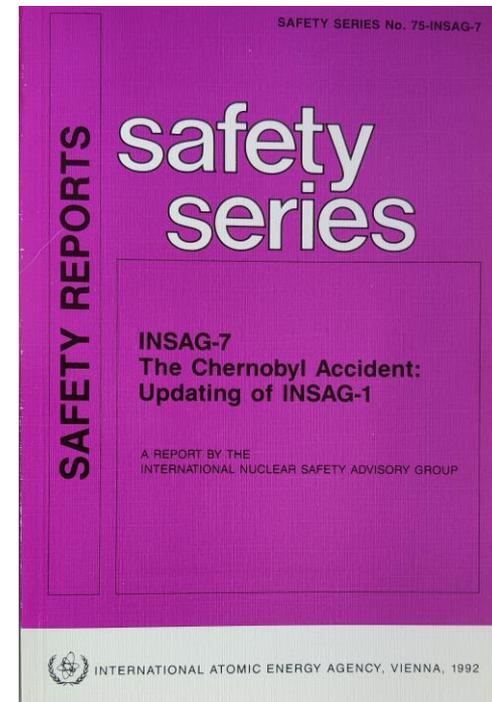
INSAG-7 “The Chernobyl Accident: Updating of INSAG-1”

More information was shared and IAEA’s INSAG experts reviewed and concluded the following in the INSAG report No 7 (1992):

- Revealed earlier RBMK accidents – no sharing and learnings, limited design modifications and improvements in operating practices
- Technical design flaws – positive void coefficient, reactor control elements
- The focus on blame of the operating staff was lessened. Difficulties to detect unsafe reactor conditions due to the control room lay-out
- Etc

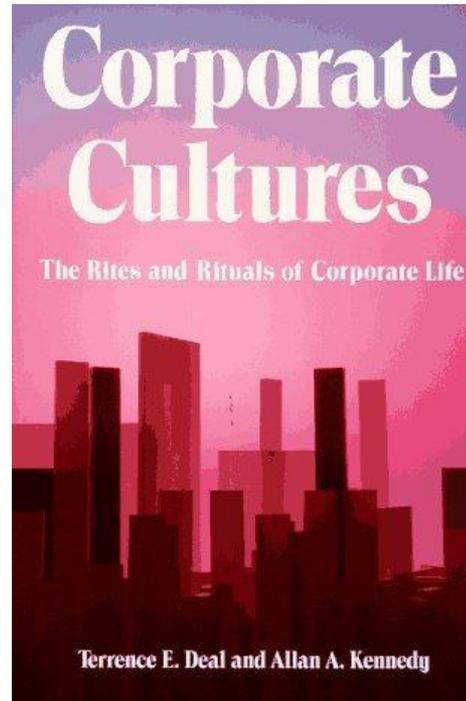
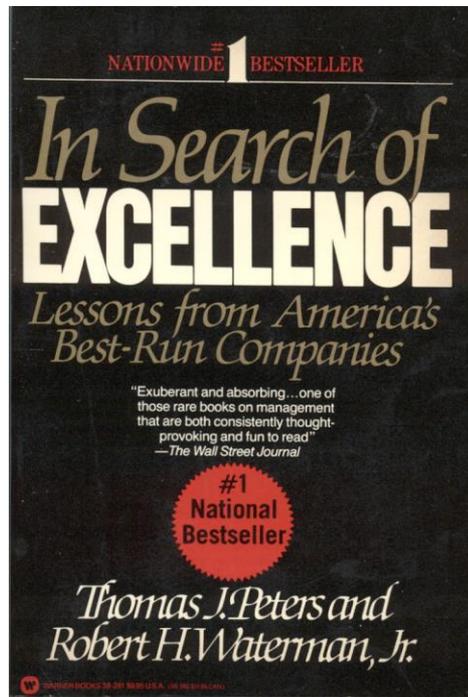
“The accident can be said to have flowed from deficient safety culture, not only at the Chernobyl plant, but throughout the Soviet design, operating and regulatory organizations for nuclear power that existed at the time.”

Source: IAEA INSAG-7 The Chernobyl Accident: Updating of INSAG-1



Personal reflection

Concept of culture peaked in the 1980's



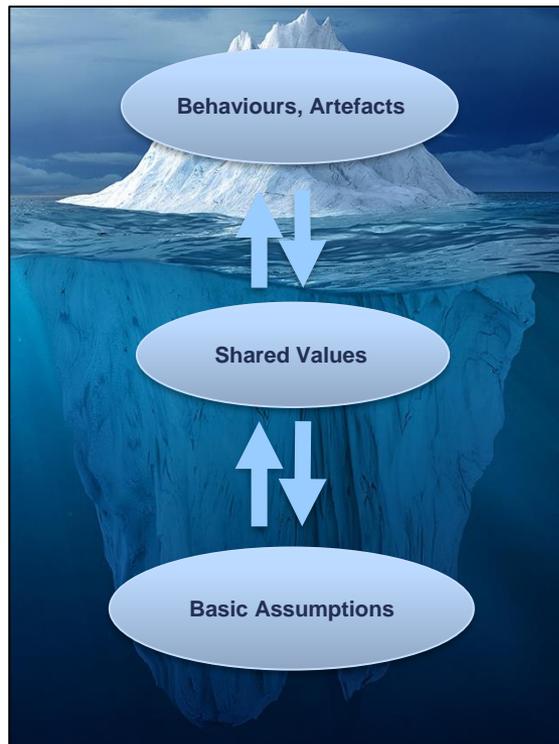
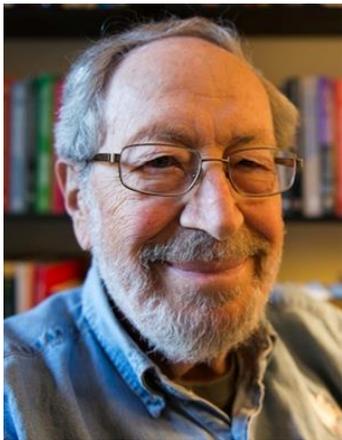
Believed to be the ultimate answer on how organizations can reach excellence

- One unified culture
- Leaders creates the culture
- Controllable
- Etc

Today we know better what culture is and how it influence the organizational behaviours

The Simple of Culture for Safety and Security

Prof. Edgar Schein's Three Levels of Culture



This is a simple model to use in daily work, it helps to organize our thinking about culture.

It is also used when assessing Safety and Security culture.

Behaviours and values can be judged, but the assumptions digs deeper in the "why" and help to understand the drivers for values and behaviours.

The IAEA Definition of Safety Culture

Definition from INSAG-4: *Safety Culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance.*

Revised definition 2007: *“Safety Culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receive the attention warranted by their significance”.*

Nuclear Operators Response



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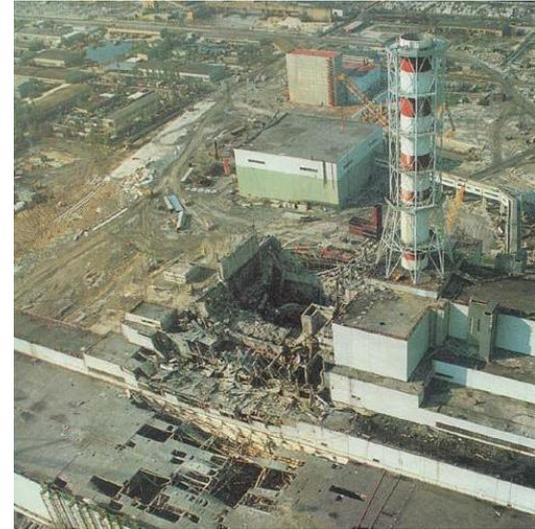
After the accident at Three Mile Island, the Carter administration formed the Kemeny Commission to investigate the incident and to provide recommendations for operational changes at nuclear power plants. INPO was formally established in December **1979**, in response to the commission's recommendations. INPO was tasked with monitoring and evaluating appropriate safety standards — including those for management, quality assurance, and operating procedures and practices at nuclear facilities.



WANO was created on 15 May **1989** following the nuclear accident in (Ukraine, former USSR). For the world's nuclear operators, this accident ended any illusions that they could work solely within the confines of their companies or countries.

Safety is everyone's business

For the world's nuclear operators, it was clear that an event at one plant impacted every plant and that nuclear safety was everyone's business.



WANO

GLOBAL LEADERSHIP IN **NUCLEAR SAFETY**

Is Culture for Safety important for other sectors?



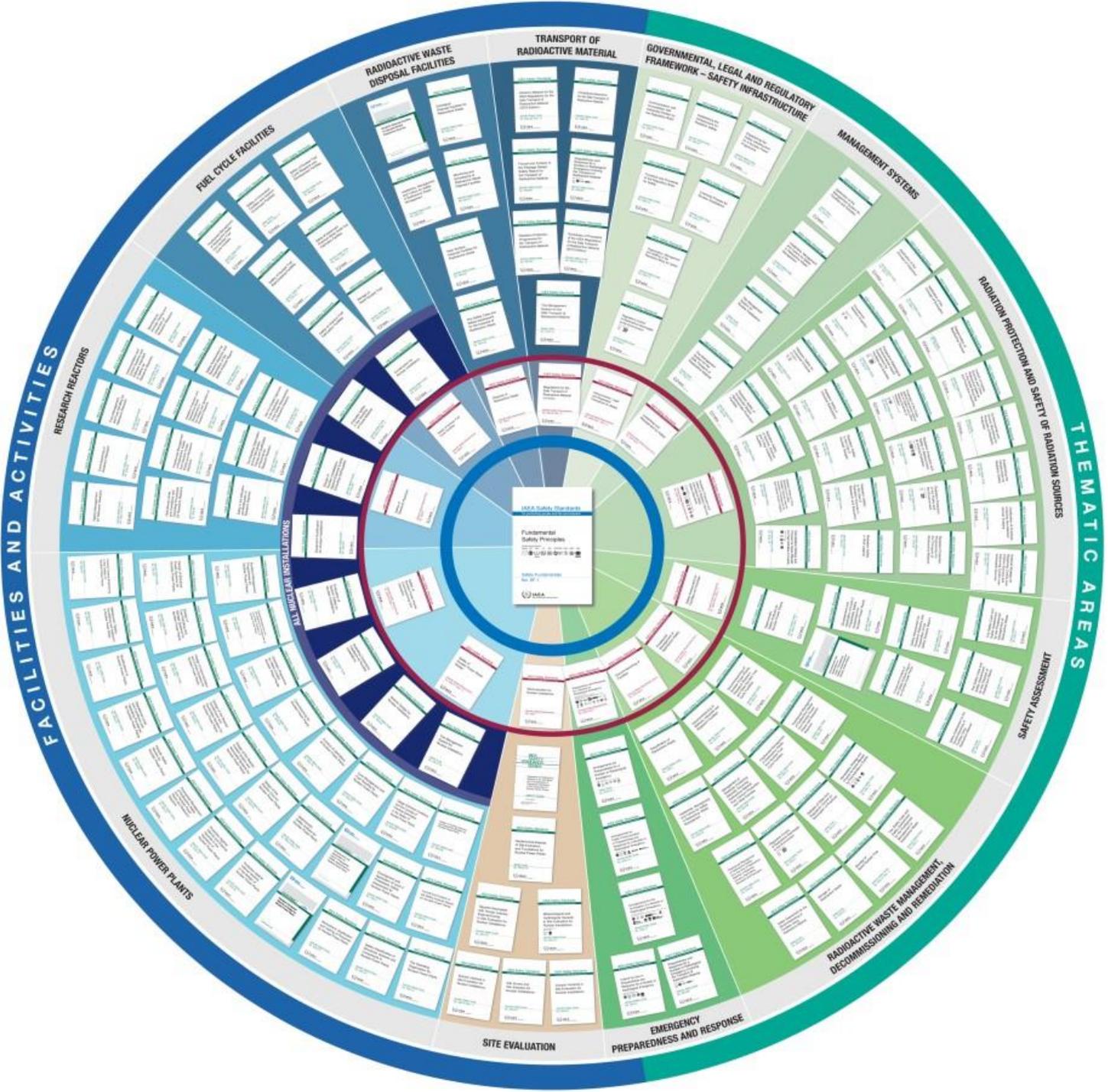


Does your industry/sector have an international standard on leadership and culture for safety?

