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Enhancing Safety Culture and Management Systems

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Culture and Safety Culture

Lessons Learned

Proactive Prevention

**IAEA Safety Standards
for Management Systems**

IAEA Present Initiatives



Safety Culture - IAEA developments

A need from Member States to:

- *understand* the concept of Safety Culture
- know how to *assess* Safety Culture
- know how to *improve and enhance* Safety Culture
- know how to *sustain and continuously improve a strong safety culture, particularly during times of change*

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Some misunderstandings, still around....

- "They lacked a safety culture..."
- In relation to a human error: "he/she had a poor safety culture"
- In relation to the commissioning of a nuclear power plant: "A safety culture should be *adopted* by the constructor, the engineer and the operator, as well as the regulatory body"
- Safety Culture **or** Safety Management?
- Organizational culture **or** Safety Culture?
- One culture **or** subcultures?
- Safety Culture **or** Safety?

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Understanding Safety Culture

INSAG-4 (1991):

"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"

In its manifestations, SC has two major components:

- *the **framework** determined by organizational policy and management action*

and

- *the **response of individuals** in working within and benefiting by the framework*

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Understanding Safety Culture

The response of all those who strive for excellence in matters affecting nuclear safety is characterized by:

A questioning attitude

+

A rigorous and prudent approach

+

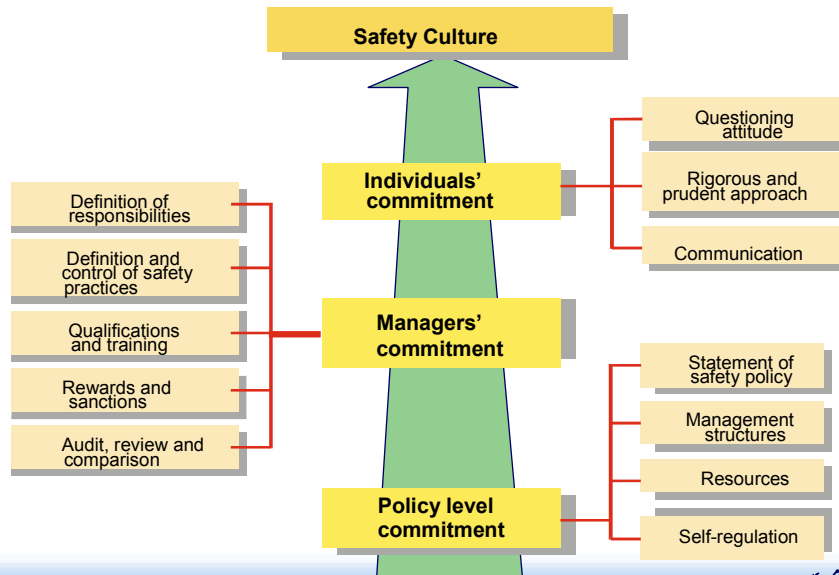
Communication

The result will be a major contribution to SAFETY

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INSAG 4: Safety culture



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Other Definitions of Safety Culture

UK Health and Safety Commission (ACSNI), 1993:

"The safety culture of an organisation is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behaviour that determine the commitment to, and the style and proficiency of, an organisation's health and safety management.

Organisations with a positive safety culture are characterised by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficiency of preventive measures"

Defined a positive safety culture

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INPO (Institute of Nuclear Power Operations)

Definition:

"An organization's values and behaviour - modeled by its leaders and internalized by its members - that serve to make nuclear safety the overriding priority"

Principles for a Strong Nuclear Safety Culture:

- Everyone is personally responsible for nuclear safety
- Leaders demonstrate commitment to nuclear safety
- Trust permeates the organization
- Decision-making reflects safety first
- Nuclear technology is recognized as special and unique
- A questioning attitude is cultivated
- Organizational learning is embraced
- Nuclear safety undergoes constant examination



Organizational Culture and Safety Culture



What is culture?

