IAEA guidance on safety culture self-assessment

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International Atomic Energy Agency

The IAEA Advisory Group INSAG

*"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 must be supplemented by the creation and maintenance of a '**nuclear safety culture**'".*

The concept of the safety culture was now formally introduced in the area of nuclear safety.

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(INSAG-1, 1986)

The IAEA Advisory Group INSAG

Definition of 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".

(The 2007 IAEA glossary)

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The Safety Culture Concept

- Is it still valid and important?

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International Atomic Energy Agency

Conclusion after the Fukushima Daiichi Accident

Quotation from the National Diet of Japan

"What must be admitted – very painfully – is that this was a disaster "Made in Japan."

Its fundamental causes are to be found in the ingrained conventions of Japanese culture:

- our reflexive obedience;
- our reluctance to question authority;
- our devotion to 'sticking with the program';
- our groupism;
- and our insularity.

Had other Japanese been in the shoes of those who bear responsibility for this accident, the result may well have been the same."

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INPO 11-005 Addendum August 2012

Lessons Learned from the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station

"Behaviours prior to and during the Fukushima Daiichi event revealed the need to strengthen several aspects of nuclear safety culture. It would be beneficial for all nuclear operating organizations to examine their own practices and behaviors in light of this event and use case studies or other approaches to heighten awareness of safety culture principles and attributes."

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NRA
Nuclear Regulation Authority

Nuclear Safety
Human and Organizational Factors
Lessons from Fukushima

Kenzo Oshima （NRA Commissioner）

International
Experts Meeting
IAEA
May, 2013

What went wrong?

Manmade disaster

- Human error
- Inaction, willful negligence
- Failure in safety-first
  Flawed safety culture (the “myth of 100% nuclear safety”)

Emergency response

- TEPCO
- Command center
- Regulatory bodies

Was the accident preventable?

Yes, if…

- "Safety first" policy had been strictly enforced; risks had been squarely faced;

- Severe accident measures (defense-in-depth) were in place (esp. natural hazards);

- International safety standards and good practices had been followed;

- Delays in reinforcements had been avoided…..

Integrated Systemic Safety Approach

Leadership & management for safety by integration of quality, health, environment, security, financial systems and safety culture

safety culture

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IAEA Safety Standards

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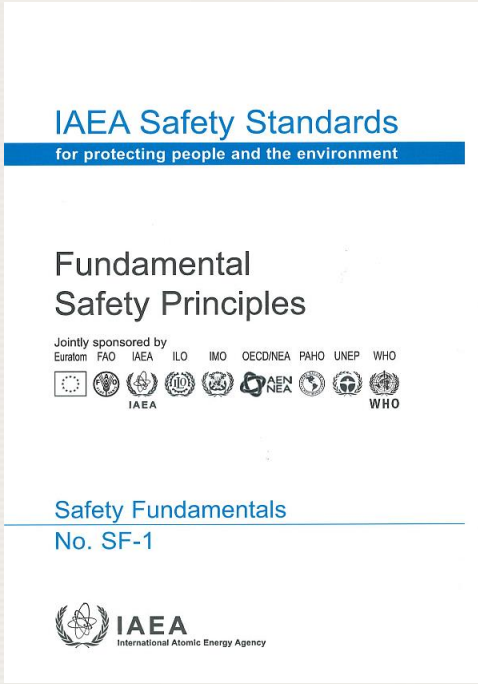
Safety Standards Hierarchy



Global reference for a high level of nuclear safety

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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****…"*

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Fundamental Safety Principles SF-1

Integration of safety culture

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 regards to safety."*

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Fundamental Safety Principles SF-1

The Interaction between individuals, technology and the organization - ITO

3.14. *"An important factor in a management system is the recognition of the entire range of **interactions** of **individuals** at all levels with **technology** and with **organizations**. To prevent human and organizational failures, human factors have to be taken into account and good performance and good practices have to be supported."*

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IAEA Safety Standards

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General Safety Requirements

- Part 1 Governmental and Regulatory Framework
- Part 2 Leadership and Management for Safety
- Part 3 Radiation Protection and Safety of Radiation Sources
- Part 4 Safety Assessment
- Part 5 Predisposal Management of Radioactive Waste
- Part 6 Decommissioning and Termination of Activities
- Part 7 Emergency Preparedness and Response