IAEA International Standards for
Protecting People and Environment



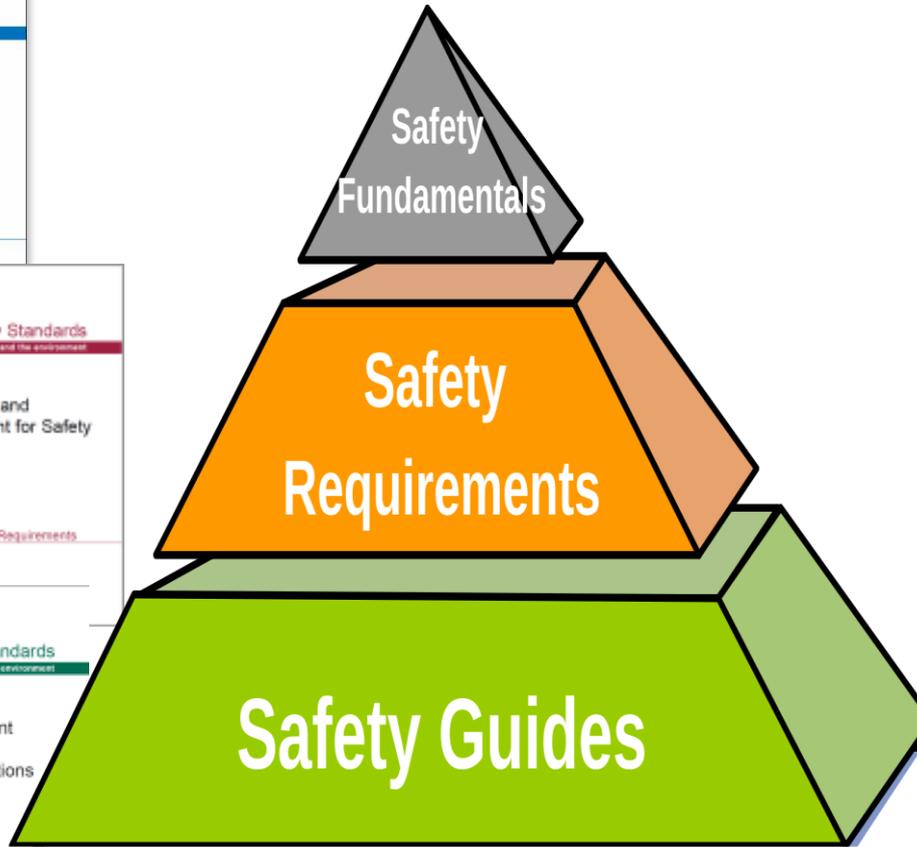
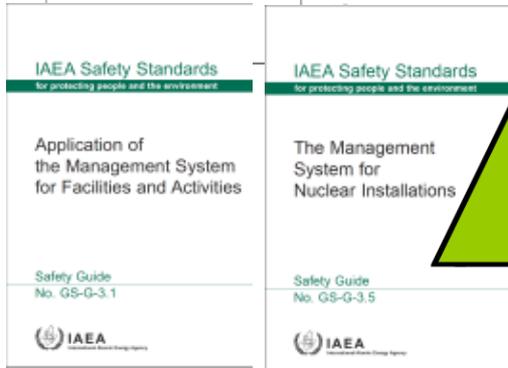
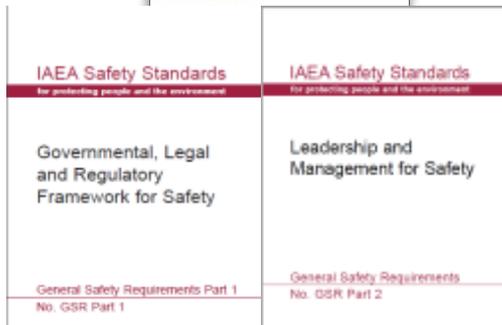
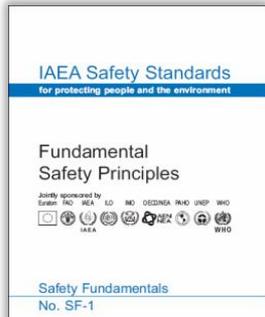
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The IAEA Safety Standards



IAEA Safety Standards



Fundamental safety objective and principles for protecting people and environment

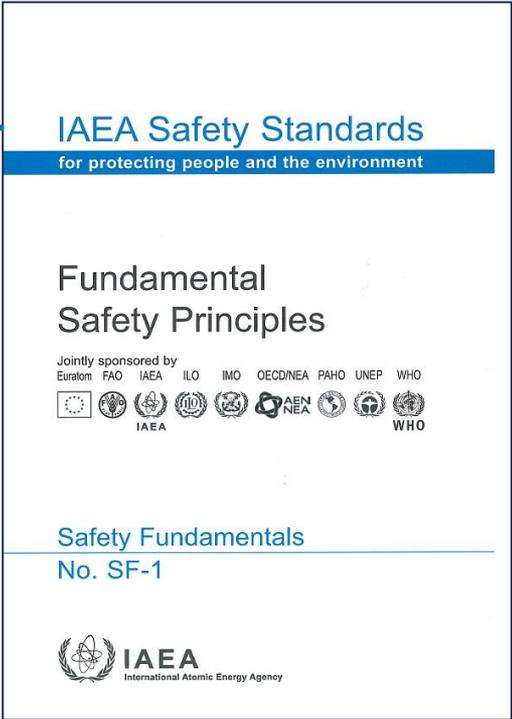
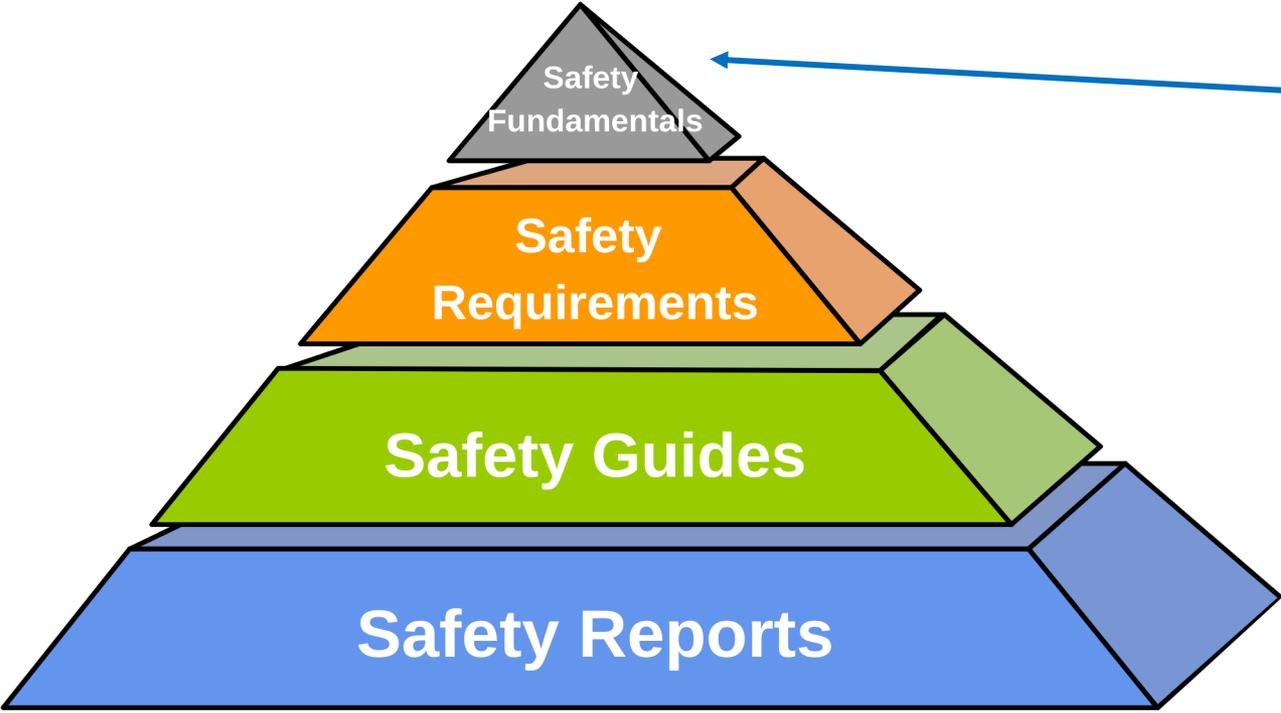
What shall be done

Requirements that must be met to ensure protection of people and environment – 'shall'

How it should be done

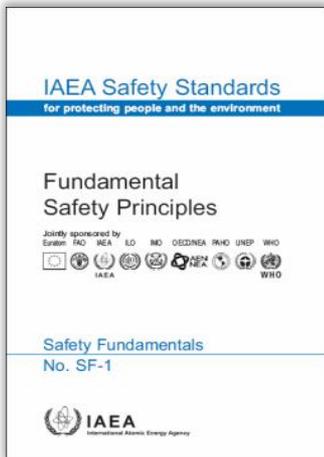
Recommended ways of meeting the requirements – "should"

IAEA Safety Standards Hierarchy



Global reference for a high level of nuclear safety

IAEA Fundamental Safety Principles

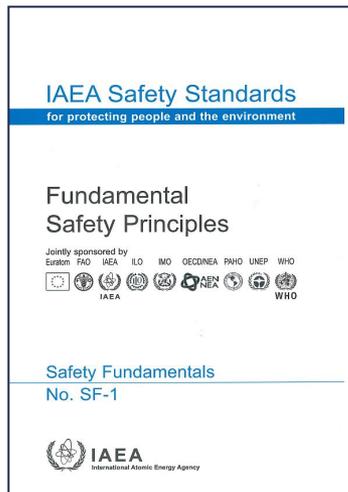


Ten safety principles form the basis on which safety requirements are developed and safety measures are implemented to achieve the primary safety objective

Principle 3: “Effective leadership and management for safety must be established and sustained in organizations concerned with, and facilities and activities that give rise to, radiation risks”

- **Principle 1:** Responsibility for safety
- **Principle 2:** Role of government
- **Principle 3:** Leadership and management for safety
- **Principle 4:** Justification of facilities and activities
- **Principle 5:** Optimization of protection
- **Principle 6:** Limitations of risks to individuals
- **Principle 7:** Protection of present and future generations
- **Principle 8:** Prevention of accidents
- **Principle 9:** Emergency preparedness and response
- **Principle 10:** Protective actions to reduce existing or unregulated radiation risks must be justified and optimized

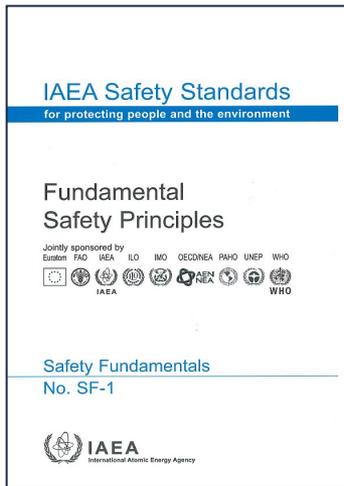
Fundamental Safety Principles SF-1



Introduction

Leadership for safety: by establishing and integrating the organization's vision, goals, strategies, plans and objectives; by **advocating individual commitment** to the protection of people and the environment from harmful effects of ionizing radiation; and by advocating the fundamental safety principles, **establishing behavioral expectations** and **fostering a strong safety culture**.