Most of the culture is below the surface



Above the surface we find the visible aspects of culture: artefacts, people's actions, language use

Below the surface we find :

- norms
- values
- fundamental assumptions of reality

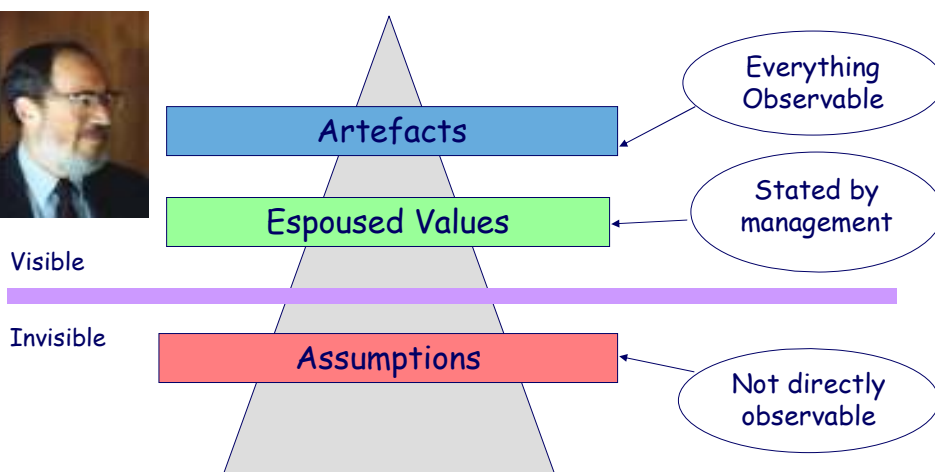
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Edgar Schein suggests that culture can be considered in **THREE LAYERS**

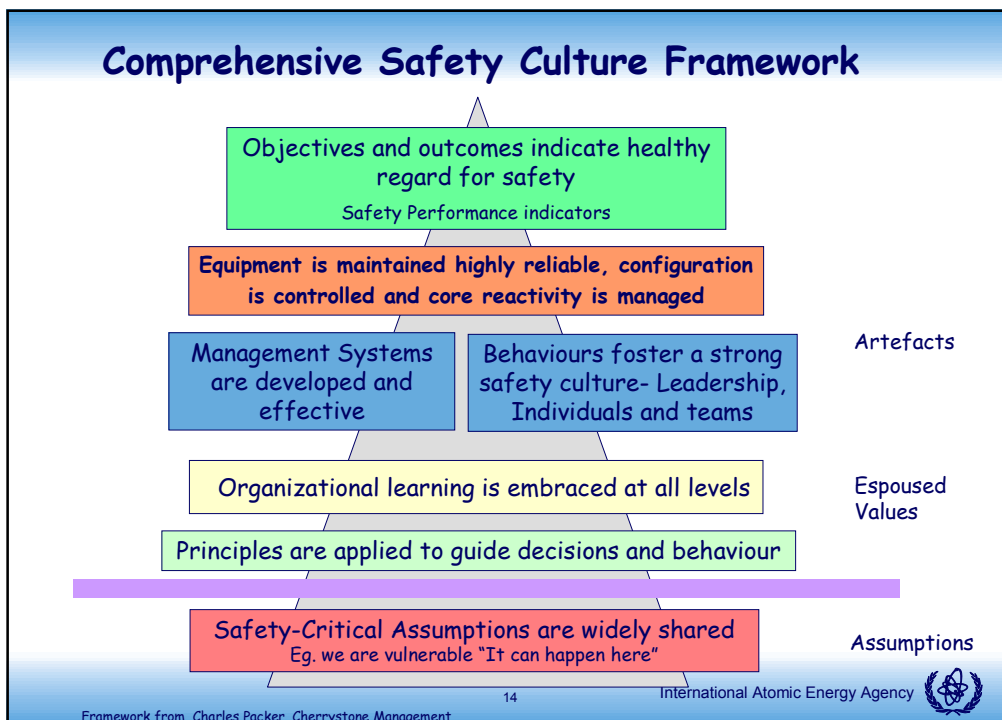
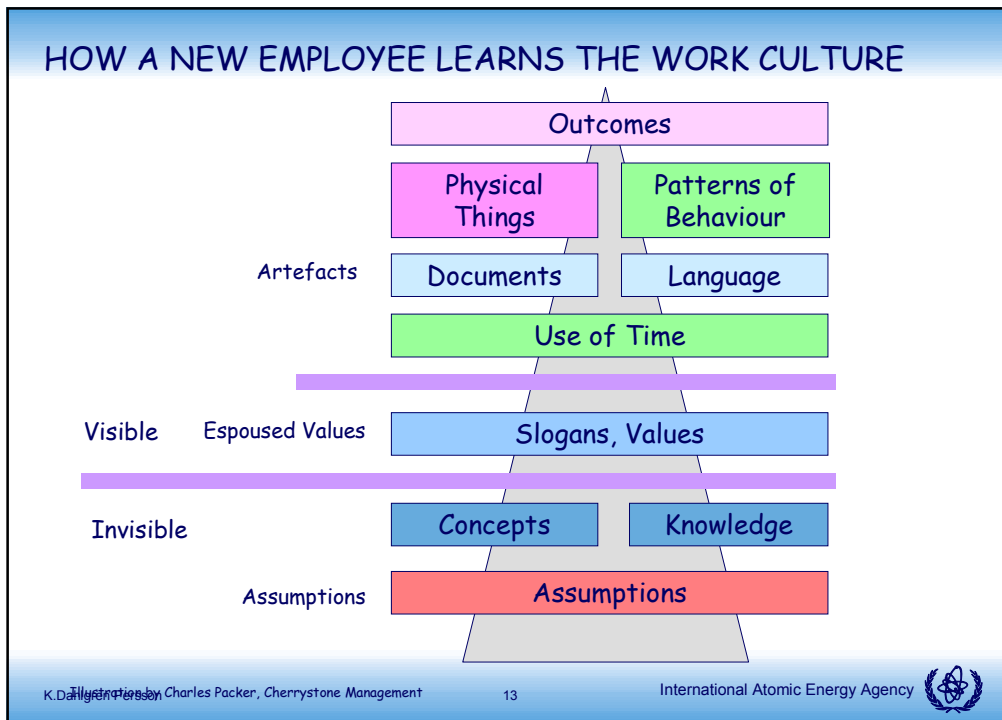