Specific Safety Requirements

- 1. Site Evaluation for Nuclear Installations
- 2. Safety of Nuclear Power Plants
  - 2.1 Design and Construction
  - 2.2 Commissioning and Operation
- 3. Safety of Research Reactors
- 4. Safety of Nuclear Fuel Cycle Facilities
- 5. Safety of Radioactive Waste Disposal Facilities
- 6. Safe Transport of Radioactive Material

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General Safety Requirements	Specific Safety Requirements
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Part 7 Emergency Preparedness and Response	6. Safe Transport of Radioactive Material

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Difference between Management and Leadership

*"The difference between management and leadership can be stated simply whereby 'management' is a **function** and 'leadership' is a **relation**. Management ensures that work is completed in accordance with requirements, plan and resources. It is through leadership that individuals may be influenced and motivated, and organizations changed. Managers may also act as leaders."*

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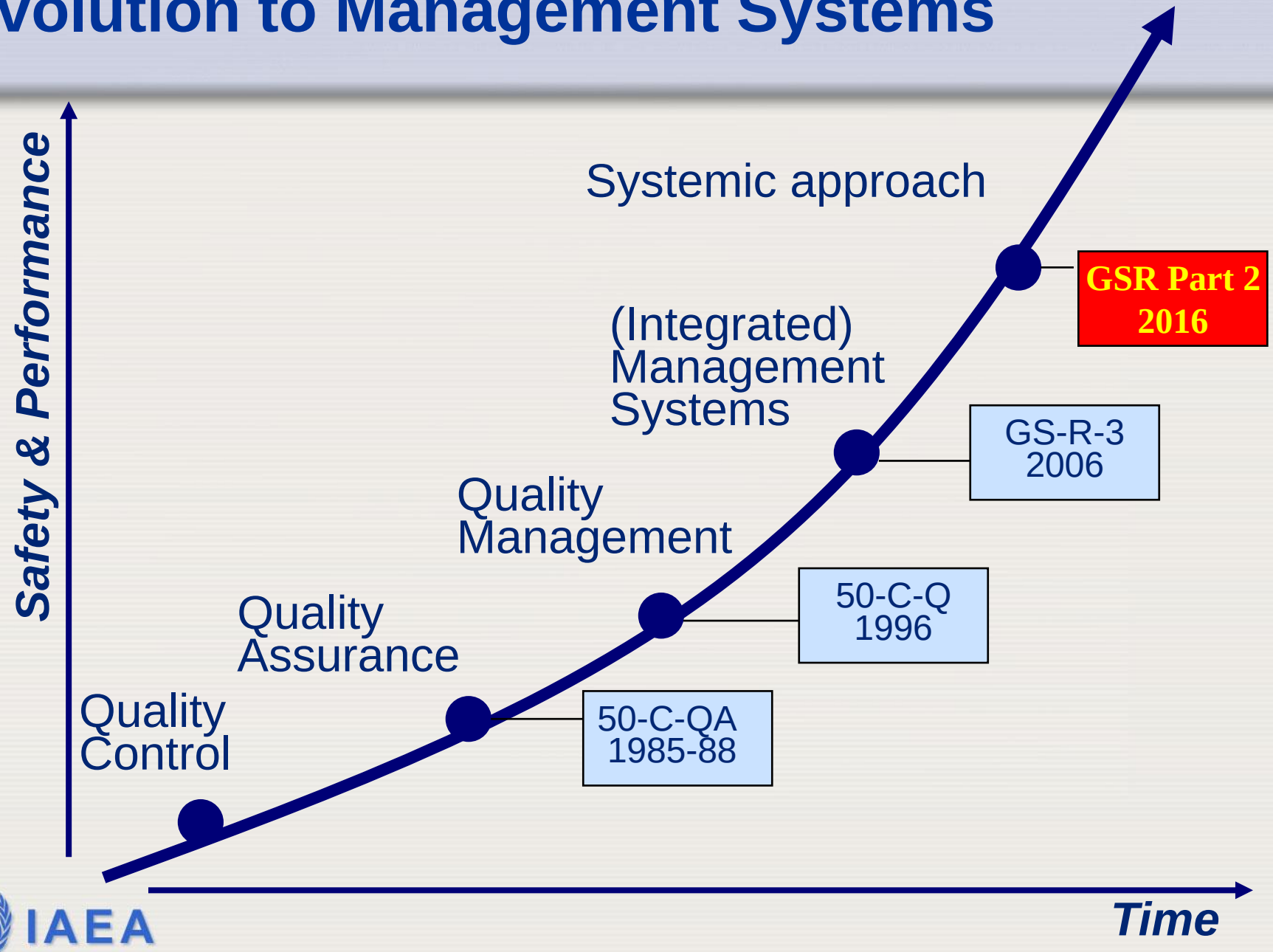
Source: IAEA Safety Standards: GS-G-3.5

