

Why Safety Culture Oversight Matters

Regional Workshop on the development and implementation of effective
IMS based on GSR Part 2

Jakarta, Indonesia
31 July- 04 August 2023

Regulatory Activities Section
Division of Nuclear Installation Section (NSNI)
International Atomic Energy Agency (IAEA)
Department of Nuclear Safety & Security

Overview

- Objective
- Why safety culture is important
- The importance of oversight
- Conclusion

Objective

- To foster a greater understanding of the process and issues; promoting and supporting a strong safety culture in the context of a regulatory body
- To foster an increased awareness and understanding of the methods for monitoring and measuring management systems, safety culture and organisational performance

Why Safety Culture is Important

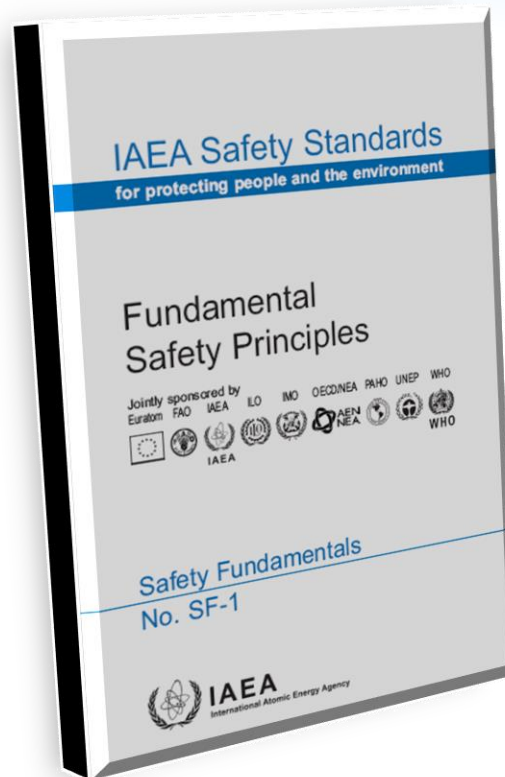
Fundamental Safety Principles

**Responsibility
for
Safety**

**Role of
Government**

**Leadership and
Management
for Safety**

**Justification of
Facilities and
Activities**



**Protective
Actions to
Reduce Existing
Or Unregulated
Radiation Risks**

**Emergency
Preparedness
and Response**

**Prevention
of Accidents**

**Optimization
of Protection**

**Limitation of
Risks to
Individuals**

**Protection of
Present and
Future
Generations**

Leadership and Management for Safety

- Effective leadership and management for safety means:
 - Leadership in safety matters at the top level – as well as at all other levels
 - Having an effective integrated management system that ensures the promotion of safety culture
 - Assessment of performance, use of feedback, and learning from experience
 - Use of a graded approach
 - Taking account of human factors and individual-technology-organisation (ITO) interactions
 - Being proactive and taking action to avoid or mitigate events or accidents

Integrated management system

- “Management system is a single integrated system used by an organization to manage the totality of its people, resources, processes, and tasks in order to meet an organization’s objectives and satisfy the stakeholders.”
- The management system is also used to understand and promote safety culture

Management Systems and Safety Culture

- **Main aim of the integrated management system should be to achieve and enhance safety by:**
 - Bringing together in a coherent manner all the requirements for managing the organization
 - Describing the planned and systematic actions necessary to provide adequate confidence that all these requirements are satisfied
 - Ensuring that health, environmental, security, quality and economic requirements are not considered separately from safety requirements, to help preclude their possible negative impact on safety
 - Identifying and integrating the requirements contained within:
 - The statutory and regulatory requirements of the Member State
 - All relevant IAEA Safety Requirements
 - Formal agreements with interested parties
 - Other relevant codes and standards adopted for use by the organization
 - Ensuring the promotion of safety and security culture, the regular assessment of safety performance and the application of lessons learned from experience

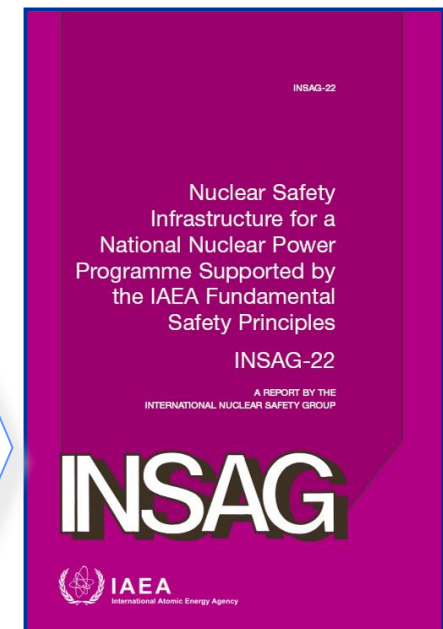
Management System, Safety Culture and Nuclear Power Infrastructure

- Establishing a nuclear power programme and building a nuclear power involves commitment
 - The building of a nuclear power infrastructure
 - Legislation and regulatory infrastructure
 - Capacity building: both technical and soft skills including, leadership and management for safety
 - Physical and organisational infrastructure
 - Safety and security infrastructure