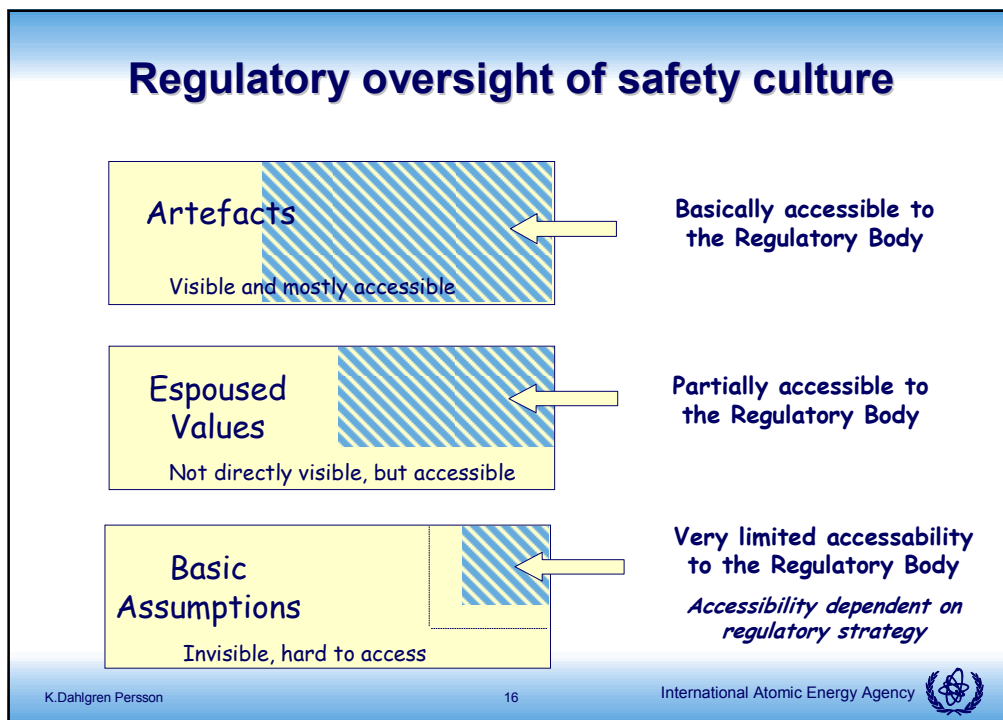
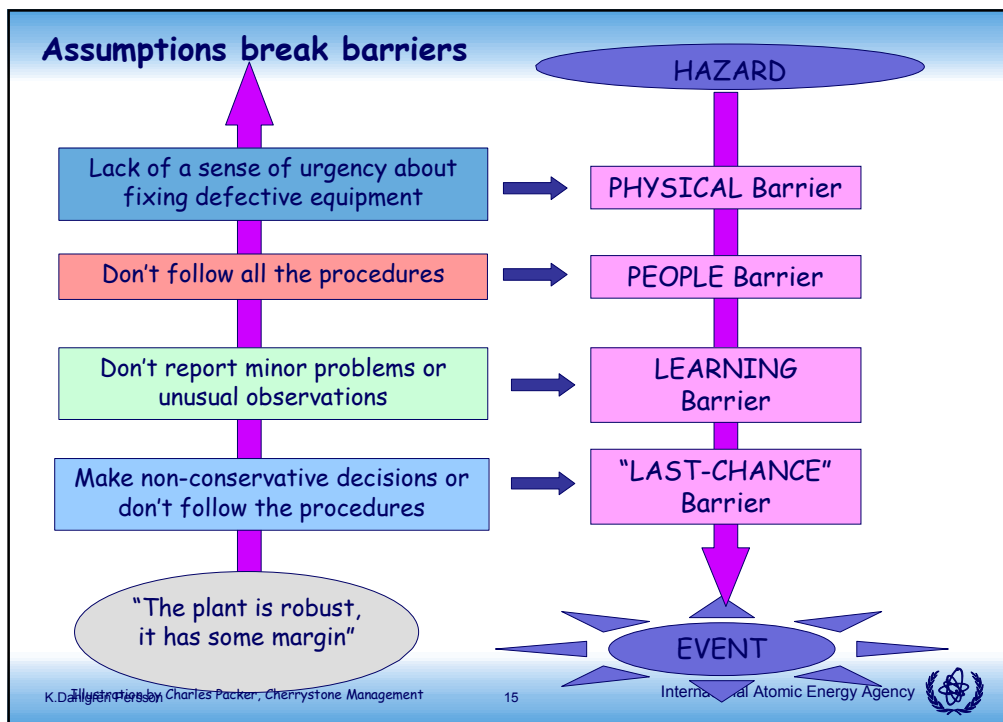
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Stages of Development of Safety Culture