Evolution to Management Systems



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Objective of the GS-R Part 2

Leadership and Management for Safety

- The application of SF-1 to establish requirements for:
  - Effective leadership for safety
  - Effective management for safety
  - Effective safety culture improvement activities
- Safety as a sustainable outcome of excellence in leadership and management
- Integrated management system: make sure that other requirements will not compromise Nuclear Safety
- Systemic approach of ITO

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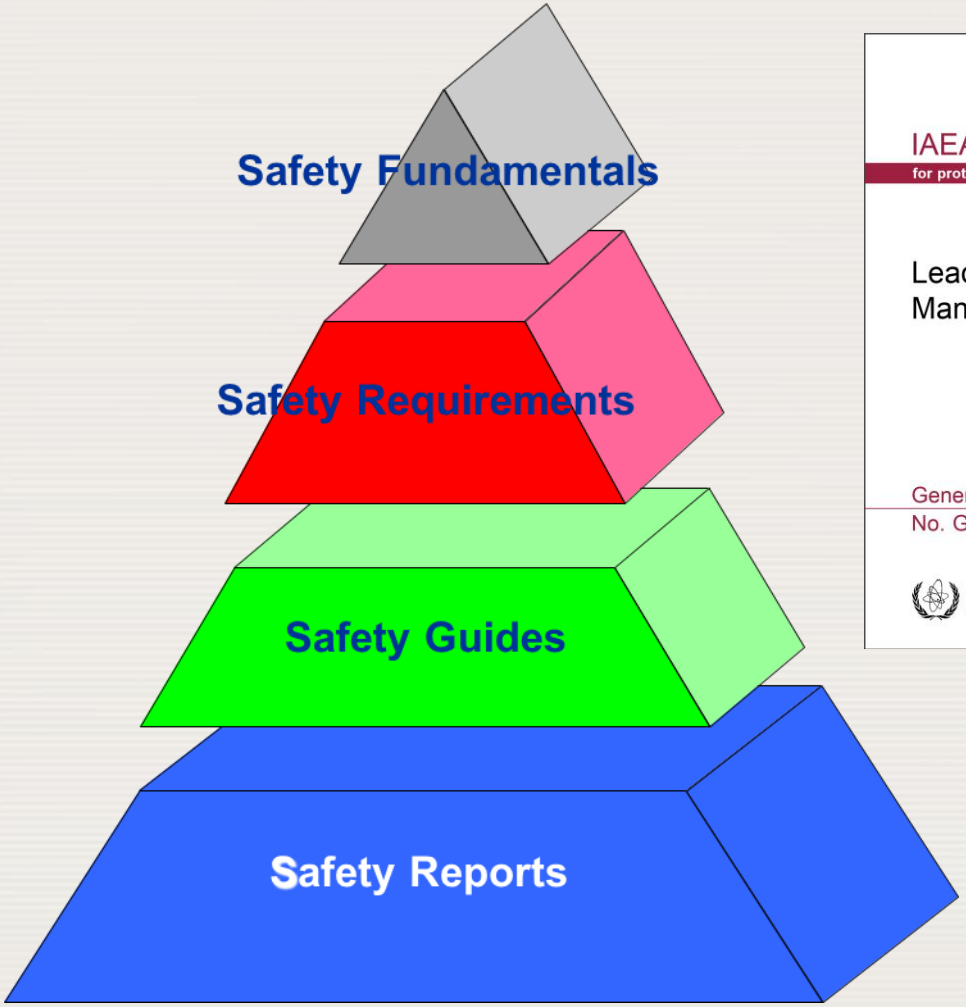
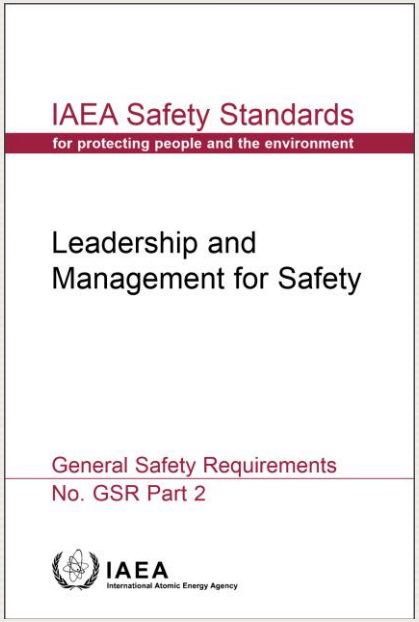
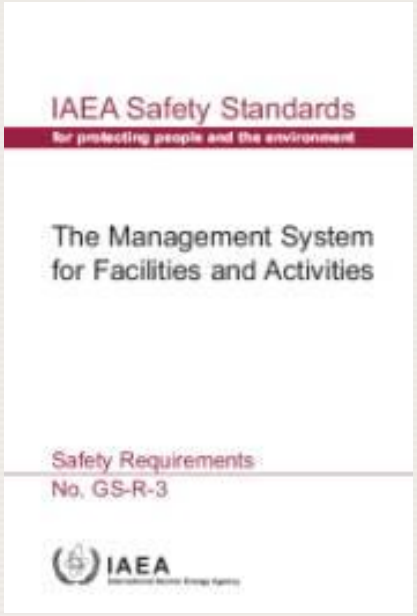
Systemic Approach – The Interaction between Individuals, Technology and Organization