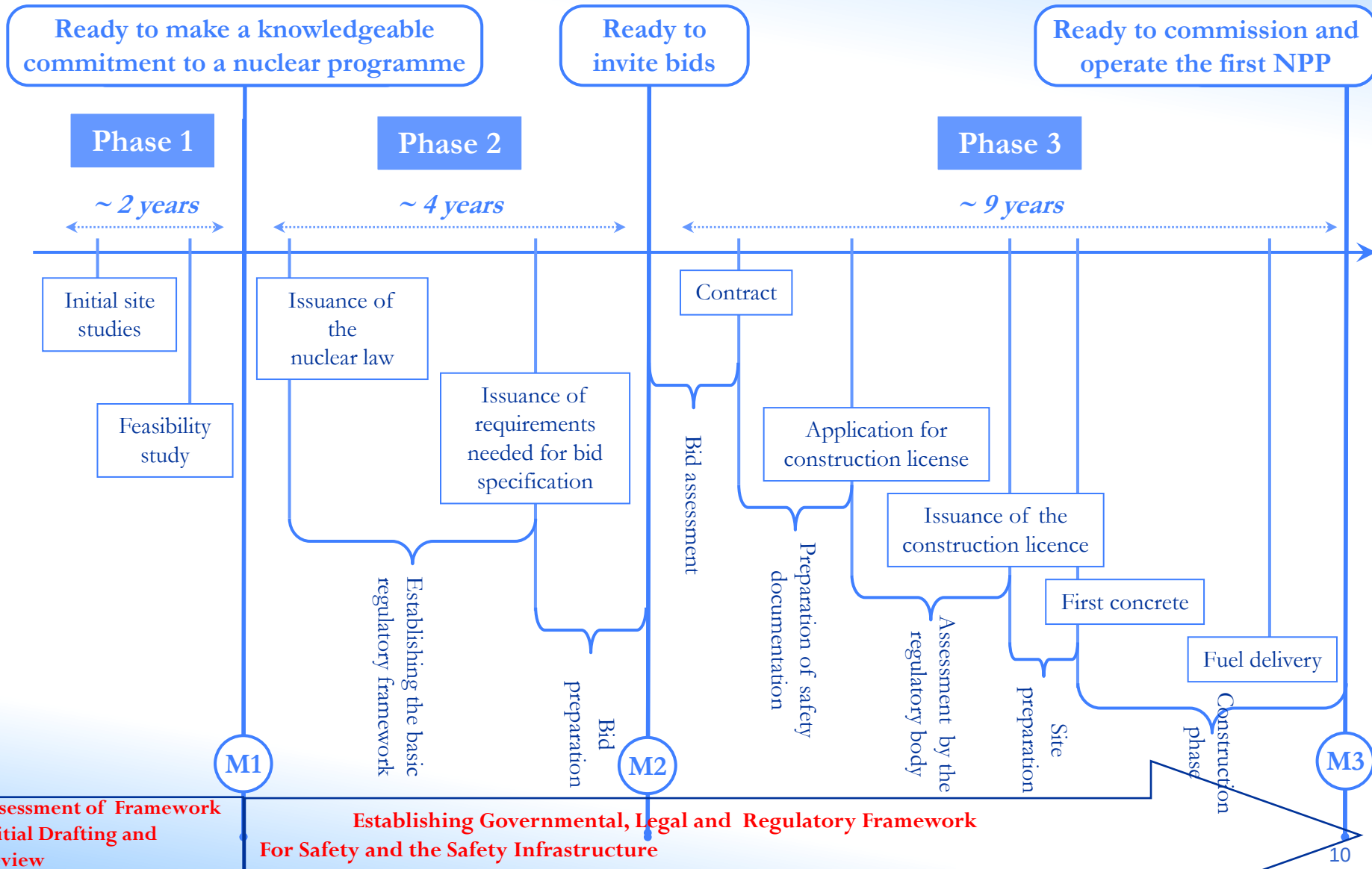
Nuclear Safety Infrastructure is the set of:

- institutional
- organizational
- technical

elements and conditions established in a Member State to provide a sound foundation for ensuring a sustainable high level of nuclear safety.

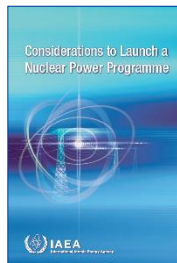


Management System and Safety Culture applicable throughout the development & operation of NPP

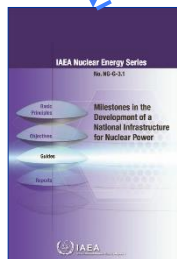
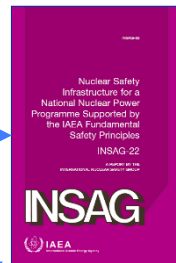


Safety Infrastructure and IAEA Safety Standards

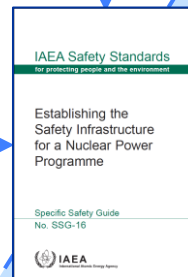
IAEA Nuclear Power Support Group's BROCHURE



International Nuclear Safety Group's REPORT-22



"Milestones" document IAEA NG-G-3.1



SSG-16



FUNDAMENTALS

IAEA SAFETY STANDARDS SERIES									
ST-1	ST-2	ST-3	ST-4	ST-5	ST-6	ST-7	ST-8	ST-9	ST-10

REQUIREMENTS

IAEA Safety Standards for protecting people and the environment	IAEA Safety Standards for protecting people and the environment
The Management System for Facilities and Activities No. GS-R-1	Leadership and Management for Safety No. GS-R-2
Safety Requirements No. GS-R-3	General Safety Requirements No. GS-R-4

GS-R-Part 2

GS-R-3

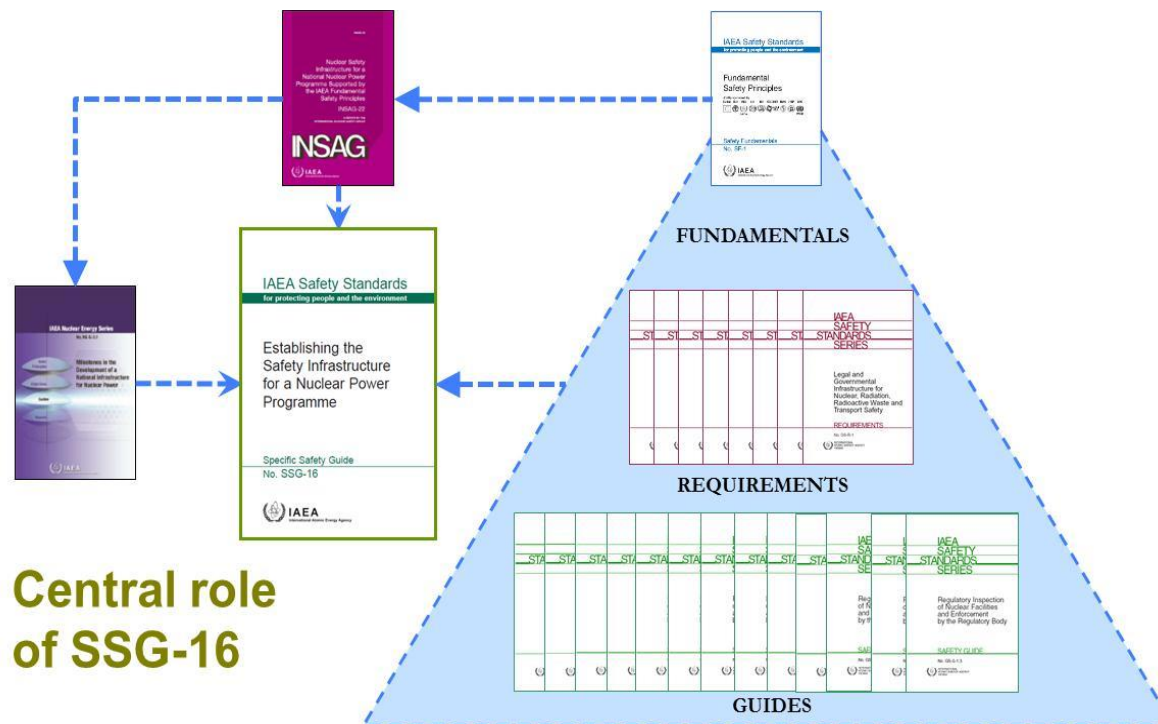
IAEA SAFETY STANDARDS SERIES									
STA-1	STA-2	STA-3	STA-4	STA-5	STA-6	STA-7	STA-8	STA-9	STA-10