Fundamental Safety Principles SF-1

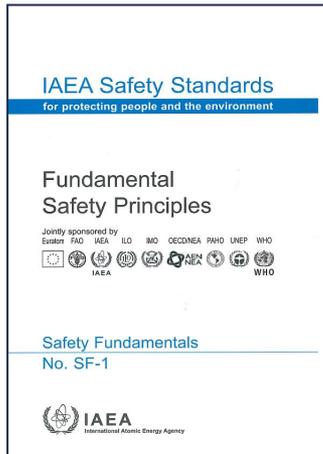


Integrated management systems

Principle 3: Leadership and management for safety

3.12. “...Safety has to be achieved and **maintained by means of an effective management system**. This system has to **integrate all elements** of management so that requirements for safety are established and applied **coherently with other requirements**, including those for human performance, quality and security, **an that safety is not compromised by other requirement or demands**. The management system also has to **ensure the promotion of a strong safety culture...**”

Fundamental Safety Principles SF-1



Integrated management systems

Principle 3: Leadership and management for safety

3.13. “A safety culture that governs the attitudes and behaviour in relation to safety of all organizations and individuals concerned must be integrated in the management system. Safety culture includes:

Individual and collective commitment to safety on the part of the leadership, the management and personnel **at all levels**;

Accountability of organizations and of individuals at all levels **for safety**;

Measures to encourage a **questioning** and **learning attitude** and to **discourage complacency** with regard to safety.

Safety Standards Hierarchy

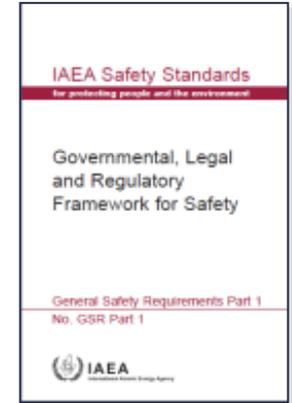


GSR Part 1

Governmental, Legal and Regulatory Framework for Safety

Requirement 1:

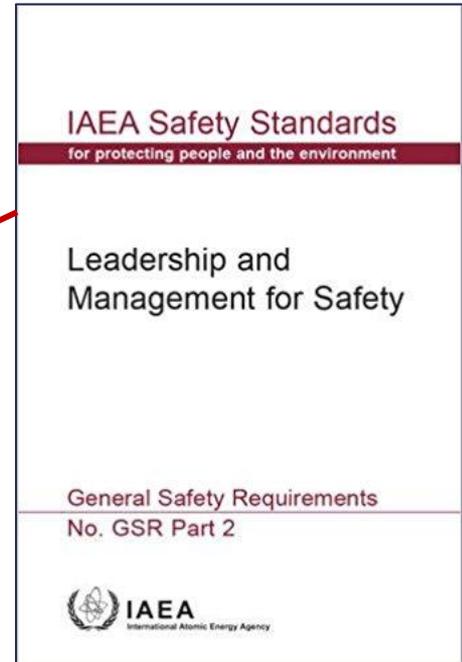
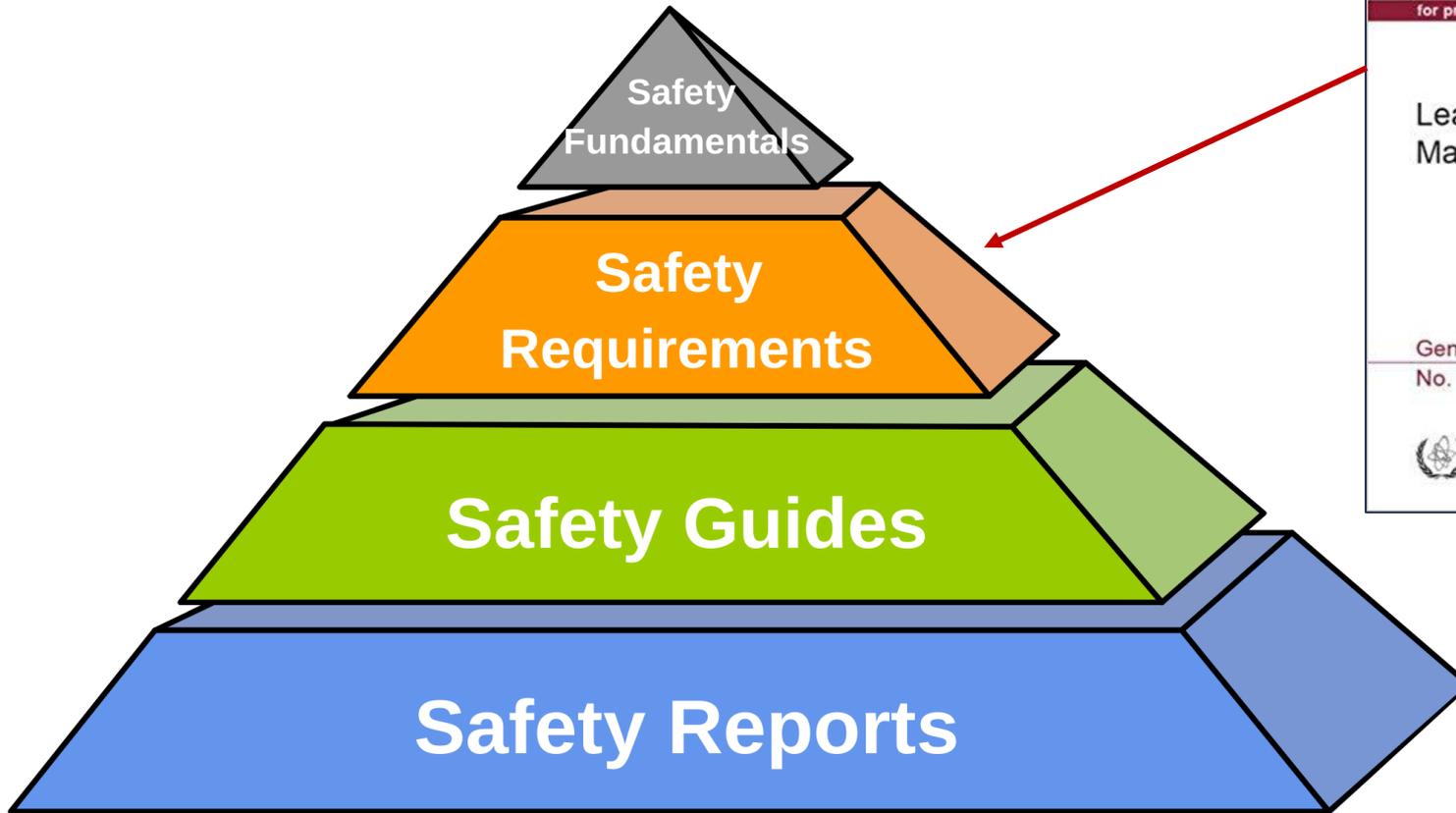
Emphasizing “the importance of the promotion of leadership and management for safety, including safety culture.”



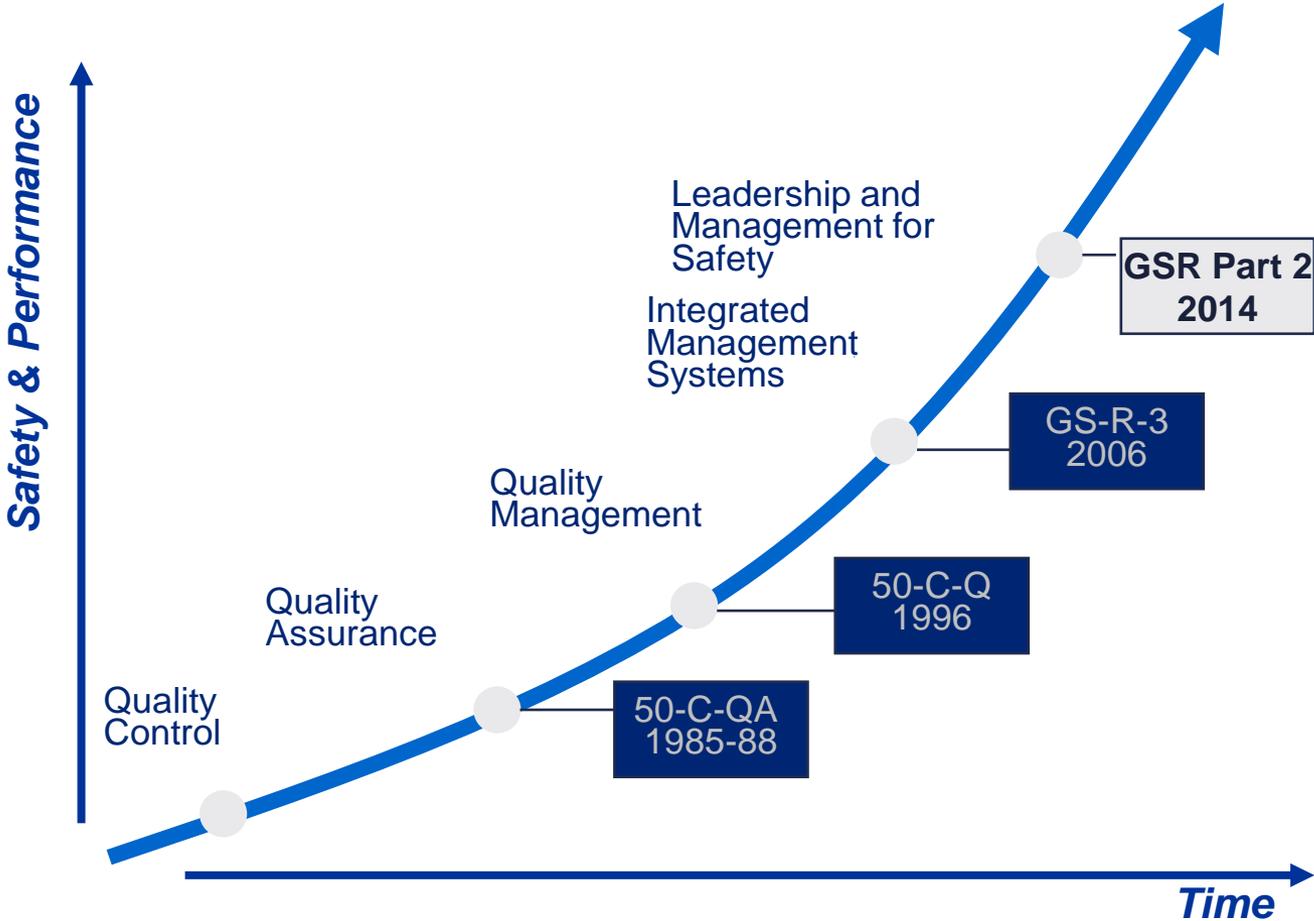
Requirement 19:

“.. to foster and support a safety culture in the regulatory body through the development and reinforcement of leadership, as well as good attitudes and behaviour in relation to safety on the part of individuals and teams.”