Safety Standards Hierarchy







Global reference for a high level of nuclear safety

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Safety (Culture) Requirement GS-R-3

*"The management system shall be used to **promote and support a strong safety culture** by:*

- *Ensuring a **common understanding** of the key aspects of safety culture within the organization;*
- ***Providing the means** by which the organization supports individuals and teams in carrying out their tasks safely and successfully, taking into account the interaction between **individuals, technology and the organization**;*
- *Reinforcing a **learning and questioning attitude** at all levels of the organization;*
- *Providing the means by which the organization continually seeks to **develop and improve** its safety culture."*

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Safety (Culture) Requirement GSR-Part 2

"Requirement 12: Fostering a 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.*
  - *All individuals in the organization shall contribute to fostering and sustaining a strong safety culture*
  - *Senior managers and all other managers shall advocate and support the following:*
    - *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;"*

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Safety (Culture) Requirement GSR-Part 2

"Requirement 12: Fostering a culture for safety

- *Senior managers and all other managers shall advocate and support the following:*
  - *Acceptance by individuals of personal accountability for their attitudes and conduct with regard to safety;*
  - *An organizational culture that supports and encourages trust, collaboration, consultation and communication;*
  - *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;*
  - *Measures to encourage a questioning and learning attitude at all levels in the organization and to discourage complacency with regard to safety;"*

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Safety (Culture) Requirement GSR-Part 2

"Requirement 12: Fostering a culture for safety

- *Senior managers and all other managers shall advocate and support the following:*
  - *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);*
  - *Safety oriented decision making in all activities;*
  - *The exchange of ideas between, and the combination of, safety culture and security culture.*

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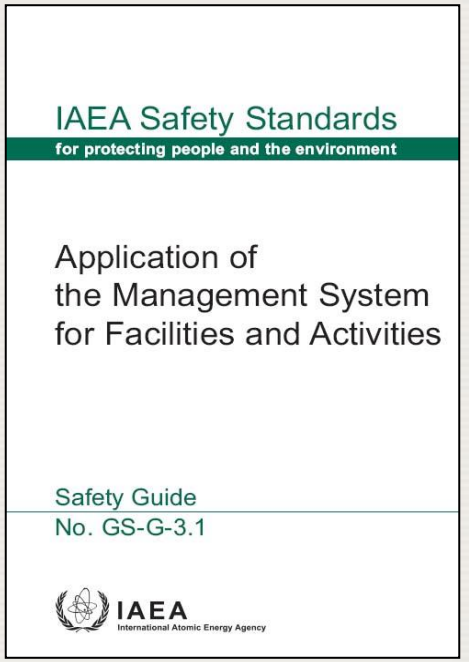
Safety Standards Hierarchy