GUIDES

IAEA SAFETY STANDARDS

Establishing a Safety Infrastructure

Safety guide **SSG-16 Establishing the Safety Infrastructure for a Nuclear Power Programme** constitutes a “Road-map” to apply the entire suite of IAEA Safety Standards progressively during the early phases of the implementation of a nuclear power programme. With 197 suggested safety related actions to be taken in the first three phases in the development.



SSG 16 Actions 72-84:

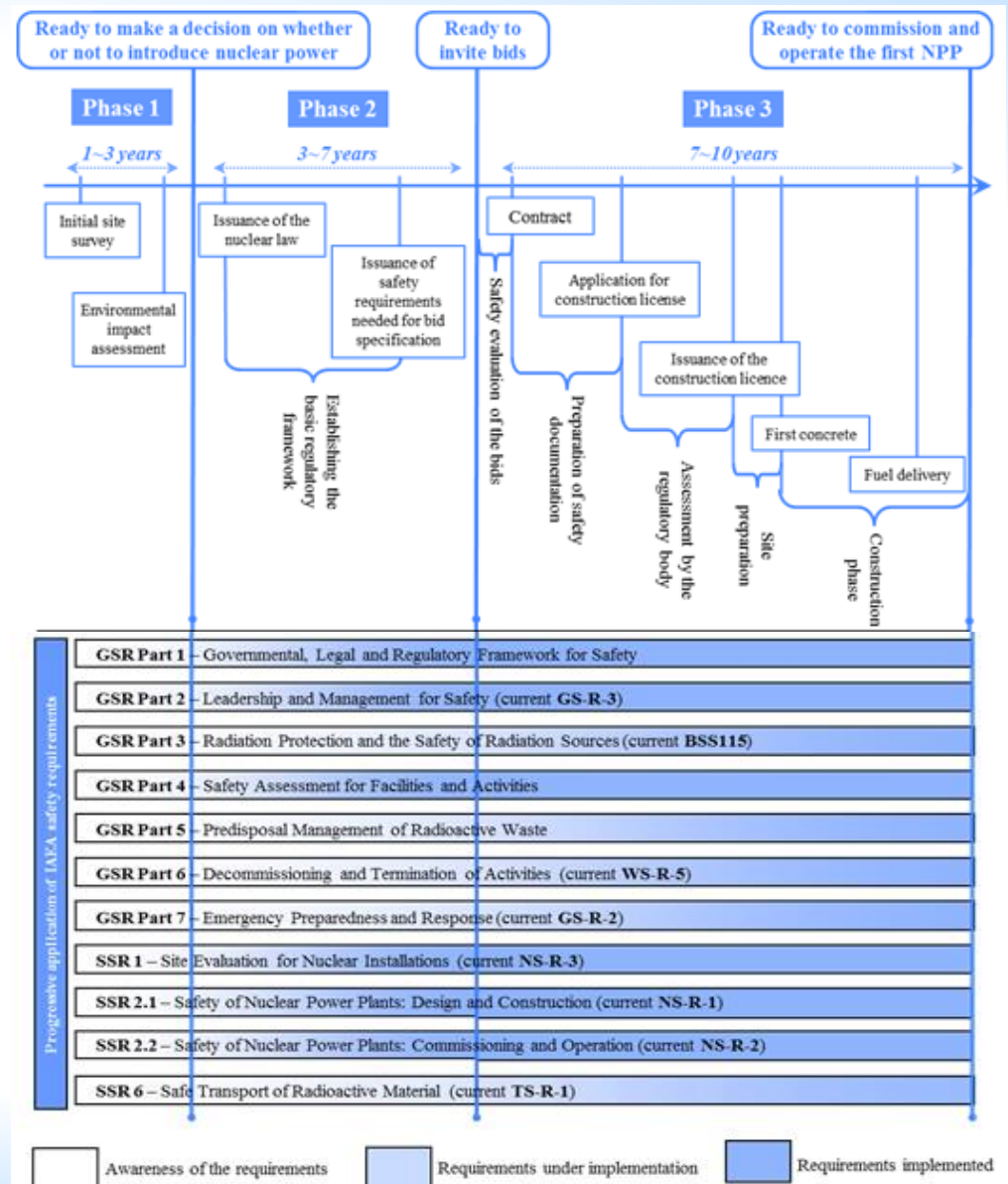
- Intended to contribute to build **leadership and management for safety**, and of a **safety culture** amongst the involved organisations, including regulatory bodies
- Starting at phase 1 government to identify senior managers for prospective organizations with leadership capabilities and attitude emphasizing safety culture.

SSG-16 Overview

For each relevant IAEA Safety Requirements publication, at which stages:

- there should be awareness of the requirements
- implementation of the requirements should be started
- requirements should be fully implemented

The initial degree of the application of these requirements may vary from State to State depending on the use of radioactive sources and nuclear installations other than NPPs before considering the nuclear power option



SSG-16 Overview

Text format for each Phase: Example

ACTIONS 72-84: LEADERSHIP AND MANAGEMENT FOR SAFETY

Phase 2

Requirements

The following actions are recommended to be completed in this Phase as a step towards the full implementation of all relevant IAEA Safety Requirements:

- Requirements 1, 19, 35 GSR part 1
- Requirements of GS-R-3/GSR Part 2 as a whole...