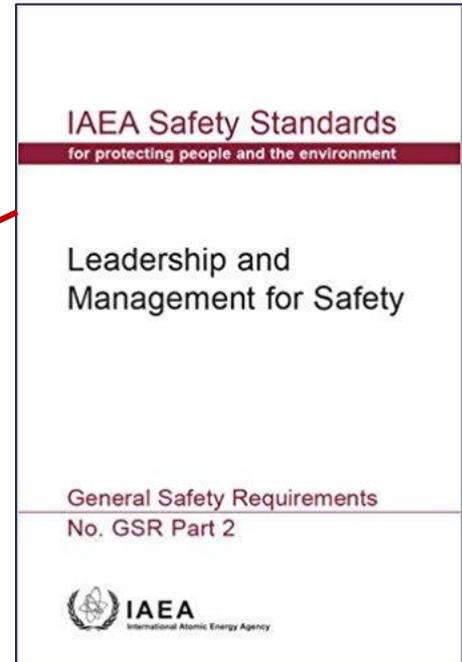
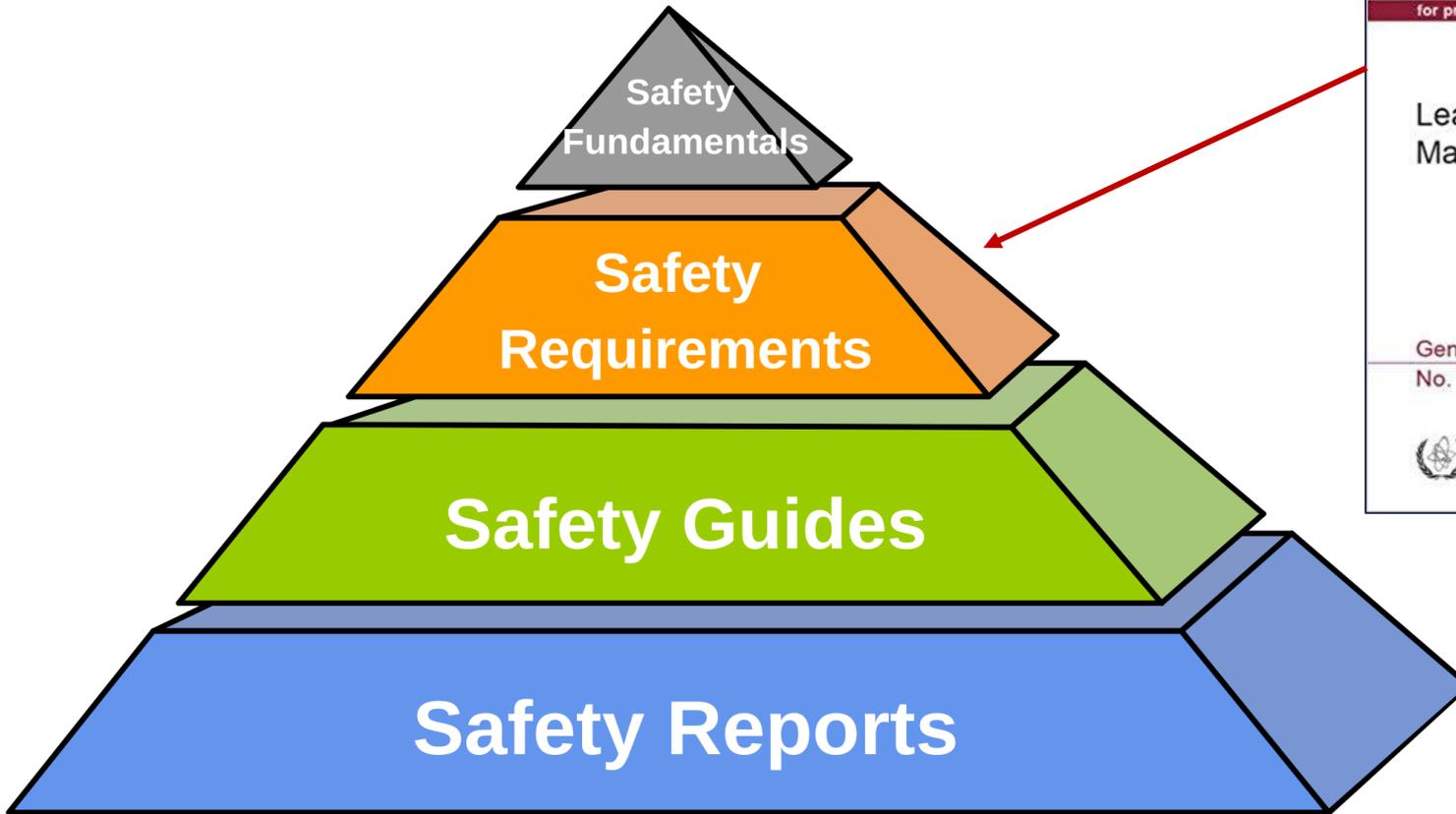
Safety Standards Hierarchy



The Evolution of IAEA's Approach



Safety Standards Hierarchy



GSR Part 2

Difference between Leadership and Management

‘Leadership’ is the use of an individual’s capabilities and competences to give direction to individuals and groups and to **influence** their commitment to achieving the fundamental safety objective and to applying the fundamental safety principles, by means of shared goals, values and behaviour. ‘Management’ is a **formal, authorized** function for ensuring that an organization operates efficiently and that work is completed in accordance with requirements, plans and resources. Managers at all levels need to be leaders for safety

GSR Part 2

Medical use of high and low hazard sources

Industrial use of high and low hazard sources

Radioactive Waste Management Facilities

Users of radioactive sources

Education and research use of radioactive sources

Regulatory bodies

Nuclear Power Plants

Research reactors

Mining, enrichment and fuel facilities

Transport of Radioactive materials

Relevancy

Graded Approach

IAEA Safety Standards

for protecting people and the environment

Leadership and Management for Safety

General Safety Requirements

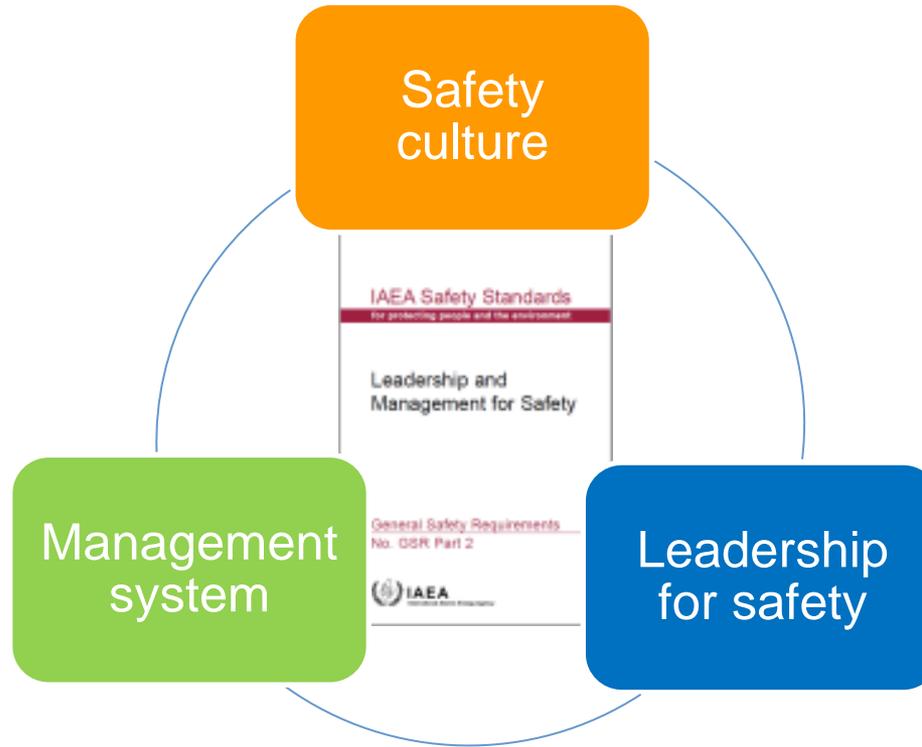
No. GSR Part 2



IAEA

International Atomic Energy Agency

A Balance of 3 elements



GSR Part 2

Requirement 2 : Leadership for safety

Managers shall demonstrate leadership for safety and commitment to safety.



Requirement 9 - Management of Resources

Req 9 Provision of Resources

4.24. Competences to be sustained in-house by the organization shall include: **competences for leadership** at all management levels; competences for **fostering and sustaining a strong safety culture**; and expertise to understand **human, technical and organizational** aspects relating to the facility or the activity, in order to ensure safety.

It is not the intention that this publication should be directly applicable to vendors, contractors and suppliers – but customers will need to have arrangements.

Requirement 12: Safety Culture

Requirement 12 Culture for Safety

Individuals in the organization, from senior managers downwards, shall foster a strong safety culture.

The management system and leadership for safety shall be such as to foster and sustain a strong safety culture.



GSR Part 2

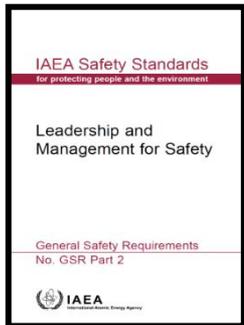
Requirement 12



GSR Part 2, Requirement 12: Individuals in the organization, from senior managers downwards, shall foster a strong safety culture. The management system and leadership for safety shall be such as to foster and sustain a strong safety culture.

5.2. Senior managers and all other managers shall advocate and support the following:

- a) A **common understanding** of safety and of safety culture, including: awareness of radiation risks and hazards relating to work and to the working environment; an understanding of the significance of radiation risks and hazards for safety; and a collective commitment to safety by teams and individuals;
- b) Acceptance by individuals of personal accountability for their attitudes and conduct with regard to safety;
- c) An organizational culture that supports and encourages **trust, collaboration, consultation and communication**;
- d) The reporting of problems relating to technical, human and organizational factors and reporting of any deficiencies in structures, systems and components to avoid degradation of safety, including the timely acknowledgement of, and reporting back of, actions taken;
- e) Measures to encourage a questioning and learning attitude at all levels in the organization and to discourage complacency with regard to safety;
- f) The means by which the organization seeks to enhance safety and to foster and sustain a strong safety culture, **and using a systemic approach** (i.e. an approach relating to the system as a whole in which the interactions between technical, human and organizational factors are duly considered);
- g) Safety oriented decision making in all activities;
- h) The exchange of ideas between, and the combination of, **safety culture and security culture**.



GSR Part 2

Requirements 13 & 14 Measurement, Assessment and Improvement

Measurement , Assessment and Improvement

Requirement 13

Measurement assessment and improvement of the management system

Requirement 14

Measurement, assessment, and improvement of leadership for Safety and Safety Culture



Safety Standards Hierarchy



IAEA Safety Standards <small>for protecting people and the environment</small>	IAEA Safety Standards <small>for protecting people and the environment</small>
Application of the Management System for Facilities and Activities	The Management System for Nuclear Installations
Safety Guide No. GS-G-3.1	Safety Guide No. GS-G-3.5
	

A red arrow points from the 'Safety Guides' level of the pyramid to the table above, specifically highlighting the 'Safety Guide No. GS-G-3.1' entry.