Global reference for a high level of nuclear safety

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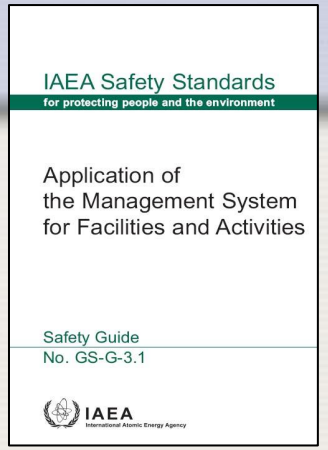
IAEA Safety Standard - Characteristics and Attributes for Strong Safety Culture



Safety is a clearly recognized value

Leadership for safety is clear

Safety Culture Characteristics

Accountability for safety is clear

Safety is integrated into all activities

Safety is learning driven

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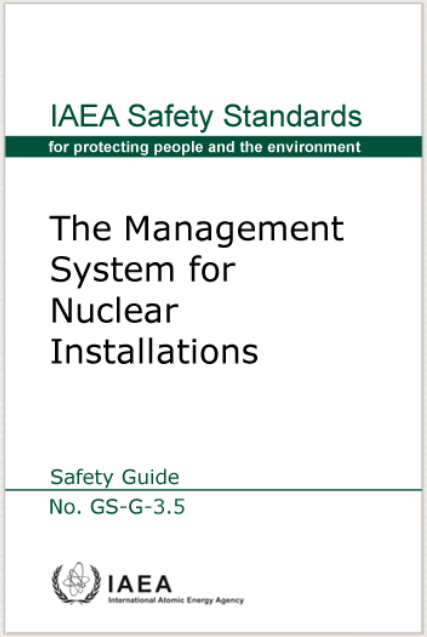
(GS-G-3.1)

Safety Standards Hierarchy



Global reference for a high level of nuclear safety

IAEA

Safety (Culture) Guidance GS-G-3.5

Specific guidance for nuclear installations*

- Further explanation of the five safety culture characteristics and the attributes
- Improving safety culture
- Warning signs of a decline in safety culture
- Concept of interaction between individuals, technology and the organisation
- Assessment of safety culture

* Nuclear power plants, other reactors (research and critical assemblies), nuclear fuel cycle facilities

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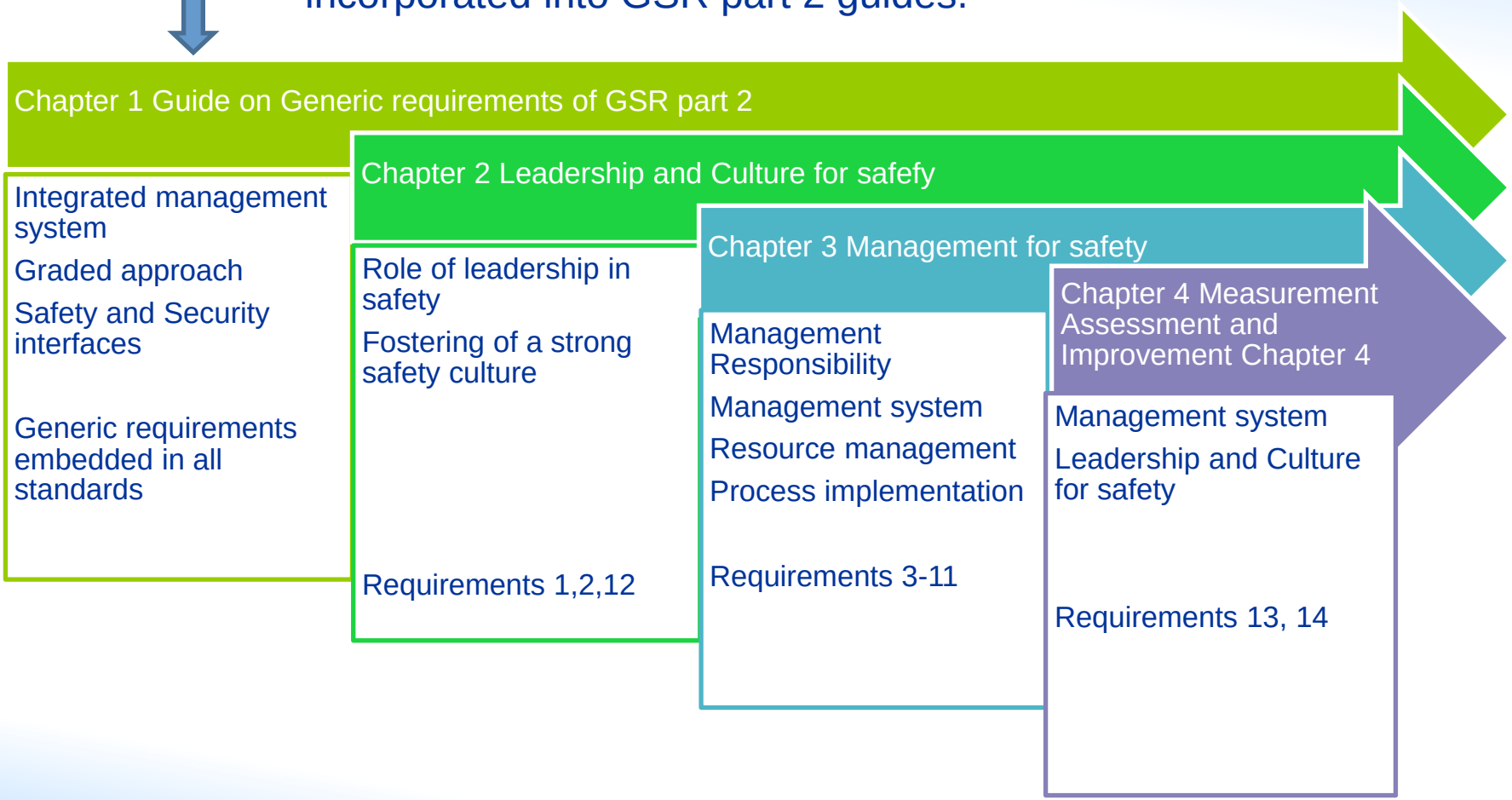
IAEA Safety Culture Publications *http://www.iaea.org*

