

# Implementation of Safety, Health and Environment



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# ***Implementation of Safety Health and Environment Management Systems***

*A comparison of German, French, Dutch, Italian and British Approaches*

***22<sup>nd</sup> October 1997***

***Headquarters of Lurgi Öl Gas Chemie GmbH,  
Frankfurt, Germany***

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## **ACKNOWLEDGEMENTS**

***This Workshop was organised by the Safety Health Executive Task Force of  
the European Construction Institute***

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**A Comparison of German, French, Dutch, Italian and British Approaches**

**Wednesday, 22 October 1997**

**Headquarters of Lurgi Öl Gas Chemie GmbH  
Frankfurt, Germany  
09.00-17.30hrs**

- 09.00 Registration and Coffee
- 09.30 Welcome and Introduction  
Mike Totterdell - ECI SHE Task Force Chairman  
Kurt Törster - Lurgi Öl Gas Chemie GmbH

## **Framework for SHE Management Systems - National Perspectives**

- 09.45 France - Mr Rousseau (Total)  
10.15 The Netherlands - Mr Marten Brascamp (Brascamp)  
10.45 Italy - Mr Senni Buratti (Snamprogetti)
- 11.15 Coffee
- 11.45 Great Britain - Mr Tony Hetherington (HSE)  
12.15 Germany - Mr Thomas Lögler (TÜV Rheinland)  
12.45 Discussion
- 13.15 Lunch

## **Implementation of SHE Management Systems - Organisational Perspectives**

- 14.45 Mr Paul Stolwijk, ABB Lummus Global  
15.15 Mr Roy Greenslade, AMEC Process and Energy  
15.45 Mr John Howlett, Technip
- 16.15 Coffee
- 16.30 Mr Giuseppe Nicoletti, Snamprogetti  
17.00 Mr Joseph Rutters, Lurgi Öl Gas Chemie  
17.30 Discussion and Closing of Workshop



# EUROPEAN CONSTRUCTION INSTITUTE

## Implementation of Safety Health and Environment Management Systems

### A Comparison of German, French, Dutch, Italian and British Approaches

Wednesday 22 October 1997

Lurgi Öl Gas Chemie GmbH, Frankfurt, Germany

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**Framework for SHE  
Management Systems -  
National Perspectives**

**FRANCE**

**Mr Rousseau  
Total**

**Paper not available at time of  
publication**

**For further information on this  
Presentation  
Please contact the ECI**





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**Framework for SHE  
Management Systems -  
National Perspectives**