Safety Culture Continuous Improvements



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OSART – Operational Safety Review Team & ISCA – Independent Safety Culture Assessment



Safety Culture Assessment

- According to IAEA Safety Standards (GSR Part 2) periodic safety culture assessments shall be performed
- Importance to have a sound assessment methodology, expertise in behaviour social science and trained team – IAEA ISCA/SCSA methodology
- Recognized international normative framework – IAEA 10 traits of a Healthy Safety Culture

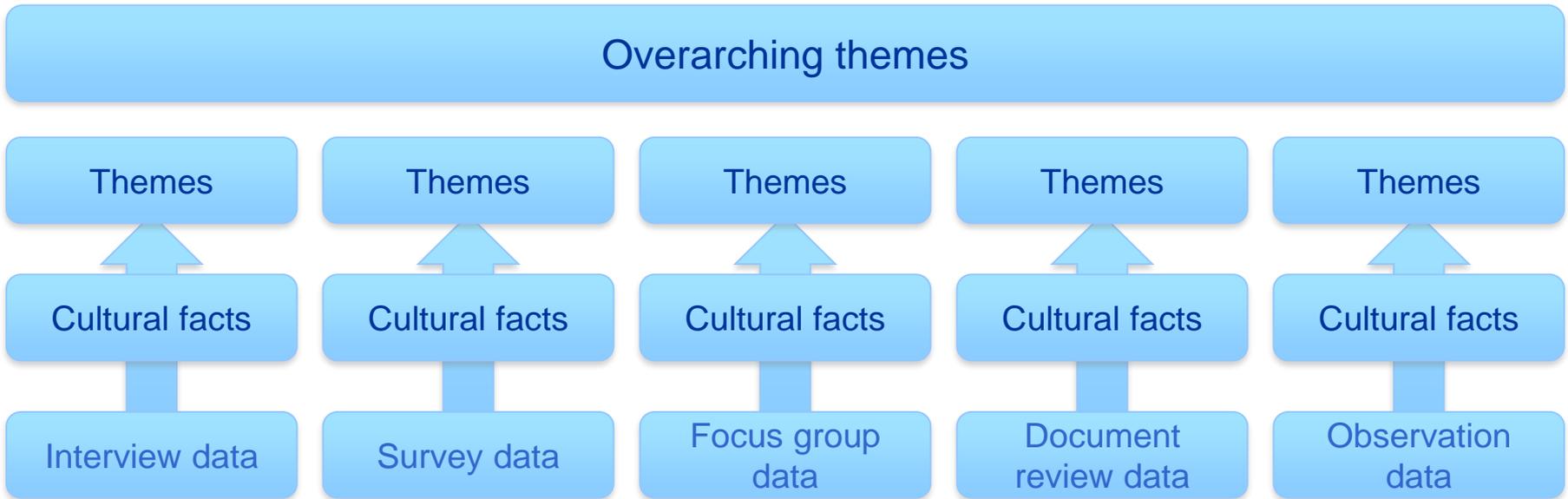
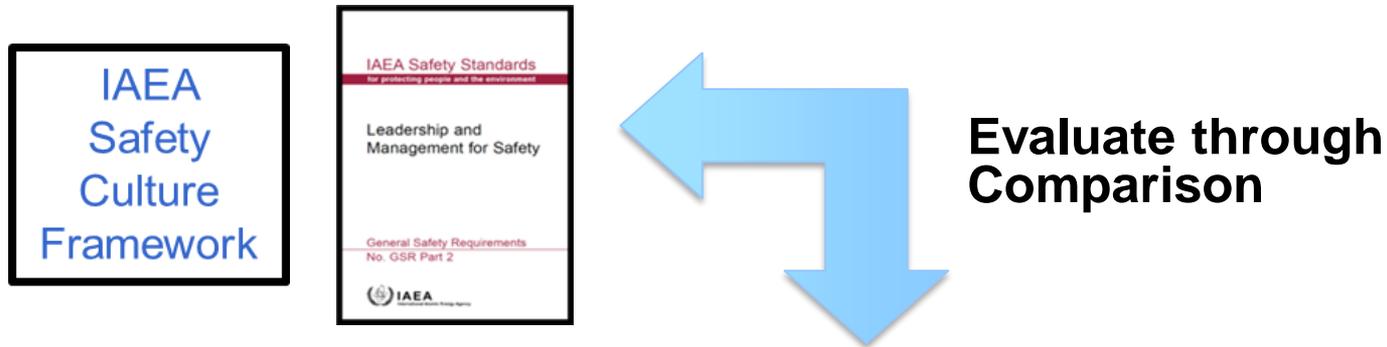


Pillars of the IAEA Safety Culture Assessment Methodology

- Based on social/behaviour science and culture theory
- Several of methods to collect data
- Separation between descriptive (is) and normative (should be) analysis
- International best practice



Process of the Analyses

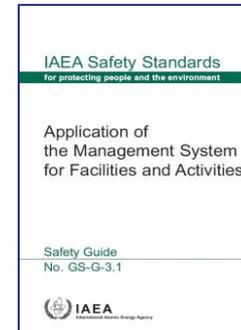


IAEA Safety Standard –

Characteristics and Attributes for Strong Safety Culture

*Safety Culture is that assembly of **characteristics** and **attitudes** in organizations and individuals which establishes that, as an overriding priority, protection and safety issues receives the attention warranted by their significance.*

-2016 IAEA Safety Glossary



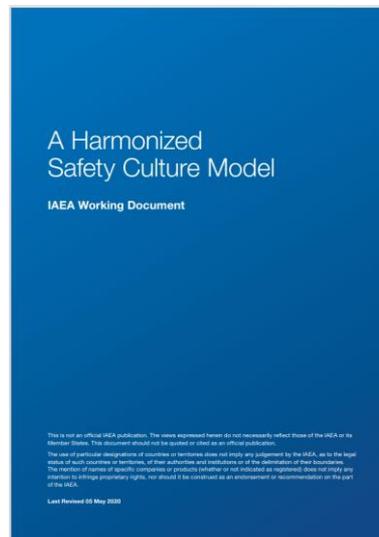
IAEA Safety Culture Characteristics and Attributes (GS-G-3.1, GS-G-3.5)

Safety is a Clearly Recognized Value	Accountability for Safety is Clear	Safety is Learning Driven	Safety is Integrated into All Activities	Leadership for Safety is Clear
<ul style="list-style-type: none"> ❑ High priority to safety: shown in documentation, communications and decision- making ❑ Safety is a primary consideration in the allocation of resources ❑ The strategic business importance of safety is reflected in business plan ❑ Individuals are convinced that safety and production go 'hand in hand' ❑ A proactive and long-term approach to safety issues is shown in decision-making ❑ Safety conscious behavior is socially accepted and supported (both formally and informally) 	<ul style="list-style-type: none"> ❑ Appropriate relationship with the regulatory body exists, which ensures that the accountability for safety remains with the licensee ❑ Roles and responsibilities are clearly defined and understood ❑ There is a high level of compliance with regulations and procedures ❑ Management delegates responsibilities with appropriate authority to enable accountabilities ❑ Ownership for safety is evident at all organizational levels and by all individuals 	<ul style="list-style-type: none"> ❑ A questioning attitude prevails at all organizational levels ❑ An open reporting of deviations and errors is encouraged ❑ Internal and external assessments, including self-assessments are used ❑ Organizational and operating experience (both internal and external to the facility) is used ❑ Learning is enabled through the ability to recognize and diagnose deviations, formulate and implement solutions and monitor the effects of corrective actions ❑ Safety performance indicators are tracked, trended, evaluated and acted upon ❑ There is a systematic development of staff competencies 	<ul style="list-style-type: none"> ❑ Trust permeates the organization ❑ Consideration for all types of safety, including industrial and environmental safety and security, is evident ❑ Quality of documentation and procedures is good ❑ Quality of processes, from planning to implementation and review, is good ❑ Individuals have the necessary knowledge and understanding of the work processes ❑ Factors affecting work motivation and job satisfaction are considered ❑ Good working conditions exist with regards to time pressures, work load and stress ❑ Cross-functional and interdisciplinary cooperation and teamwork are present ❑ Housekeeping and material condition reflect commitment to excellence 	<ul style="list-style-type: none"> ❑ Senior management is clearly committed to safety ❑ Commitment to safety is evident at all management levels ❑ Visible leadership showing involvement of management in safety related activities ❑ Leadership skills are systematically developed ❑ Management assures that there is sufficient and competent staff ❑ Management seeks the active involvement of staff in improving safety ❑ Safety implications are considered in the change management process ❑ Management shows a continuous effort to strive for openness and good communications throughout the organization ❑ Management has the ability to resolve conflicts as necessary ❑ Relationships between management and staff are built on trust

Traits of a Healthy Nuclear Safety Culture

Safety culture traits

IR.	Individual Responsibility	2
QA.	Questioning Attitude	2
CO.	Communication	3
LR.	Leader Responsibility.....	4
DM.	Decision-Making	5
WE.	Work Environment.....	5
CL.	Continuous Learning.....	6
PI.	Problem Identification and Resolution.....	6
RC.	Raising Concerns	7
WP.	Work Planning	7



Example:

WE. Respectful Work Environment

Trust and respect permeate the organization. A high level of trust is cultivated in the organization. Differing opinions are encouraged, discussed, and thoughtfully considered. Employees are informed of steps taken in response to their concerns.

Attributes

- WE.1 Respect is Evident:** All individuals are treated with dignity, respect, and openness and their contributions are recognized.
- WE.2 Opinions are Valued:** Individuals are encouraged to ask questions, voice concerns, and provide suggestions. Differing opinions are solicited and respected.
- WE.3 Trust is Cultivated:** Trust is fostered among individuals and work groups throughout the organization. Openness and honesty are fostered between individuals, between work groups, and throughout the entire organization.
- WE.4 Conflicts are Resolved:** Fair and transparent methods are used to resolve conflicts.

<https://www.iaea.org/newscenter/news/iaea-issues-harmonized-model-for-enhanced-safety-culture-in-nuclear-organizations>

IAEA's Draft of Ten Traits of Culture for Safety

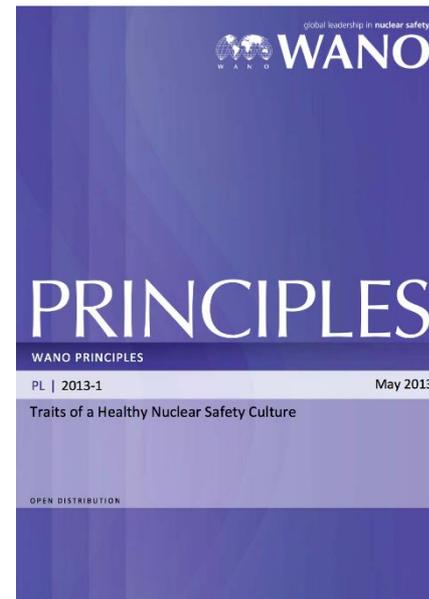
<p>Individual Responsibility</p> <ul style="list-style-type: none"> ▪ Adherence ▪ Ownership ▪ Collaboration 	<p>Questioning Attitude</p> <ul style="list-style-type: none"> ▪ Recognize Unique Risks ▪ Avoid Complacency ▪ Question Uncertainty ▪ Recognize and Question Assumptions 	<p>Communication</p> <ul style="list-style-type: none"> ▪ Free flow of information ▪ Transparency ▪ Reasons for Decisions ▪ Expectations ▪ Workplace Communication 	<p>Leader Responsibility</p> <ul style="list-style-type: none"> ▪ Strategic Alignment ▪ Leader Behavior ▪ Employee Engagement ▪ Resources ▪ Field Presence ▪ Rewards and Sanctions ▪ Change Management ▪ Authorities Roles and Responsibilities 	<p>Decision Making</p> <ul style="list-style-type: none"> ▪ Systemic Approach ▪ Conservative Approach ▪ Clear Responsibility ▪ Resilience
<p>Work Environment</p> <ul style="list-style-type: none"> ▪ Respect is Evident ▪ Opinions are Valued ▪ Trust is Cultivated ▪ Conflicts are Resolved ▪ Facilities Reflect Respect 	<p>Continuous Learning</p> <ul style="list-style-type: none"> ▪ Constant Evaluation ▪ Learning from Experience ▪ Training ▪ Leadership Development ▪ Benchmarking 	<p>Problem Identification and Resolution</p> <ul style="list-style-type: none"> ▪ Identification ▪ Evaluation ▪ Resolution ▪ Trending 	<p>Raising Concerns</p> <ul style="list-style-type: none"> ▪ Supportive Policies are Implemented ▪ Confidentiality is Possible 	<p>Work Planning</p> <ul style="list-style-type: none"> ▪ Work Management ▪ Safety Margins ▪ Documentation and Procedures

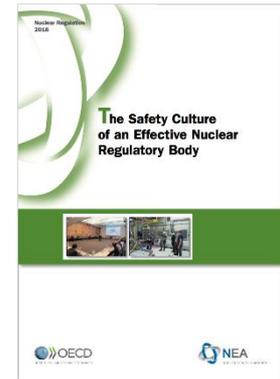
WANO Principles

Traits of a Healthy Safety Culture

Principles, traits and attributes 1: Individual Commitment to Safety

1. Individual Commitment to Safety
 - Personal Accountability
 - Questioning Attitude
 - Safety Communication
2. Management Commitment to Safety
 - Leadership Accountability
 - Decision-Making
 - Respectful Work Environment
3. Management Systems
 - Continuous Learning
 - Problem Identification and Resolution
 - Environment for Raising Concerns
 - Work Processes