Stage 1

Safety management is determined by regulations and rules

**Prescriptive/
Compliance**

Stage 2

Good safety performance becomes an organizational goal

**Performance/
Outcomes**

Stage 3

Safety performance can always be improved

**Process+
Outcomes**

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17

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Lessons Learned from Accidents and Incidents

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IAEA Topical Issues Conference 1998

"Shortcomings in Safety Management -Symptoms, Causes, Recoveries"

Common symptoms

- Believed they belonged to the best performers (production) - complacency
- Utility and Regulatory Focus on Technical rather than Management and People Issues
- Organizational Insularity
- Lack of Effective Corporate Oversight
- Continuous Management Directional Changes and Cost cutting
- Repeated Problems
- General Dissatisfaction of Regulatory Authority

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IAEA Meeting June 2003- Common issues

- Previously good performers and Gradual deterioration over time
- Over-reliance on technology - Strong belief in the robustness of the plant design
- Adverse effects of downsizing, management-worker relationships, management-union-regulator relationships
- Ineffective QA programme
- Ineffective reactor safety oversight
- Lack of competence in human performance evaluation
- Lack of Leading Indicators
- Regulatory issues

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Themes "Warning Flags" - INPO List

- Overconfidence
- Isolationism
- Managing relationships
- Production priorities
- Nuclear Leaders
- Operations and Engineering
- Plant events
- Self-critical
- Managing change



Texas City Refinery Accident 2005

Explosions and fires killed 15 people and injured another 180, alarmed the community (43000 people to remain indoors + houses damaged) and resulted in financial losses exceeding \$1.5 billion.

"The Texas City disaster was caused by organizational and safety deficiencies at all levels of the BP corporation. **Warning signs** of a possible disaster were present for several years, but company officials did not intervene effectively to prevent it"

- Relied on **past success** (as measured only by personal injury rates)
- **Repeat problems** without proper management actions
- Did not **learn** from past incidents-lacked a reporting and learning culture
- **Cost cutting, failure to invest and production pressures**
- Training and staff **downsized**
- Ineffective corporate **safety leadership and oversight**
- Effects of **organizational changes** on safety not effectively assessed
- Managers did not **lead by example** regarding safety
- **Failure of regulator** (OSHA) to inspect and intervene



The Columbia Accident Investigation Board

"In our view, the NASA **organizational culture** had as much to do with this accident as the foam. Organizational culture refers to **the basic values, norms, beliefs, and practices** that characterize the functioning of an institution. At the most basic level, organizational culture defines **the assumptions that employees make** as they carry out their work. It is a **powerful force that can persist through reorganizations** and the change of key personnel. It can be a positive and negative force."