**The Netherlands**

**Marten Brascamp**  
**Brascamp Veiligheidsadvies**

# Framework for SHE management systems - Dutch perspective

Marten Brascamp

Presentation at the ECI-workshop on SHE management

Frankfurt, 22 October 1997

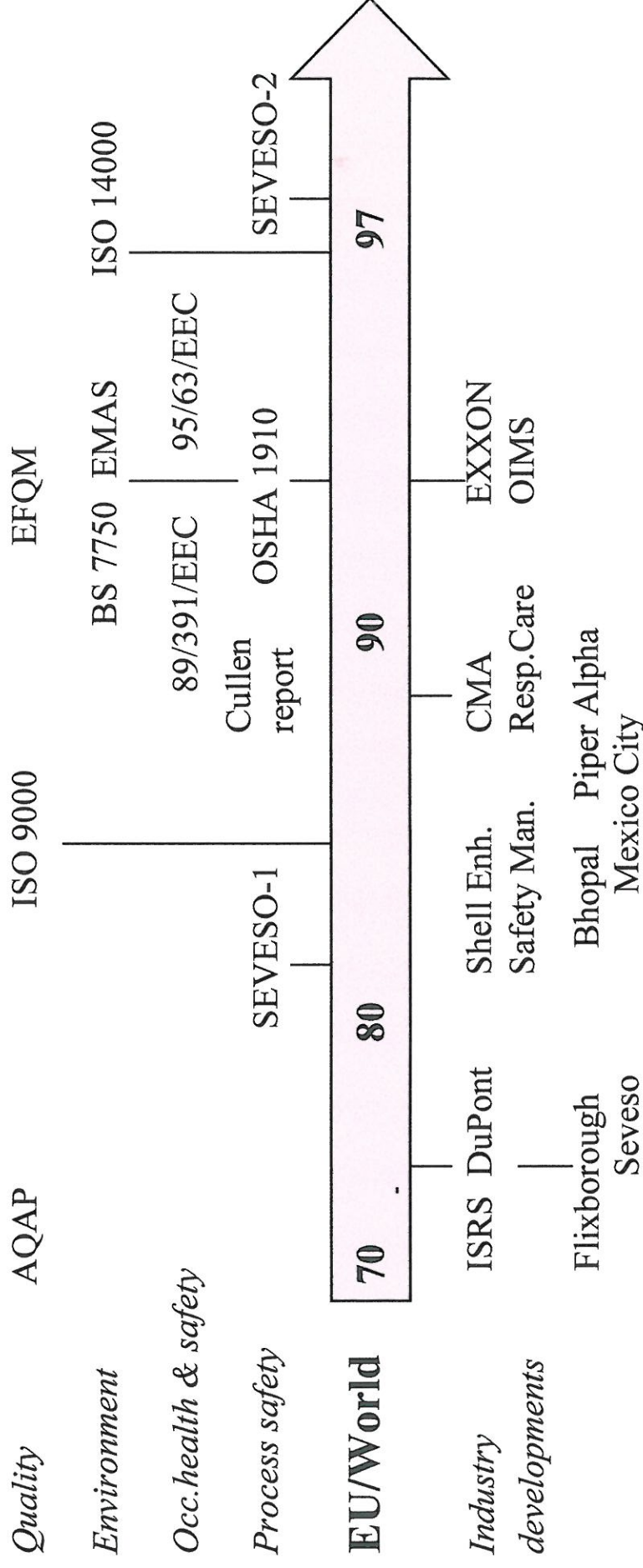


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2. Developments in The Netherlands
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4. Construction sector perspective



# International trends in SHE&Q



# Developments in The Netherlands

NL	Quality	Environment	Occ.health & safety	Process safety
1982				
1988	NEN-ISO 9000		Occ.safety report	External safety report
1990	Product liability act			
1994		First combined Q-E certificate	New occ.H&S Act	Safety Certif. Contractors VCA
1996		Annual envir. reporting	Risk evaluation, Annual plans Build. & Constr Process Act	
1997		E-management under permit to operate	Work equipment act	

# SHE&Q in Dutch industry 1997

## *Quality*

Total ISO certificates (>50 empl.) 7500 (industry:±80%)

## *Environment*

Total BS 7750 certificates (>50 empl.) 100's (industry:±5%)

EMAS certificates 13

Chem ind. Responsible Care members ±75 (75%)





# Construction sector perspective

## **Directly from legislation**

- Project risk evaluation, planning, co-ordination, education
- Safe work equipment
- Liability

## **Directly from principals**

- Safety certificate VCA

## **Indirectly through principals' vendor rating**

- Quality and SHE management systems





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**Framework for SHE  
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National Perspectives**

**ITALY**

**Senni Buratti**  
**Snamprogetti**



## **Biography for S. Senni Buratti**

Simberto Senni Buratti completed his engineering education at the University of Pisa (Italy) with a Doctor of Nuclear Engineering degree in 1971.

His professional career commenced with employment at CAMEN (Centre of the Military Application for the Nuclear Energy) in Pisa. In 1997 he joined Agip Nucleare, the nuclear company of the Italian ENI Group. Starting in 1981, he had a 4 year professional experience in the USA in the Ocean Mining Associates company, where he held the position of Director of System Engineering. In October 1985 he joined Snamprogetti where, presently, he is the manager of the Safety, Reliability and Occupational Health Department.

He is the author of many papers in the safety and reliability area and he has been chairman in Italian and European Conferences.

He is a member of the managing Committee of CISAP (Italian Committee for Safety and Environment in the Process Industry).