Principle 1: Leadership for safety is to be demonstrated at all levels in the regulatory body

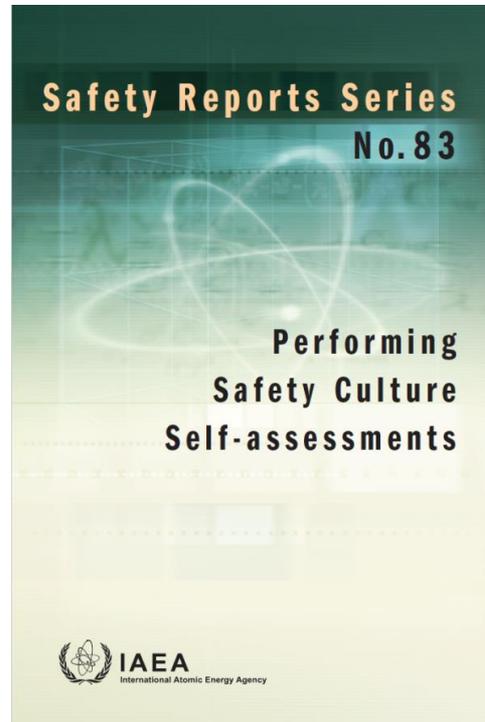
Principle 2: All staff of the regulatory body have individual responsibility and accountability for exhibiting behaviours that set the standard for safety

Principle 3: The culture of the regulatory body promotes safety, and facilitates co-operation and open communication

Principle 4: Implementing a holistic approach to safety is ensured by working in a systematic manner

Principle 5: Continuous improvement, learning and self-assessment are encouraged at all levels in the organisation

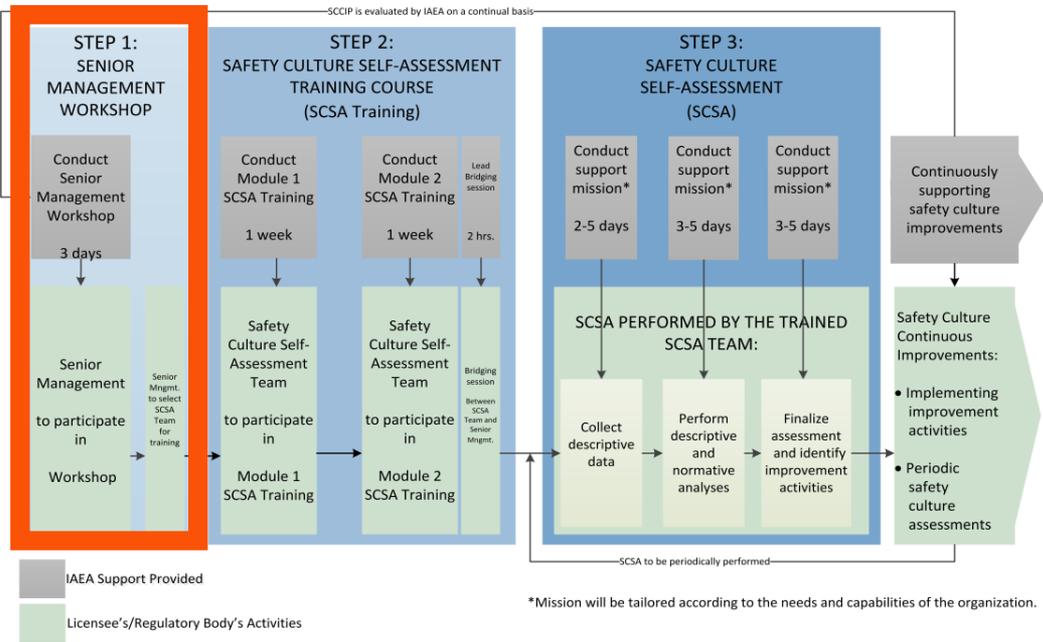
Learning how to self-assess is an excellent way to continuously improve safety culture..



https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1682_web.pdf

Step 1 – The Senior Management Workshop

Senior Management Safety Culture Workshop – 1 - 3 DAYS



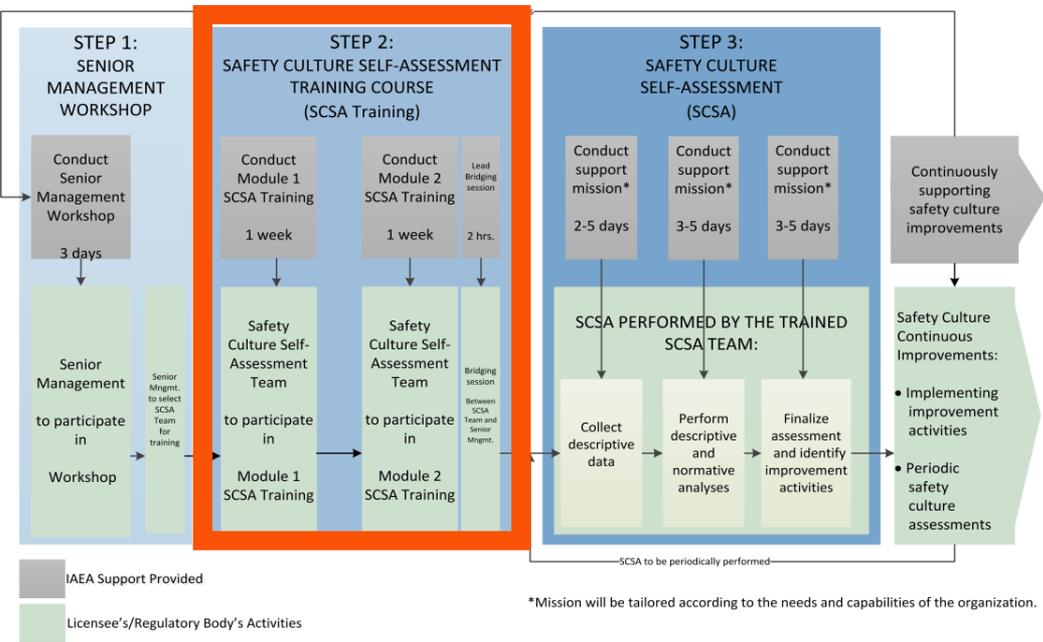
- Introduction to the IAEA view on safety culture.
- Role of safety culture assessments for improving safety culture.
- Roles and responsibilities of senior management in cultural improvement activities.
- Required team competencies, skills and training to perform safety culture self-assessments.

Step 2 – Safety Culture Self-Assessment Training

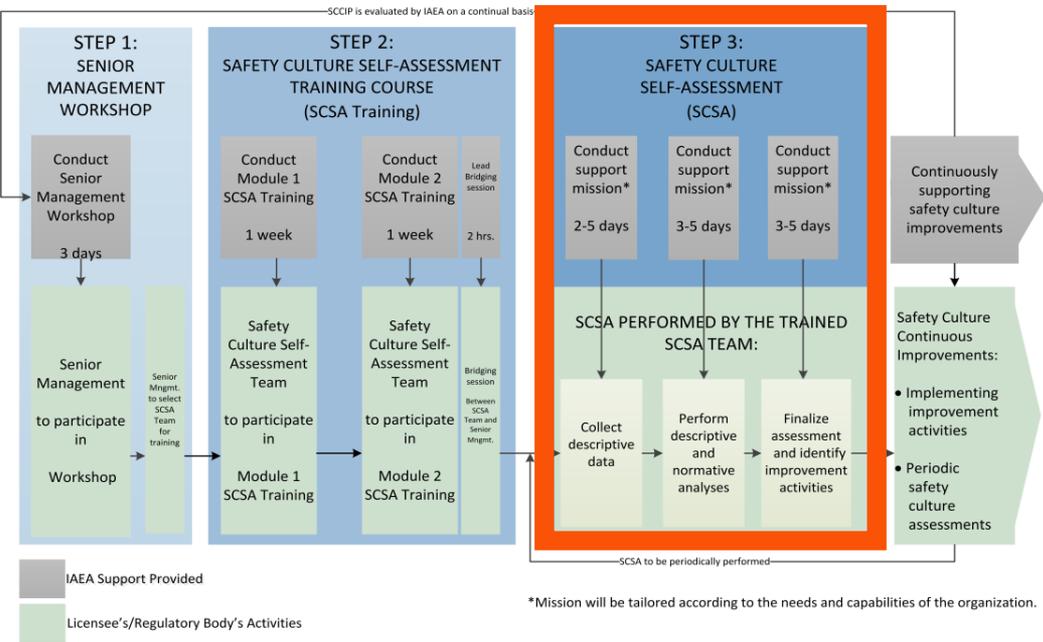
Safety Culture Self Assessment Training

1 – 2 WEEKS

- Train a cross-functional, cross-hierarchical team to:
 - Perform high-quality Safety Culture Self-Assessments applying the established IAEA Safety Culture Assessment Methodology.
 - Develop and implement effective safety culture improvement activities.
- CONCLUSION: Bridging session to ensure alignment between team and senior management.
- OUTCOMES: A self-assessment team that is equipped with practical tools and knowledge to perform high-quality safety culture assessments.



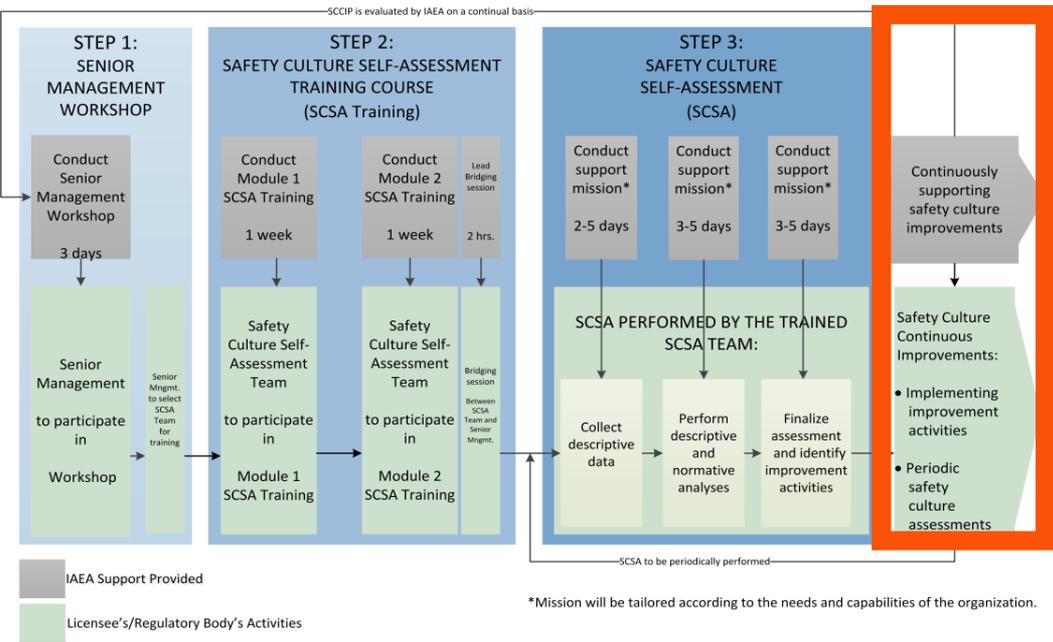
Step 3 - Performing Safety Culture Self-Assessments (SCSAs)



SCSAs Performed by Trained Assessors

- Tailored IAEA missions to conduct safety culture self-assessments depending on the need of individual organisations.
- **OUTCOMES:** Final Self-Assessment Report and Safety Culture Improvement Program.