NOTES

- Different types of technical failures
- Different types of reactors
- Different types of production
- Different types of national culture

BUT

Similar types of organizational failures

- All events apparently rooted in the organizational culture
- The root causes appear to have been established many years before the event, yet went undetected



Lessons learned from events

**What Lessons do
we really learn
from?**

**The same old
stories?**



**Do more positive examples have a
greater impact?**



A positive example (real)

A typical story: A plant that for many years was considered a "best in class" facility later on became a bottom-quartile performer with numerous organizational effectiveness problems

Senior management: "we isolated ourselves when we achieved a good rating and we stopped improving. At this point we were really stubborn to change because we still generated electricity and we were profitable"



Organizational Effectiveness Results

- **Decrease in Human Performance Errors**
from 1.2 to .58 per 10000 employee work hours
- **Reduced Maintenance backlog**
from 400 to 21 items in three years
- **Exceeded Outage Goals**
(financial, safety and scheduling) for the first time in plant history
- **Met annual financial budget goals**
for the first time in plant history
- **Improved INPO assessment ratings**
- **Improved INPO cumulative index for key performance indicators**
from 85.9 to 99.9%



Some critical success factors

- Strategic Culture Change Road Map
- Organizational Culture Assessment - identification of present and ideal culture +
- The leadership behaviours needed to move from present to ideal culture
- Creating a meaningful and compelling vision
- Leadership development program using "Appreciative Inquiry Principles" (focus of attention is on positive potential - the best of what has been, what is, and what might be. It is a process of positive change)
- Senior Managers modelling new desired behaviours
- Teamwork across functional lines



Prevention

Not only

Reactive prevention

Learning from events and making improvements

also

Proactive prevention

The ability of organizations to identify the nature and causes of developing problems (early warning signs), applying already existing MTO knowledge, development of a strong safety culture nurtured by leadership

"You become a hero if you fix a problem during the outage, but not the same recognition if you make a good long-term planning"



Management and Leadership



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Manager or Leader?

Management = a function

- Planning/Budgeting
- Organizing/Staffing
- Controlling/Problem Solving

Leadership = a relationship

- Establishing Direction
- Aligning People
- Motivating and Inspiring

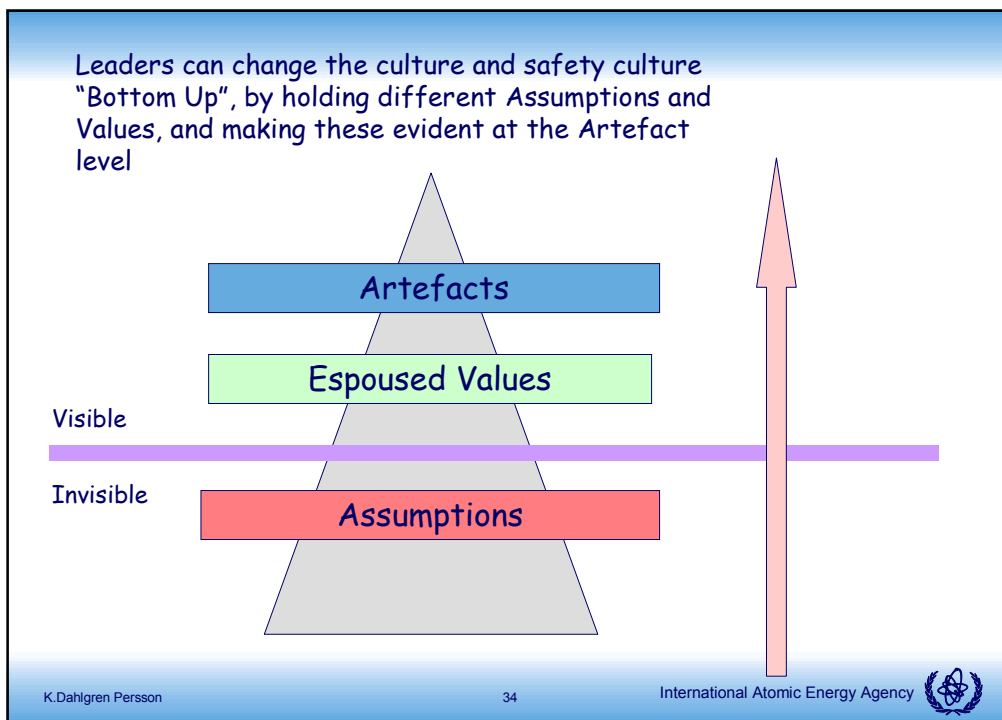
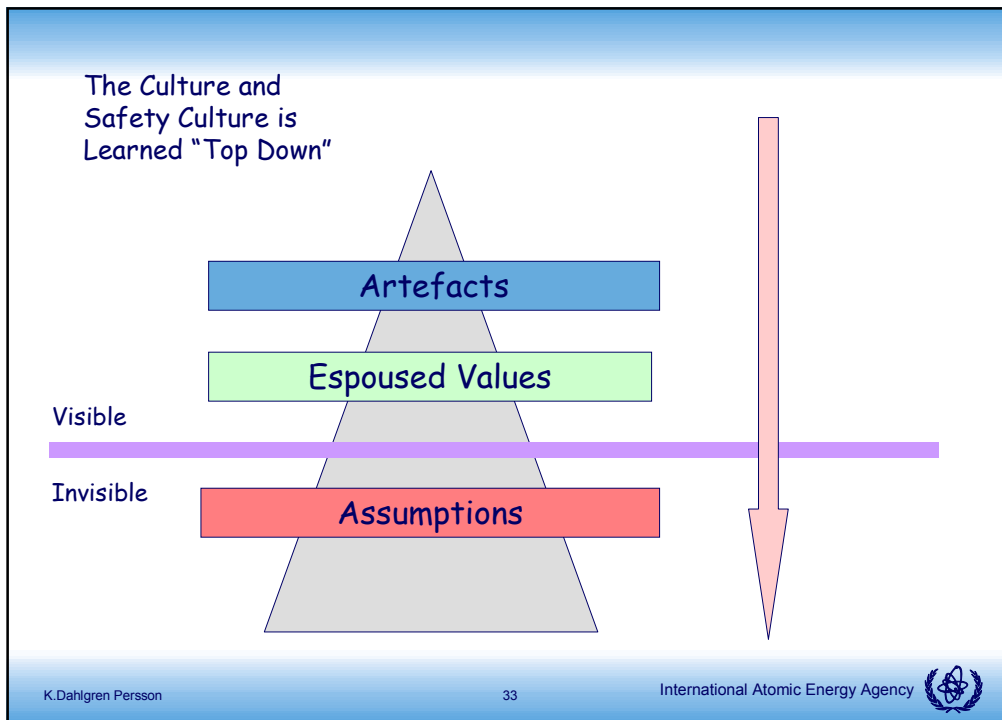
To manage means to accomplish activities and master routines, while to lead means to influence others and create visions for change