## **EUROPEAN CONSTRUCTION INSTITUTE**

### **Safety, Health and Environmental Management Systems Seminar**

#### **ABSTRACT**

#### **FRAMEWORK FOR SHE MANAGEMENT SYSTEMS-ITALIAN PERSPECTIVES**

**Dr. Ing. S. Senni Buratti (Snamprogetti -Italy)**

La salute delle persone, la sicurezza nella progettazione, costruzione, operazione e manutenzione degli impianti e la protezione dell'ambiente sono aspetti che fra loro interagiscono e che necessitano quindi integrazione, coordinamento e gestione univoca (SHE Management).

In questa sede si vogliono fornire alcune indicazioni su come ci si sta muovendo in Italia in relazione a tale tema, sia a livello di Autorità di controllo che di operatori (società di ingegneria ed esercenti di impianti).

Per quanto riguarda le Autorità di controllo e gli Enti autorizzativi, va prima di tutto dato atto che in questi ultimi anni vi è stato, in Italia, un enorme impegno nella definizione e promulgazione di leggi riguardanti la salute, la sicurezza e l'ambiente.

Purtroppo, la frammentazione dei vari attori a cui deve essere fatto riferimento in tema di salute, sicurezza e ambiente, unita alla mancanza di coordinamento fra gli attori stessi, porta a far ritenere che non siano buone, per lo meno a breve termine, le prospettive per opportuni sistemi di SHE Management a livello di Autorità di controllo ed Enti autorizzativi.

Il panorama è differente quando si guarda all'interno delle organizzazioni delle maggiori società di ingegneria o di operatori di impianti. In quest'ambito è ritenuto importante, ai fini di un miglioramento dell'efficienza, dei costi e dei tempi di realizzazione e intervento, il coordinamento degli aspetti di salute, sicurezza, ambiente.

Tali società infatti stanno implementando ben strutturate e coordinate Politiche e Piani di Salute Sicurezza e Ambiente, le cui attività sono portate avanti per tutto il ciclo di vita di un impianto, dalla fase di progetto concettuale, attraverso le fasi di progetto di base, progetto di dettaglio, costruzione e commissioning, fino alla fase operativa.

I principali obiettivi di tali Politiche e Piani riguardano la riduzione della possibilità di eventi incidentali, il soddisfacimento di tutti i target di Salute, Sicurezza e Ambiente, lo sviluppo delle opportune misure di prevenzione e protezione, la minimizzazione del rischio basata su considerazioni ALARP, lo sviluppo e l'adozione di una cultura in cui la salute, la sicurezza e l'ambiente sono elementi prioritari.

## **EUROPEAN CONSTRUCTION INSTITUTE**

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#### **FRAMEWORK FOR SHE MANAGEMENT SYSTEMS - ITALIAN PERSPECTIVES**

**Dr. Ing. S. Senni Buratti (Snamprogetti Italy)**

The health and welfare of personnel, the safety of plant design, construction, operation and maintenance and the protection of the environment are interfacing aspects which need integration, coordination and overall management.

This paper wants to give some highlights on the Italian perspectives of the above matter in relation to the framework existing within both the governmental Authorities and industrial organisations, such as engineering companies and plant operators.