The Never Ending Learning Journey



Safety Culture Continuous Improvement

- Creation / amendment of safety culture continuous improvement programme.
- Implementation of improvement activities.
- Periodic safety culture assessments performed by Safety Culture Ambassadors.

*Mission will be tailored according to the needs and capabilities of the organization.

Shared Space



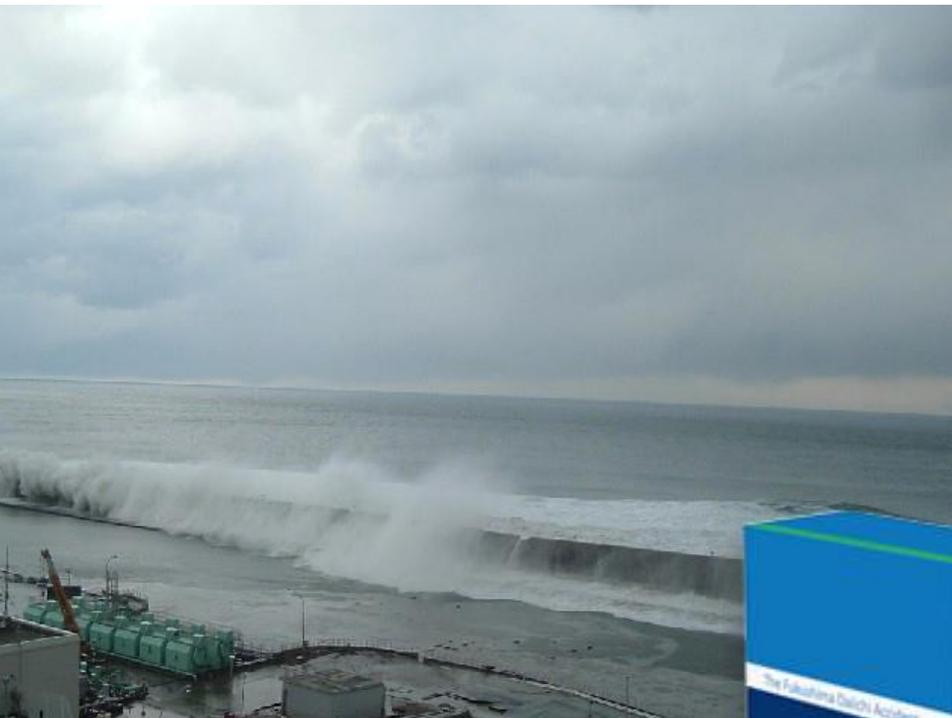
Shared Space Characterized by

- Working relationships that support trust
- Decrease of power dynamics
- Mutual respect
- Openness – free flow in sharing of thoughts and ideas
- Enables individuals to express views related to their inner thoughts and feelings about a particular issue without fear of recrimination or exclusion
- Shared space goes deeper than sharing facts
- Dialogue instead of discussion/argumentation
- Curiosity about others perspective

Fukushima



EVOLVING ENERGY CONSORTIUM



<http://photo.tepco.co.jp/en/date/2011/201105-e>

Damage to Fukushima Daiichi NPS (1)



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Source: TEPCO Akira Kawano presentation IAEA Safety Culture Conference 2016



REUTERS

The IAEA Fukushima Daiichi Accident Report

- One report by the IAEA Director General
- Five technical volumes
- The result of extensive international collaborative effort
- Five Working Groups
- 180 experts
- 42 Member States



“This report presents an assessment of the causes and consequences of the accident at the Fukushima Daiichi nuclear power plant in Japan, which began on 11 March 2011. Caused by a huge tsunami that followed a massive earthquake, it was the worst accident at a nuclear power plant since the Chernobyl disaster in 1986.”

- Yukiya Amano, IAEA Director General

www.pub.iaea.org/books/IAEABooks/10962/The-Fukushima-Daiichi-Accident

Human and Organizational Factors Team

The Human and Organizational Factors (HOF) Team consisted of 11 experts:

- Kathleen Heppell-Masys, Team Lead, CNSC, Canada
- Monica Haage, Technical Lead, IAEA
- Amanda Donges, INPO, U.S.
- Hanna Kuivalainen, STUK, Finland
- Sonja Haber, IAEA
- Cornelia Ryser, ENSI, Switzerland
- Birgitte Skarbø, IAEA
- Per Chaikiat, SSM, Sweden
- Luigi Macchi, Dedale, France /VTT, Finland
- Kunito Susumu, TEPCO, Japan
- Takafumi Ihara, TEPCO, Japan

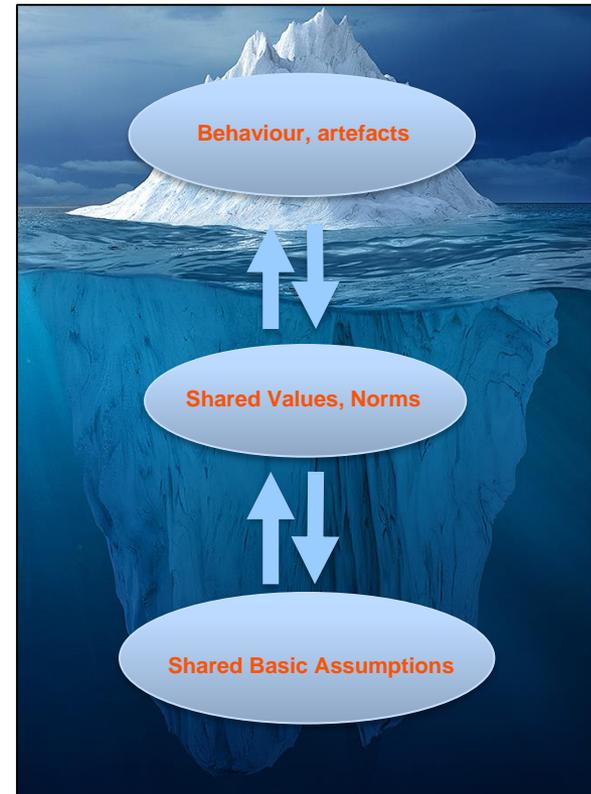


Broad experience, vast knowledge and various competencies

First Observation – Shared Basic Assumptions

Over time, the stakeholders of the Japanese nuclear industry developed a shared basic assumption that plants were safe

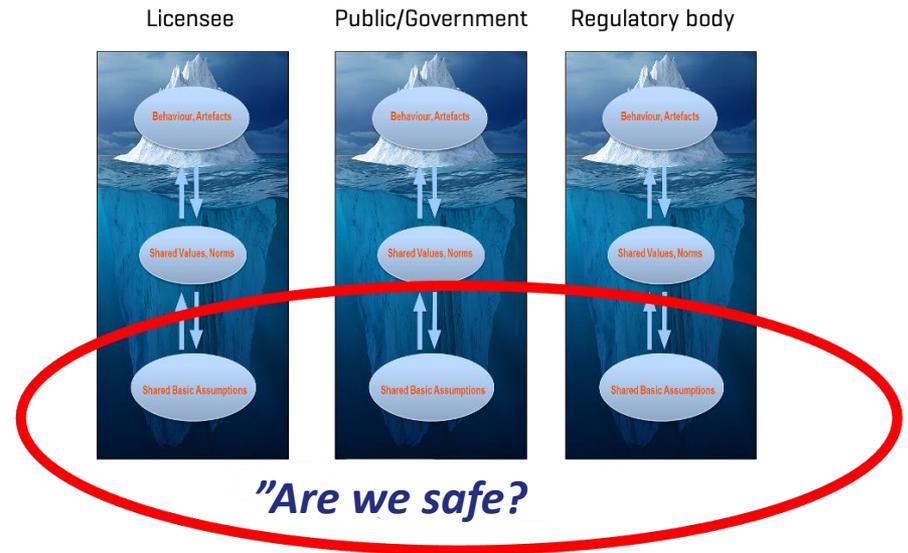
- Led stakeholders to believe that a nuclear accident would not happen
- Constrained their ability to anticipate, prevent and mitigate the consequences of the earthquake triggering the Fukushima Daiichi accident



Lessons Learned 1

Lessons Learned:

1. Individuals and organizations need to consciously and continuously **question their own basic assumptions** and their implications on actions that impact nuclear safety.



Lessons Learned 4 and 5

Lessons Learned:

4. A **systemic approach to safety** needs to be taken in event and accident analysis, considering all stakeholders and their interactions over time.

5. To proactively **deal with the complexity** of nuclear operations, the **results of research** on complex sociotechnical systems for safety need to be taken into account by all stakeholders involved.

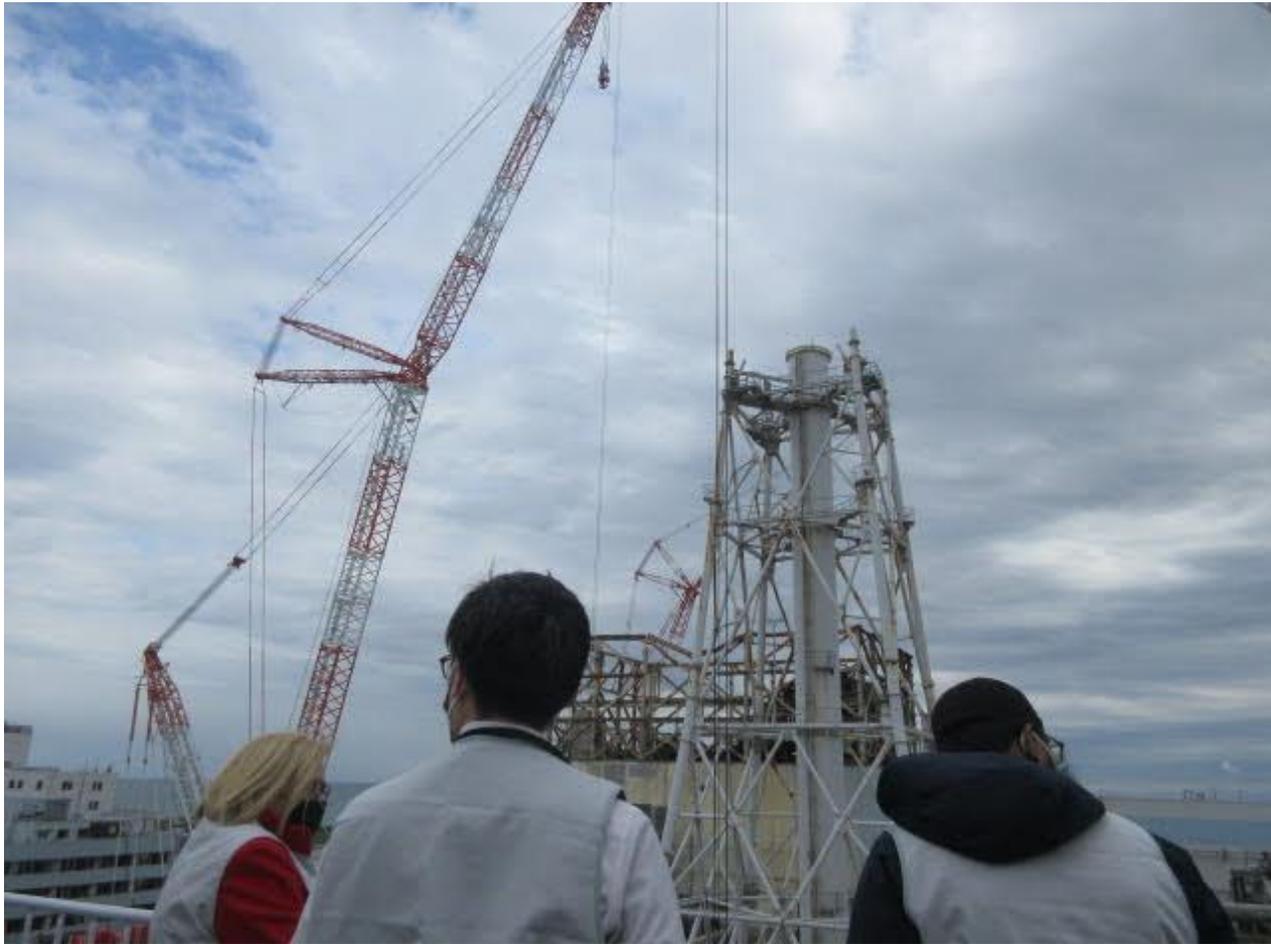


Lessons Learned 6 and 7

6. The **regulatory body** needs to acknowledge its role within the national nuclear system and the potential for its impact on the nuclear industry's safety culture.