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32

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**"We can't solve problems
by using the same kind of thinking
we used when we created them"**

Albert Einstein



There are many OPPORTUNITIES

Things that people pay attention to:

- What managers/leaders MEASURE
- What managers/leaders PERSONALLY INSPECT
- How managers/leaders RESPOND TO A CRISIS
- Who makes DECISIONS, and how decisions are made
- What criteria are used to allocate RESOURCES
- Whether managers/leaders TEACH & COACH
- Who gets RECOGNITION or REWARDS and for what
- Who gets PROMOTION
- What LANGUAGE is used by managers/leaders
- How the managers/leaders treat the REGULATOR



IAEA New Safety Standards On Management Systems

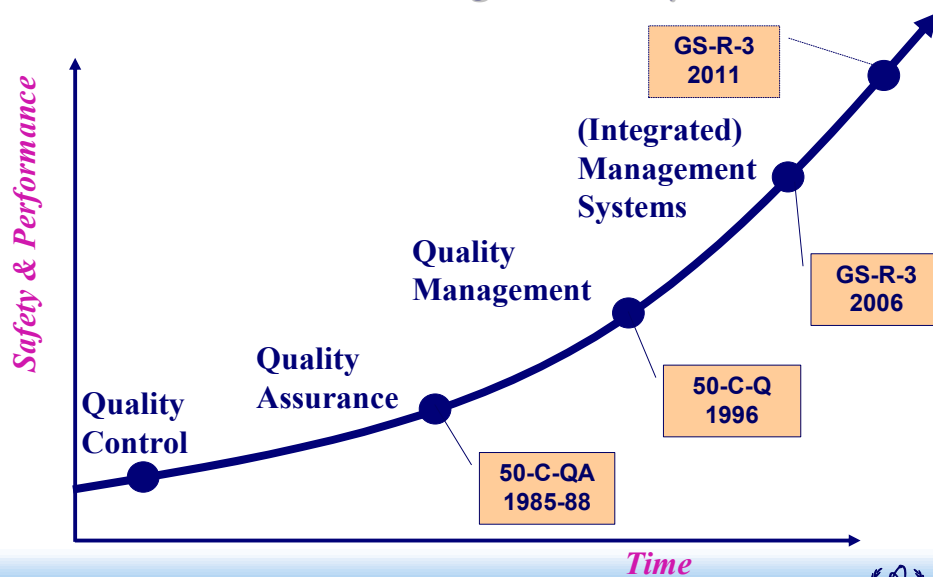
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Evolution to Management Systems