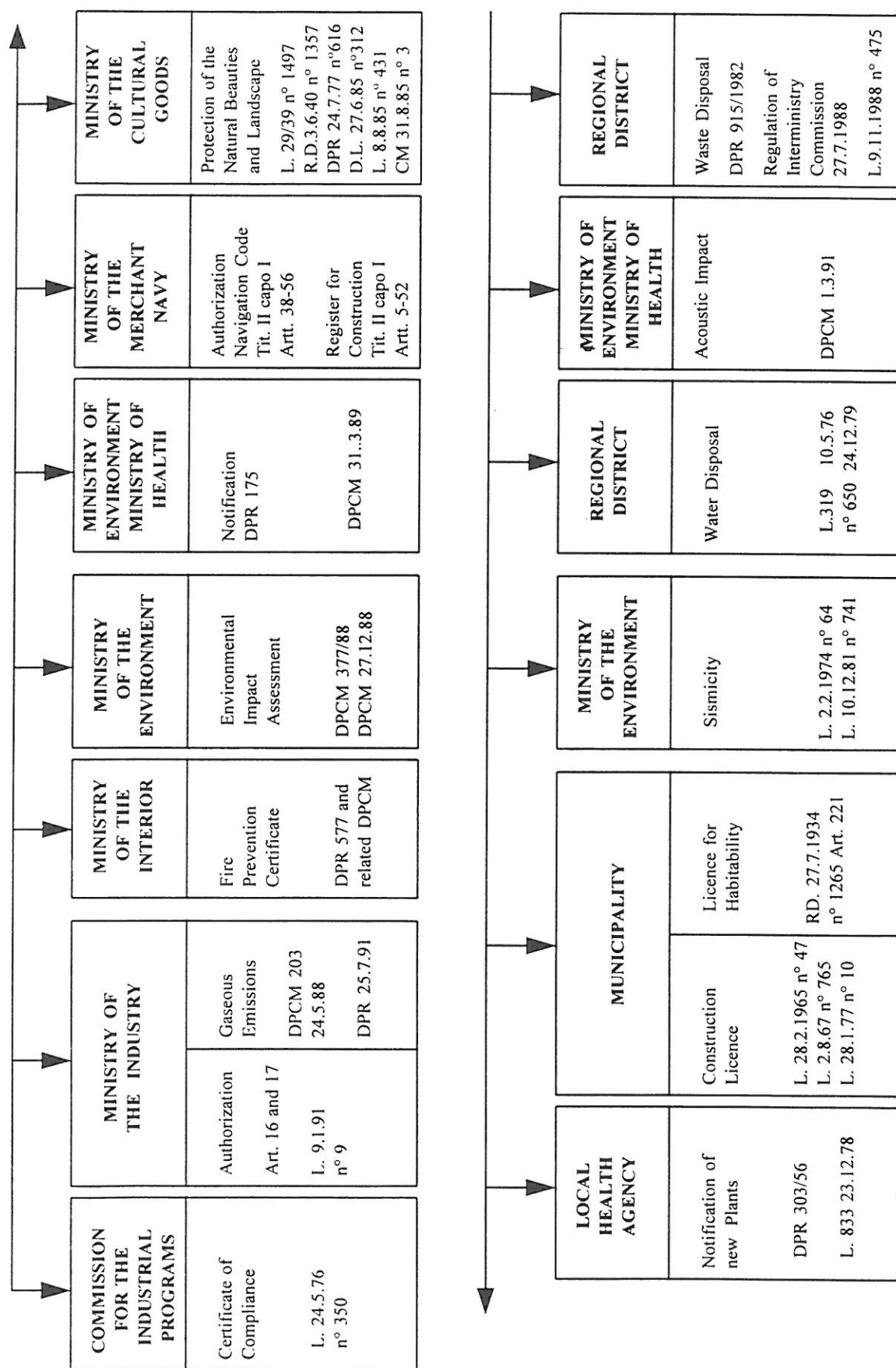
The Italian legislation related to the SHE matter has been very active in these last years.

A lot of laws, directives, regulations, acts have been issued to regulate the SHE aspects in design, construction and operation, the most important of which are related to:

- Major accident hazards (Seveso directive)
- Environmental impact assessment
- Gaseous emissions
- Health and safety at the work sites
- Safety of machinery
- Construction sites.

Apart from the complexity and, sometimes, the inconsistency of the above regulations, one aspect strictly related to the matter we are dealing with has to be underlined.