Document	Title
Safety Fundamentals No. SF-1	Fundamental Safety Principles
Safety Requirements No. GS-R-3	The Management System for Facilities and Activities
Safety Guide No. GS-G-3.1	Application of the Management System for Facilities and Activities
Safety Guide No. GS-G-3.5	The Management System for Nuclear Installations
Safety Series No. 75-INSAG-4	Safety Culture
Safety Series No. 75-INSAG-15	Key Practical Issues in Strengthening Safety Culture
Safety Report Series No. 11	Developing Safety Culture in Nuclear Activities
Safety Report Series No. 42	Safety Culture in the Maintenance of Nuclear Power Plants
Safety Report Series: No. 74	Safety Culture during Pre-Operational Phases – Published Sept 2012
Safety Report Series: No. 83	Performing Safety Culture Self-Assessment – Published June 2016
Safety Report Series:	How to Continuously Improve Safety Culture - draft
TECDOC-1321	Self-assessment of safety culture in nuclear installations
TECDOC-1329	Safety culture in nuclear installations
TECDOC:	Regulatory Oversight Of Safety Culture In Nuclear Installations

Development of Guides

GS-R-3 Detailed aspects that will need to be incorporated into GSR part 2 guides.



Source: Helen Rycraft, IAEA

Development of Guides

GS-R-3 Detailed aspects that will need to be incorporated into GSR part 2 guides.

Chapter 1 Guide on Generic requirements of GSR part 2

- Integrated management system
- Graded approach
- Safety and Security interfaces
- SSG 22
- INSAG 24
- INSAG 27
- IAEA TECDOC No. 1740

Chapter 2 Leadership and Culture for Safety

- Safety Report Series 74,
- Safety Report Series 83
- Safety Report Series 42
- Safety Report Series 11

Chapter 3 Management for safety

Requirements 3-11

- GS-G-3.1
- [GS-G-3.2, 3.3, 3.4,]
- GS-G-3.5
- TS-G 1.4
- SSG 1.6
- GSG 5
- WSG 1.2
- WSG 2.7
- SRS 75
- SSR 74

- DS 4762
- DS 473
- DS460
- DS492
- Tech doc 1501
- Tech Doc 1711
- Tech doc 1762
- NG-G-3.1
- NG-T 1.1
- NG-t 3.10
- Safety Reports Series No. 75