7. Licensees, regulators and governments need to conduct a **transparent and informed dialogue** with the public on an ongoing basis.

At Fukushima Daiichi Unit 1-4



TEPCO Self-Reflection of the underlying causes

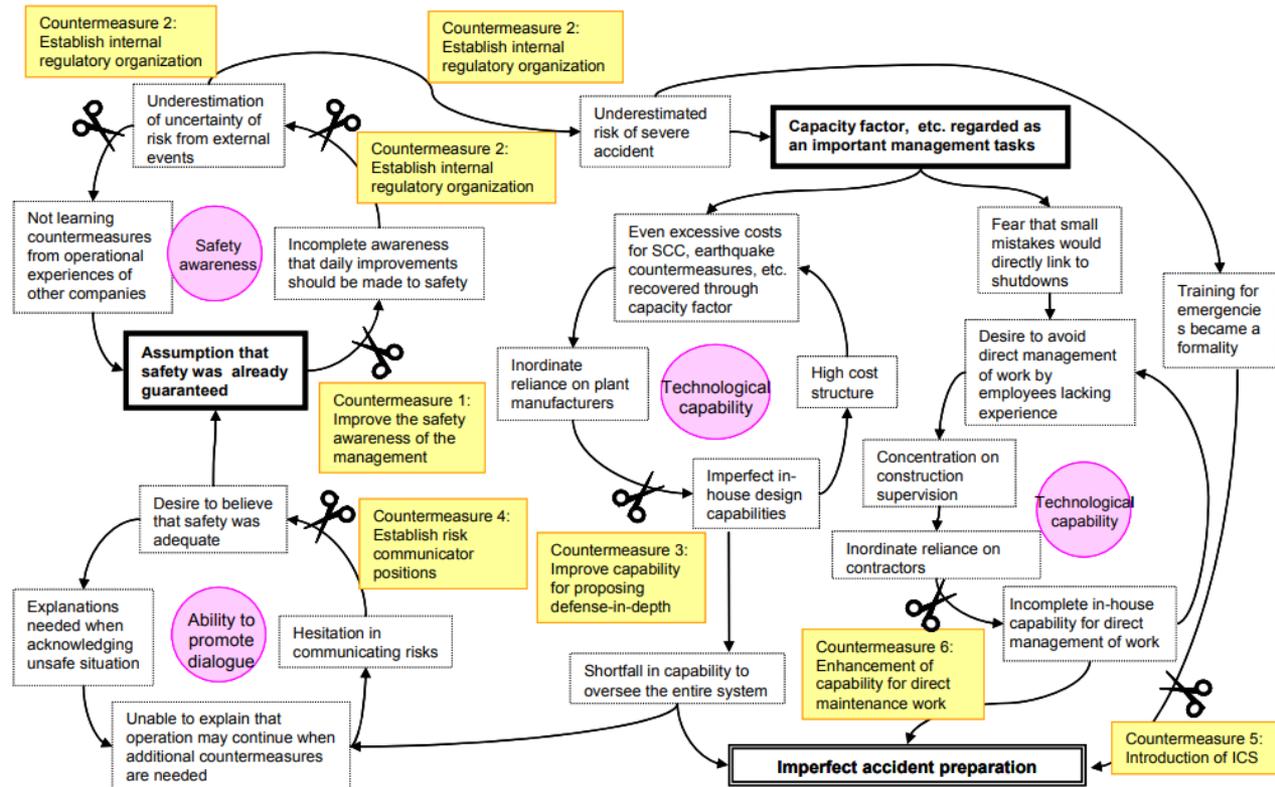


Figure 4-1: Severing the Negative Spiral

To be realistic the world is not as linear as assumed



New Developments at IAEA



EVOLVING ENERGY CONSORTIUM

Ongoing 2025 & Future Activities



Further Evolvement of the Concept of Safety Culture - Culture for Safety

Safety Culture/Culture for Safety is a subset of the Organizational Culture



- The organizational culture is influencing the safety & security performance
- The organizational culture can support or detract from safety & security

Answers to the below questions provides an insight:

- How is safety and security valued and prioritized?
- How are people reporting incidents and near misses?
- How updated is the management system?
- How people feel about sharing critical views related to safety and security?
- How are people given feedback when not following procedures?
- How much resources are used for ensuring safety and security?
- How focused managers are on safety and security in their daily work?

The balance between Culture for Safety and Security



Examples of Unique Features of Safety

- Safety addresses unintentional human actions
- Relies on openness and transparency in information
- Requires emergency access to different areas
- Safety professionals are most often engineers

Examples of Unique Features of Security

- Security concern intentional [malicious] human actions
- Requires a level of confidentiality of information
- Requires restriction of the access to security areas
- Security professionals usually have a military or police background

What is different?



- Better understanding of complexity
- Systemic challenges
- The need for collective intelligence
- Building resilience – can't depend on top-down
- Distribution of power
- Generation change

IAEA International Leadership School



Strengthening Resilience in the Nuclear Organization

Definition: “A system that can adjust its design and functioning prior to, during, or following events (changes, disturbances, and opportunities), and sustain required operations under both expected and unexpected conditions.”

Core capabilities

1. Systemic thinking,
2. Deep and integrated facility knowledge,
3. Adaptation to context,
4. Relationship orientation,
5. Sustained vigilance,
6. Timely and effective decision-making



Strengthening Resilience in the Nuclear Organization

3 Key contributions

1. Extending the Defence in Depth concept
2. The concepts of Resilience tailored for nuclear
3. Practical guidance for nuclear application

Dynamic Leadership: Navigating a Changing Nuclear Landscape and Extending Resilient Capacity

- **Supply Chains:** The pandemic showed the vulnerability of global supply chains, affecting the availability of critical components and materials. Additionally, physical constraints in global shipping are easily shut down for many reasons.
- **Demographic Trends:** The workers who pioneered the broad use of nuclear power are aging out of the workforce, requiring the incorporation of younger generations.
- **Public Opinion:** Public opinion toward nuclear power has fluctuated over the decades and within countries.
- **Financial Conditions:** Inflation, the availability of capital, the stock market, and government fiscal policies have created financing challenges.
- **Geopolitical Shifts:** Geopolitical changes can impact international agreements, technology transfer, and alliances, affecting nuclear cooperation and regulations. This includes armed conflicts.
- **Climate Change:** The environmental impacts of climate change are becoming more severe and challenging operations.
- **Social Dynamics:** The rise in popularity of remote work may influence how nuclear organizations attract, retain, and manage talent.
- **Technological Advances:** The integration of advanced technologies such as artificial intelligence (AI) and digitalization in nuclear operations adds complexity to decision-making processes.
- **New Reactor Designs:** The development of small modular reactors and their integration into the grid will increase complexity.
- **Renewable Energy Sources:** The development and integration of renewable energy sources will likely impact the long-term strategies of nuclear leaders.
- **Multiple Generation Workforce:** Attracting and retaining younger workers while balancing the needs of a multi-generational workforce will increase complexity of workforce management.
- **Competencies:** Clearly defining the competencies required for technological advances has become more complex.
- **Regulatory Changes:** Evolving environmental and safety regulations, and licensing process ambiguity in compliance requirements create ambiguity in compliance requirements.
- **Mental Health:** The growing awareness and occurrence of mental health issues in the workplace will add complexity and ambiguity to workforce management.



Dynamic Leadership: Navigating a Changing Nuclear Landscape and Extending Resilient Capacity

- Enabler 1 – Systemic Thinking;
- Enabler 2 – Diversity and Inclusion;
- Enabler 3 – Engagement;
- Enabler 4 – Reflection;
- Enabler 5 – Learning.



Dynamic Leadership: Navigating a Changing Nuclear Landscape and Extending Resilient Capacity

3 Key contributions

1. Recognizing the dynamic element of leadership
2. Leadership is not a position, it's a requirement for anyone in the organization
3. Strong focus on the practical application with toolbox and training workshops



Final Reflections



EVOLVING ENERGY CONSORTIUM

Kerstin Dahlgren – The founder of MTO/HTO and much more



You cant talk about this topic without mentioning Kerstin Dahlgren

Kerstin Dahlgren has been an important driving force of the evolvement in leadership, management and culture for safety.

Her work at IAEA laid a foundation for the continued work in the area

She coined MTO/HTO the interplay between Human, Technical and Organizational Factors – Systemic Approach to Safety

She has been honored for the great achievements in nuclear and radiation safety

Lessons Learned from Nuclear Power

- Importance of Human and Organizational Factors
- Safety Culture/Culture for Safety is always a 'maker or breaker'
- Integration of Leadership, Management and Culture for Safety
- Regulators role in fostering a healthy safety culture
- Being vigilant of basic assumptions
- Systemic Approach to Safety (HTO)

Three Mile Island



Chornobyl



Fukushima



Personal observations from an international outlook

- People around world are challenged with the same type of issues
- Not much difference between industries
- Loads of theories and frameworks about *what* and less about *how*
- Strong focus on measurements, assessments, KPIs
- Limitation of practical approaches that can accelerate safety and viability of the organization



Thoughts about the Future

- Forums like SÄKU is important – Sharing and Learning
- Avoiding of re-inventing the wheel
- Bring in more contemporary approaches
- Keep it simple but base the approaches on science
- Collaborate and support each other – Safety is a We-Work



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www.2EC.se



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- IAEA Draft of the 10 Traits of a Healthy Safety Culture
<https://www.iaea.org/newscenter/news/iaea-issues-harmonized-model-for-enhanced-safety-culture-in-nuclear-organizations>
- IAEA Technical Meeting on Managing on the Unexpected with links to video presentations Sutcliffe, Hollnagel, Paries, Roberts, Dahlgren etc
<https://gnssn.iaea.org/NSNI/EaT/TM/Pages/MtU.aspx>
- Prof. Edgar Schein's talk to nuclear leaders from IAEA Safety Culture Conference 2016
<https://drive.google.com/file/d/0B0Ykqnv3HOdGUF9SUTdQNVh3WDg/view?resourcekey=0-4f188c13XusawAlzWvbdrQ>
- IAEA Safety Report 83 Performing Safety Culture Self-Assessment
https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1682_web.pdf
- IAEA Safety Culture during Pre-Operational Phases
http://www-pub.iaea.org/MTCD/Publications/PDF/Pub1555_web.pdf



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https://en.wikipedia.org/wiki/Midnight_in_Chernobyl

TEPCO report with self-reflection and systemic analysis of the accident

https://www.tepco.co.jp/en/press/corp-com/release/betu13_e/images/130329e0801.pdf

OECD-NEA Safety Culture Principles for Regulatory Bodies

https://www.oecd-nea.org/jcms/pl_14948/the-safety-culture-of-an-effective-nuclear-regulatory-body?details=true

Intent Based Leadership video clip

<https://www.youtube.com/watch?v=I5RkDDo6B9Y>

Humble Inquiry video clip

<https://www.youtube.com/watch?v=BOw0IDrKvuw>

Humble Leadership (warmly recommended read for managers)

https://books.google.es/books/about/Humble_Leadership.html?id=xG9ODwAAQBAJ&redir_esc=y