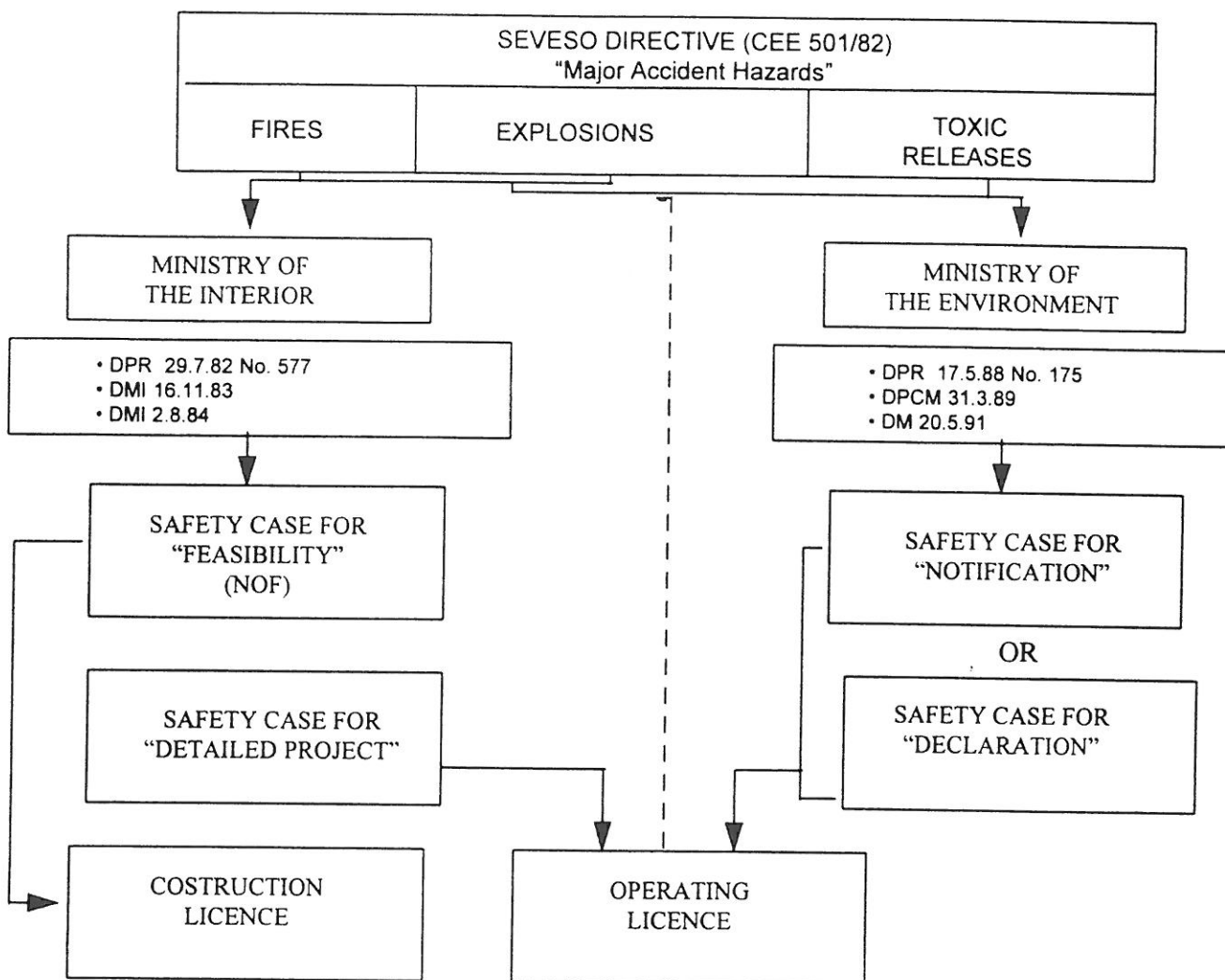
This is the high fragmentation of the Authorities to which it must be referred for the SHE authorizing processes. Various and different governmental Departments (Ministry of the Interior, Ministry of Environment, Ministry of the Labour, Ministry of Health, Ministry of the Industry) as well as local Authorities have the responsibilities of regulating and auditing the various aspects of the SHE matter. Figure 1 gives an overlook on how many authorizing Bodies are involved in the process for the operating licence of an industrial plant.



**Figure 1 - Governmental Bodies involved in the Plant Authorizing Processes**

In addition, coordination among the various actors is missing. This brings to consider far away the possibility of having a framework for a SHE Management System within the governmental organizations and Authorities.

An example to better clarify the problem is shown in Figure 2, where the major steps of the authorization process related to the Seveso directive are presented.



**Figure 2 - Major Accident Hazards Plant - Authorizing Framework**

Here two Ministries (Interior and Environment) are in charge for the application of the regulations related to the major accident hazards. The result is that two parallel and different processes have to be followed by the plant operator in order to achieve the operating license.

Recent new legislations, such as the DM 137/97, are trying to recombine the above double paths, but again the variety of actors involved, both at the local and central level, creates huge difficulties in coordinating the matter.