Chapter 4 Measurement Assessment and Improvement Chapter 4

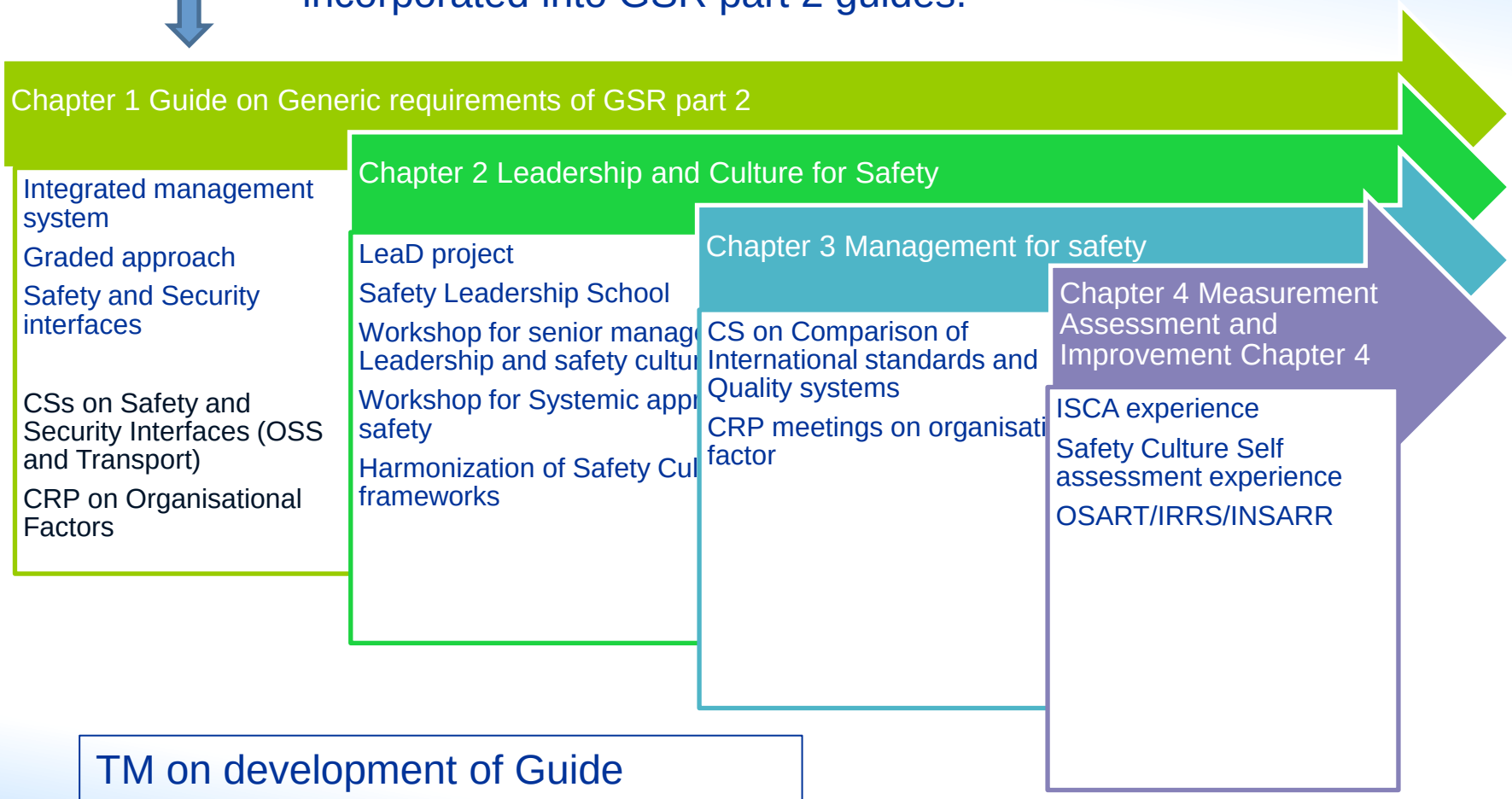
Requirements 13, 14

- Safety Report Series 83
- Services series 32
- GS-G-3.1
- [GS-G-3.2, 3.3, 3.4,]
- GS-G-3.5
- Tech Doc 1141
- Tech Doc 1707
- Tech Doc 1491

Source: Helen Rycraft, IAEA

Development of Guides

GS-R-3 Detailed aspects that will need to be incorporated into GSR part 2 guides.



TM on development of Guide
CS on review of Guide information.

Source: Helen Rycraft, IAEA

Summary

- IAEA's approach to Safety Culture is expressed in Safety Standards, Safety Reports and Technical Documents
- Safety culture is an essential component of the leadership and management for safety
- The international nuclear community emphasizes the importance of strong safety culture

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