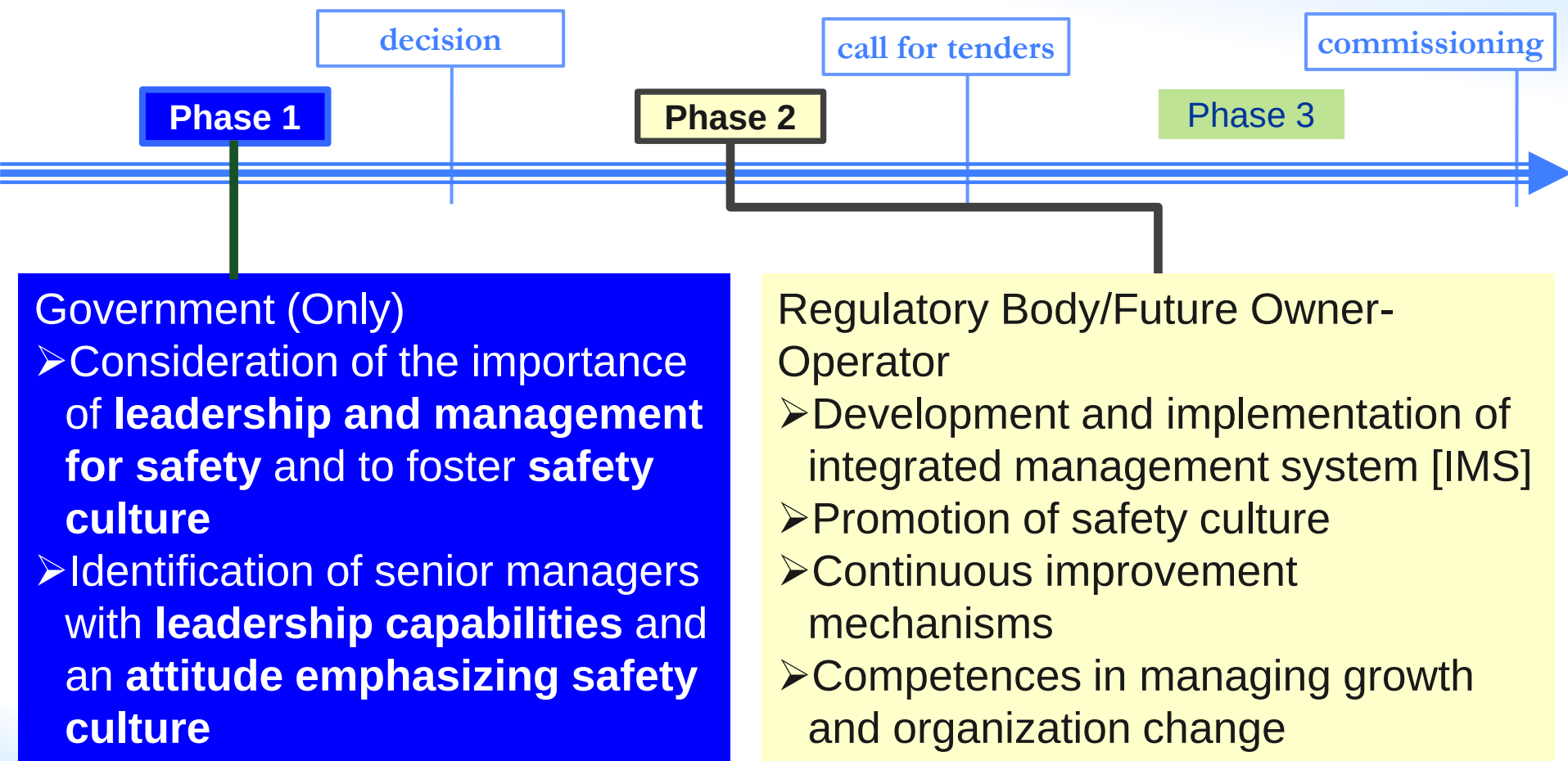
Action

Action 75. The regulatory body and the operating organization should start developing and implementing effective management systems in their respective organizations and should promote a strong safety culture.

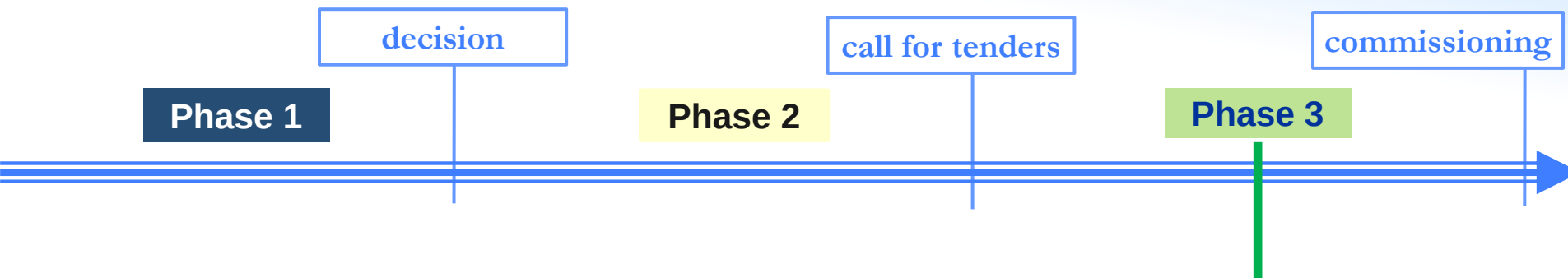
Additional text

2.185 (...) As an effective way of establishing a safety culture and promoting the development of leadership for safety, management systems should be implemented that provide structure and direction to...