The scenario is quite different if we look inside the organizations of the engineering companies and plant operators.

Here is generally felt that the coordination of activities related to the Health, Safety and Environment is quite mandatory to improve effectiveness, cost and timing.

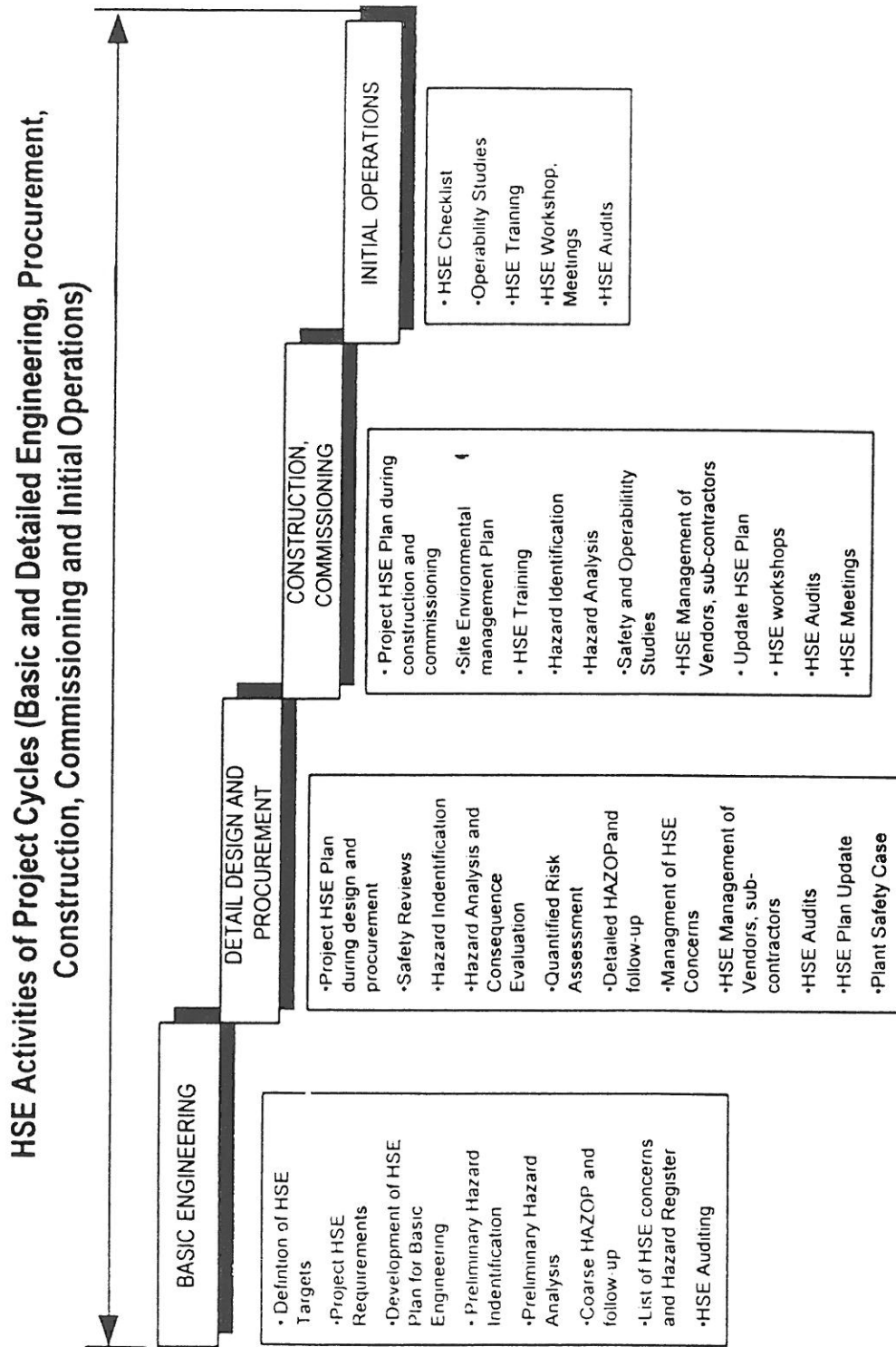
The major companies are implementing well structured SHE policies and SHE plans based on the general principles of good management that suggest to enable the integration and the coordination of all the SHE aspects.