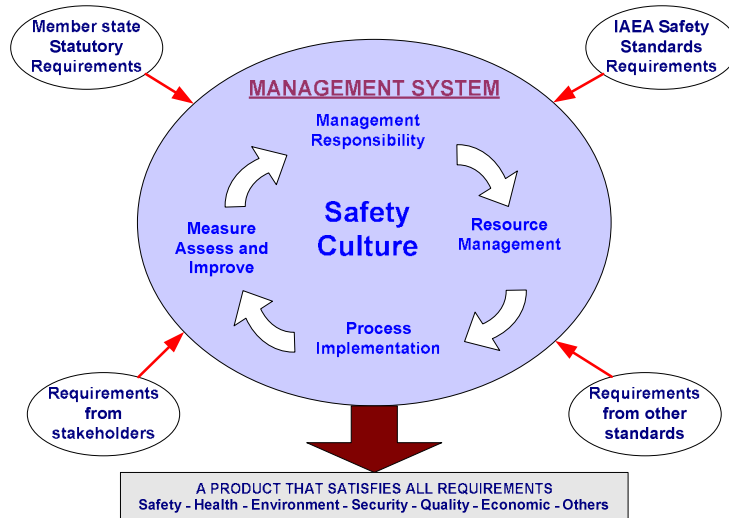
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Management system model



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The IAEA Safety Standards for Management Systems represent an **integrated** approach that recognizes:

- that safety emerges from the entire system of work that the organization performs - it cannot be separated out
- that all of the safety barriers are designed, constructed and applied by people and that people's basic beliefs, attitudes and behaviours (culture) are fundamental to safety
- that leadership is essential for the development of a strong safety culture and the successful implementation of the management system

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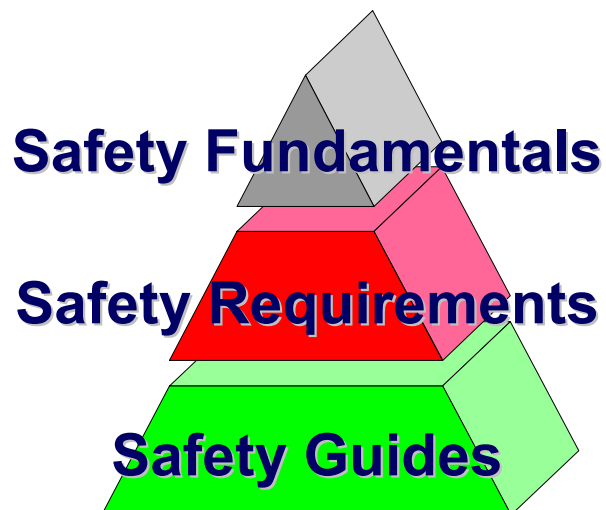


Two general aims of the Management System

- To focus the performance of the organization on achieving and improving safety through the planning, control, implementation and supervision of safety related activities in normal, transient and emergency situations
- To foster and support a strong safety culture through the development and reinforcement of good safety attitudes, values, and behaviour in individuals, teams and the organization so as to allow them to carry out their tasks safely



SAFETY STANDARDS HIERARCHY



IAEA Safety Standards for integrated Management Systems



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IAEA Safety Standards SF-1: 10 Safety Principles

Principle 3:

Leadership and management for safety

- Safety has to be achieved and maintained by means of an effective management system.
- This system has to integrate all elements of management
- The management system also has to ensure the promotion of a safety culture,
- Recognition of the interactions between individuals, technology and organization.



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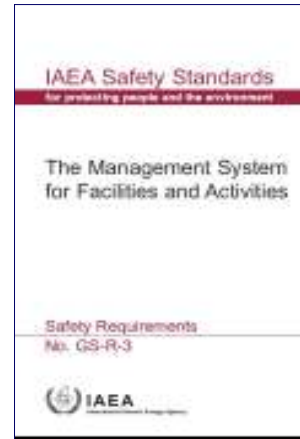
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The management system shall be used to promote and support a strong safety culture by:

- 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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3. Management Responsibility

- 3.1. Management **at all levels** shall demonstrate its **commitment** to the establishment, implementation, assessment and continual improvement of the management system and shall allocate adequate resources to carry out these activities.
- 3.2. Senior management shall develop individual **values**, institutional **values** and **behavioural expectations** to support the implementation of the management system and shall **act as role models** in the promulgation of these values and expectations.
- 3.3 Management **at all levels** shall communicate to individuals the need to adopt these individual values, institutional values and behavioural expectations as well as to comply with the requirements of the management system.