Graded and Phased Development of Leadership and Management for Safety



Graded and Phased Development of Leadership and Management for Safety

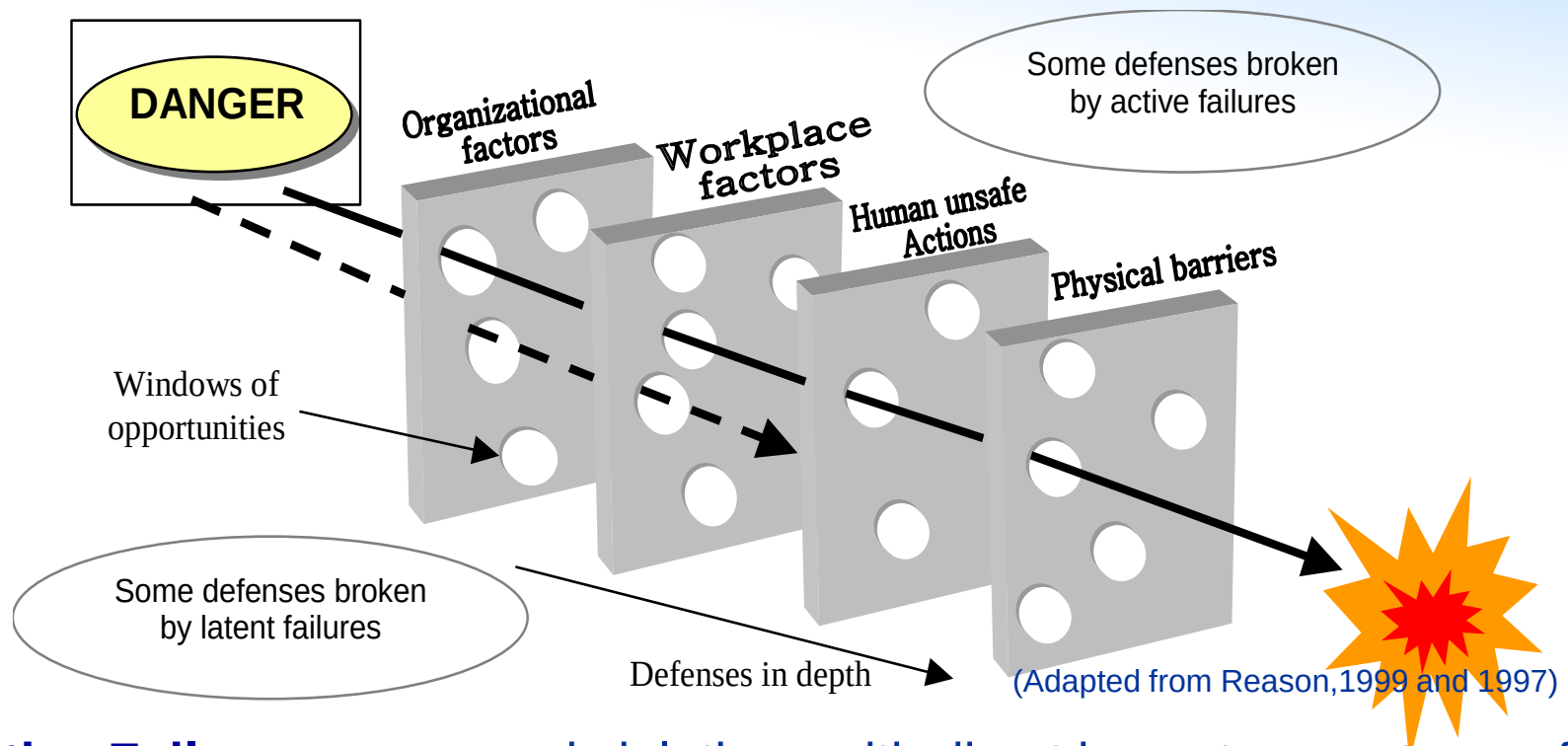


- Continuation to implement **Integrated Management System** promoting **Safety** and **Safety Culture**
- Effectiveness and **continuous improvement** of IMS
- Management and transfer of **safety related knowledge**
- **Leadership** and **succession development**
- **Regulatory oversight** of operator's programme on safety management
- Effective **leadership** and **effective management for safety**

The Need for a Management System

- MS needed to promote a strong safety culture
 - Safety culture affects safety performance
 - E.g.: Injury rates; accident rates; patient safety
 - Results supported across industries
 - Aerospace, healthcare, manufacturing, construction, agriculture, off-shore oil and gas, highway safety, maritime

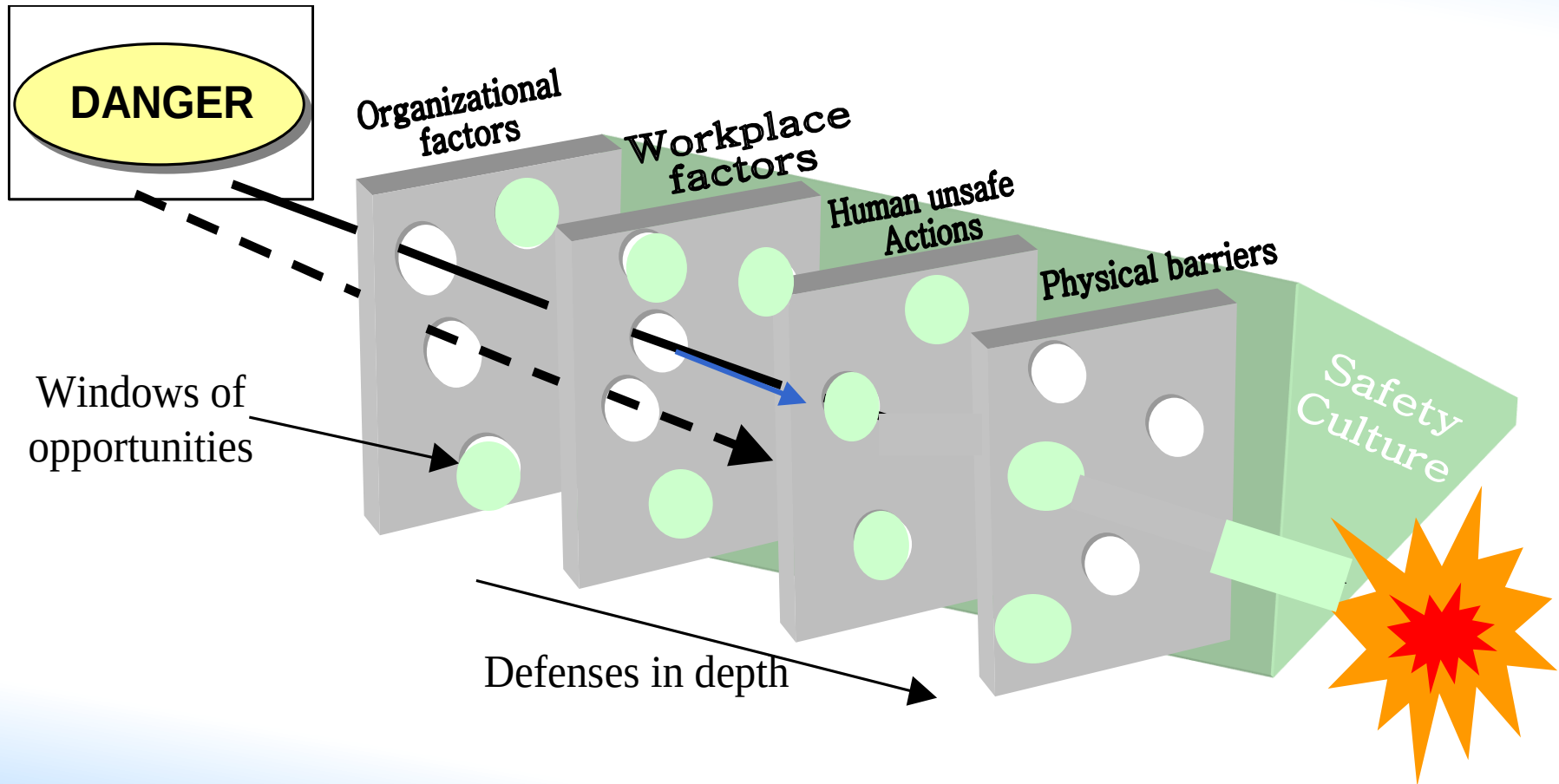
Accident Trajectory and Culture



Active Failures: errors and violations with direct impact on system safety (Ex: front line operator inadequate action).

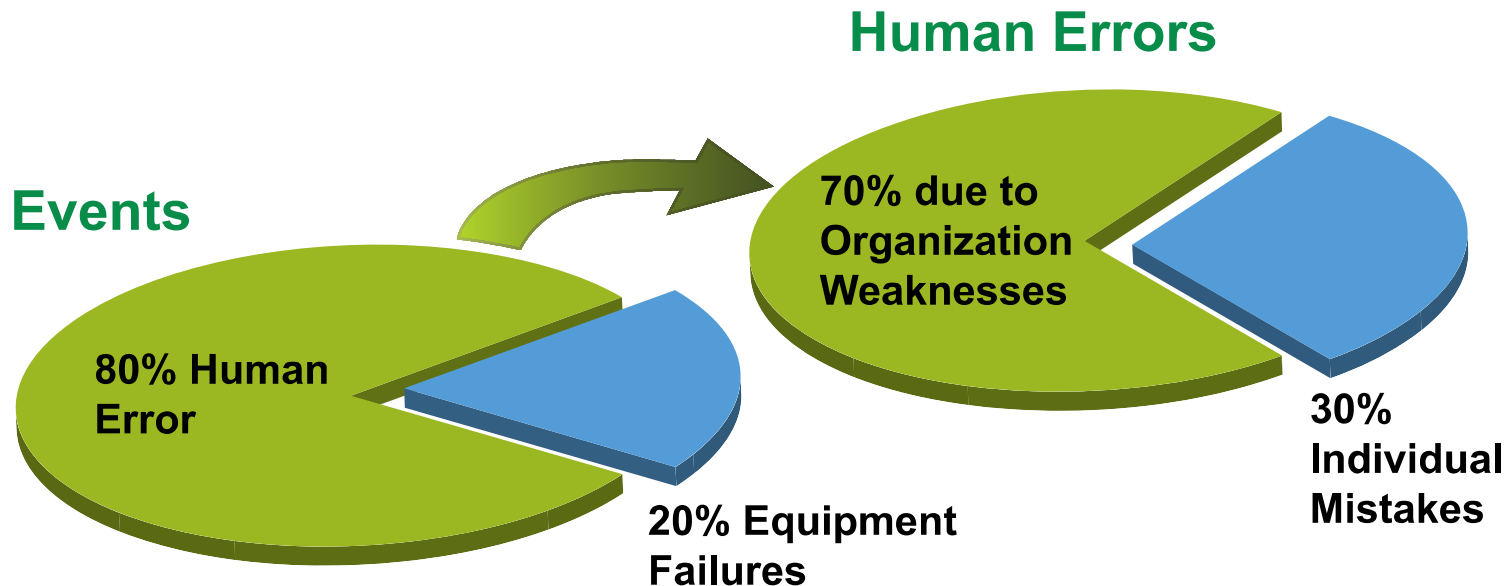
Latent Failures: errors involving several organizational factors (design, maintenance, communication, procedures, leadership, culture, etc.). (Ex: lack of openness to report near misses, incident and accident; deficient maintenance procedure, etc.).