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6. MEASUREMENT, ASSESSMENT AND IMPROVEMENT

SELF-ASSESSMENT

6.2. Self-assessment shall be carried out by senior management and by all other management levels in the organization to evaluate the performance of work and the safety culture



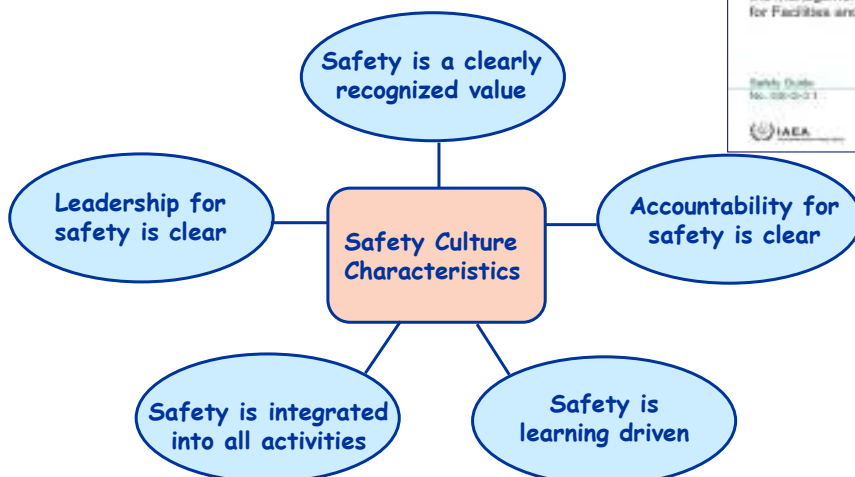
INDEPENDENT ASSESSMENT

6.3 Independent assessments shall be regularly conducted on behalf of senior management to:

- ...
- Determine the adequacy of work performance and leadership
- Evaluate the organization's safety culture
- Identify opportunities for improvement



IAEA SAFETY CULTURE CHARACTERISTICS AND ATTRIBUTES (GS-G-3.1)



Safety is a clearly recognized value

Attributes

- 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 behaviour is socially accepted and supported (both formally and informally)

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Leadership for safety is clear

Attributes

- 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

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Accountability for safety is clear

Attributes

- 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

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Safety is integrated into all activities

Attributes

- 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

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Safety is learning-driven

Attributes

- 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

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New IAEA initiatives to foster preventive approaches/cultures

- **Leadership for nuclear facilities and activities**
- **Leading indicators for effective management systems and safety culture**



Why should the IAEA provide guidance on leadership

- IAEA provides guidance to a wide range of nuclear facilities and activities, as well as the whole life-cycle of facilities
- Nuclear leaders face unique challenges
- Many Member States are planning for introducing nuclear energy for the first time



Leading Indicators for effective management systems and safety culture

New IAEA Activity

There are different types of indicators that measure and monitor safety:

- “*Output indicators*” called *lagging indicators* show the safety performance in terms of measures of past performance eg injury rates.
- “*Input indicators*” called *leading indicators* monitor the processes that are effecting and maintaining safety performance.
- Indicators can also be **positive, negative and neutral**.

Wherever possible the adoption of positive leading indicators should be encouraged as this sets goals to **achieve** rather than situations to **avoid**.



IAEA Services

- Seminars and workshops
- Support to Safety Culture Enhancement Programs (SCEP)
- OSART with enhanced review of safety culture
- Safety Culture Assessment by a Review Team (SCART)
- Support to Enhancement of Integrated Management Systems including Safety Culture (EMS)



***Safety Culture is a never ending story -
it's a journey- not a place, not a number***

Employee at Krsko NPP, Slovenia

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59

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...Thank you for your attention

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60

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Some IAEA documents for further reading

- Link to the IAEA Safety Standards: <http://www-ns.iaea.org/standards/>
- GS-R-3 "The Management System for Facilities and Activities"
- GS-G-3.1 "Application of The Management System for Facilities and Activities"
- GS-G-3.5 "Management Systems for Nuclear Installations"
- INSAG-4 "Safety Culture"
- INSAG-13 "Management of Operational Safety in Nuclear Power Plants"
- INSAG-15 "Key Practical Issues in Strengthening Safety Culture"
- Safety Reports Series No 11 "Developing Safety Culture in Nuclear Activities"
- Safety Reports Series No 42 "Safety Culture in the Maintenance of Nuclear Power Plants"
- TECDOC -1321 "Self-assessment of Safety Culture in Nuclear Installations"
- TECDOC -1329 "Safety Culture in Nuclear Installations"
- TECDOC -1491 "Management of Continual Improvement"
- TECDOC xxxx "Regulatory Oversight of Management Systems" (final draft)
- NE Series Report "Managing Organizational Change" (final draft)