Industrial Accident and Safety Culture

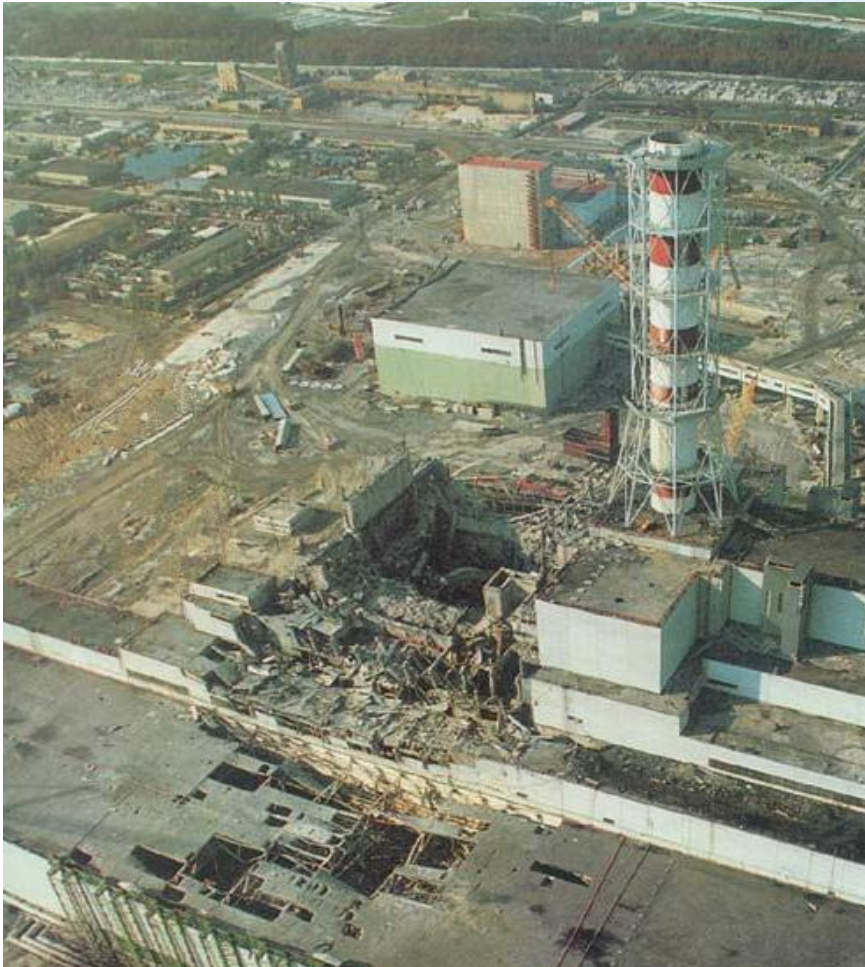


The Need for a Management System and a Strong Safety Culture

- Research
 - Contribution of human error to the occurrence of events



Source: IAEA Nuclear Energy Series Report, NG-T-2.7, Managing Human Performance to Improve Nuclear Facility Operation



Conclusion from 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

(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 receive the attention warranted by their significance”.*

(The 2022 IAEA glossary)

We Still Face the Safety Culture Challenge

Fukushima Daiichi

Unit 1 Hydrogen Explosion



Damage to Units 1 and 3



Unit 3 Hydrogen Explosion



Many stakeholders have a different picture of what this technology entails. These images are powerful and effective in instilling fear, particularly when displayed over and over again



We want to avoid this...



Fukushima Daiichi

Because it leads to this



...And They Can Shut You Down



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.”

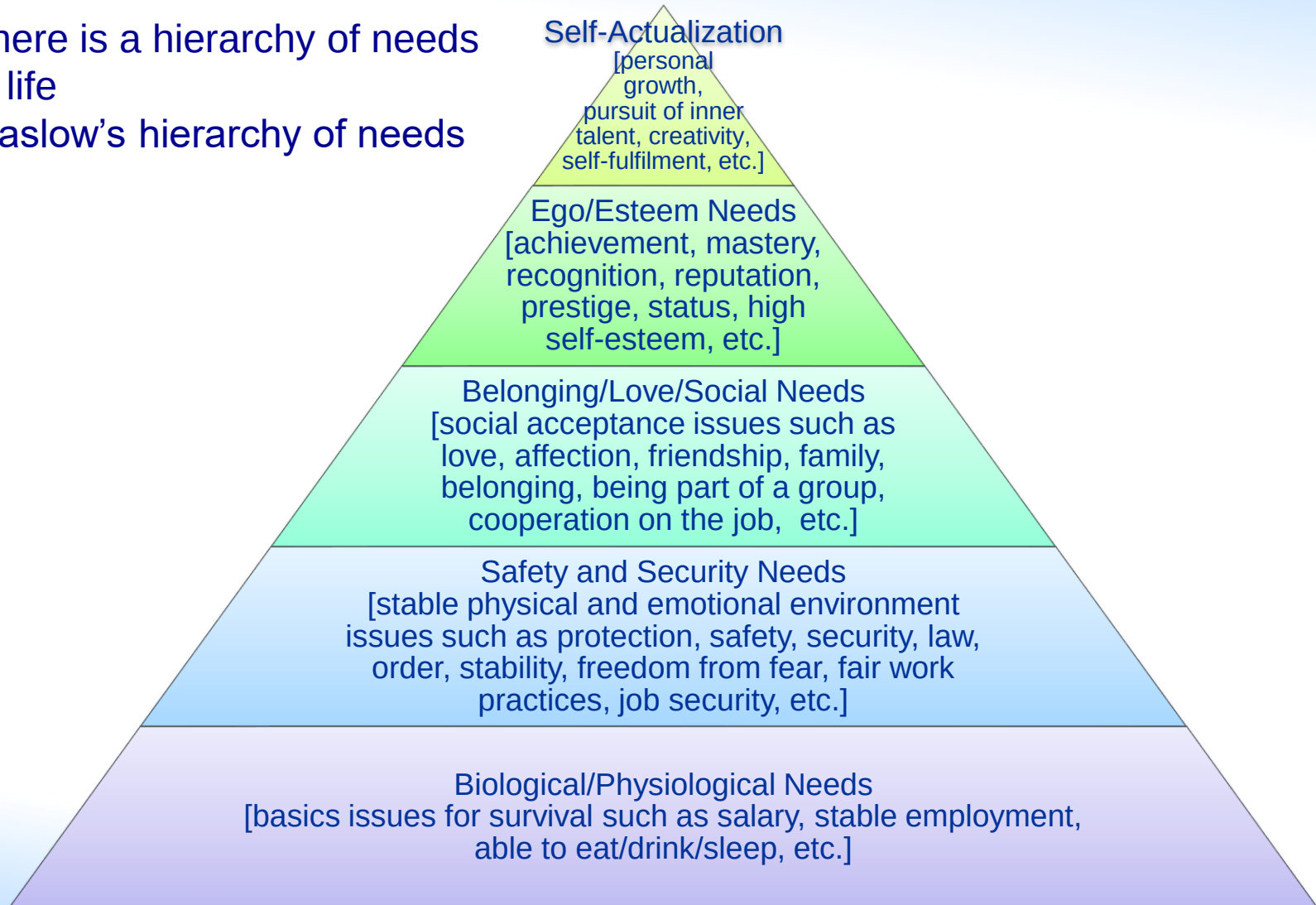
Its fundamental causes are to be found in the ingrained conventions of Japanese culture:

- 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.”

Manage Stakeholder Needs Well

- There is a hierarchy of needs in life
- Maslow's hierarchy of needs



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 behaviours in light of this event and use case studies or other approaches to heighten awareness of safety culture principles and attributes.”

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.....**

The Importance of Oversight

The Importance of Oversight

Why Monitor and Conduct Oversight?

- Organisations need to check from time to time that:
 - They are addressing the reason for their existence; by evaluating if they are:
 - addressing the need they are supposed to meet?
 - being effective?
 - doing the right work?
 - using the resources wisely and not being wasteful?
 - being efficient and doing the work right?
 - employing the right people, plans and strategies?
 - employing the right physical plant, tools and materials
 - employing the right processes, procedures and tactics, information, and culture, etc to attain the objectives and goals to meet the needs or requirements?
- The Organisations itself is usually in the best position to answer these questions
- Oversight helps to keep the organization true to form

Why Monitor and Conduct Oversight?

- To answer question, organisation needs to monitor and measure the effectiveness of the management system to determine if organisational goals are met
 - Permits confirmation of the ability of processes to achieve intended results
 - Enables organisation to identify opportunities for improvement

Why Monitor and Conduct Oversight?

- Process development
 - Processes and activities for management for safety shall be developed and effectively managed to achieve the organization's goals without compromising safety
[GS-R Part 2 Req. 10]
 - The processes of the management system that provide the means to meet all requirements to achieve the organization's goals shall be identified, planned, developed, implemented, assessed and continually improved
 - New or modified processes shall be reviewed and approval so that safety is not compromised and align with the goals , strategies, plans and objectives of the organization

[Ref: GS-R Part 2 Req 10|GS-R 3|5.1, 5.2, 5.3, 5.4, 5.5; GS-G-3.1|5.1, 5.9]

Why Monitor and Conduct Oversight?

- Monitoring, Measurement and Assessment
 - The effectiveness of the management system shall be measured, assessed and improved to enhance safety performance, including minimizing the occurrence of problems relating to safety.
[GSR Part 2 Req. 13]
 - The effectiveness of the management system shall be monitored and measured including through self-assessment and independent assessment to confirm the ability of all the processes to achieve the intended results and their ability to ensure safety, to evaluate performance of work including culture and to identify opportunities for improvement.
 - Potential non-conformances and causes of safety related events that could detract from the organization's performance shall be identified using feedback from, both within internal and external organization; through the use of research; through the sharing of knowledge and experience; technical and research development; and the identification of best practices.

[Ref: GSR Part 2|Req 13,14|GS-R-3|6.1, 6.2, 6.3, 6.11,6.15,6.16]

Why Monitor and Conduct Oversight?

- Improvement
 - The effectiveness of the management system shall be monitored and measured to confirm the ability of the organization to achieve the results intended and to identify opportunities for improvement of the management system.
[GSR Part 2 Req.13]
 - Opportunities for the improvement of the management system shall be identified and actions to improve the processes shall be selected, planned and recorded. Improvement plans shall include plans for the provision of adequate resources, using project management methods. Actions for improvement shall be monitored through to their completion and the effectiveness of the improvement shall be checked.
 - Individuals in the organization should be considered the best source of ideas for improvements. Even small improvements should be controlled in order to understand their cumulative effects.

[Ref: GSR Part 2, Req 13| GS-R-3| 6.17, 6.18, 6.16; GS-G 3.1|6.78, 6.81,6.82]

The Importance of Oversight?

Assessing and Continually Improving

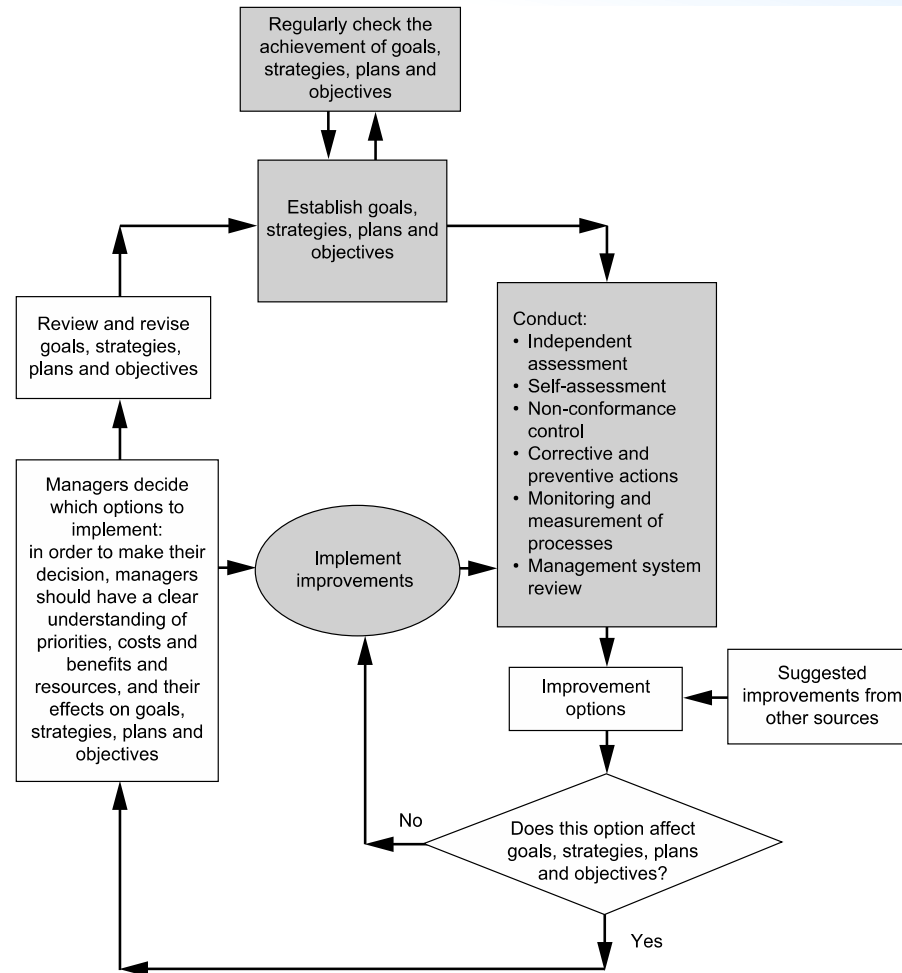


FIG. 3. The continual improvement cycle. The shaded boxes denote requirements for the management system [1]. The start box is the 'establish goals, strategies, plans and objectives' box.

Conclusion

- Culture is important – it affects safety performance
- A management system that promotes and supports a strong safety culture is essential
- Regulatory bodies can gain assurance that owners/operators of nuclear facilities and licensed activities have made adequate provision for robust management systems and the promotions and support for a strong safety culture

What is measured or monitored is managed

Thank you!