Generally, within these SHE policies, compliance with legislation is seen as a minimum objective and SHE management principles include:

- Integration of SHE into business objectives
- Management and resources
- Communications
- Continuous improvement
- Hazard identification and hazard analysis
- Risk assessment
- HSE plan
- HSE training
- Audit, performance measurement and reporting
- Material hazards
- Reporting of accidents, incidents and complaints, and investigation
- Management of change
- Definition of SHE activities of conceptual design, front end and detailed design, construction and commissioning and initial operations
- SHE management of sub-contractors and suppliers
- Crisis and emergency management

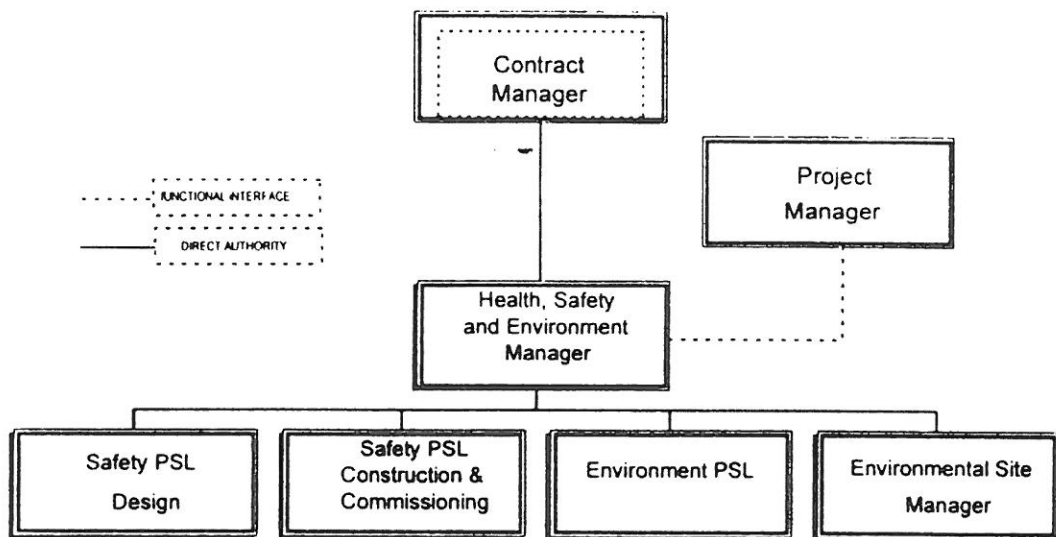
When applied to a specific project, the SHE activities permeate the overall project life cycle, starting from the conceptual design, passing throughout the basic and detailed engineering, procurement, construction, commissioning, up to the operation phase.





**Figure 3 - Typical HSE Activities of EPC Contract**

Typical SHE activities of an Engineering, Procurement, Construction (EPC) Contract are given in figure 3, while figure 4 gives the typical SHE organization structure of an EPC project.



**Figure 4 - Typical HSE Organisation of EPC Project**

The HSE organisation structures are the managing tool for implementing and coordinating the HSE system within the project, with the following main objectives:

- to minimise the possibility of accidents and damage during all phases of the project and to guarantee a safe working environment for people, in compliance with the stated Health and Safety and Environment specifications and national and international regulations.
- to ensure compliance with the acceptability criteria stated for the project;
- to identify all potential hazards associated with the project, and to develop prevention, control and mitigation's measures to eliminate or minimise harm to people, damage to plant or equipment, or adverse environmental damage;
- to minimise the risk associated with the plant based on ALARP justification;
- to review the impact of interface SHE activities on the project, communicate to Company to resolve them in accordance with the scope of work;
- to encourage the adoption of a positive, proactive, committed safety culture throughout all the phases of the project.

In conclusion, speaking about the italian perspective for SHE management systems, it can be said that there is a great effort in the industry area (both engineering companies and plant operators) in implementing SHE Management policies and systems, because it is felt that this is the only way for reaching high standards of health, safety, welfare and environmental protection both for Company employees and for any persons affected by the operation of their projects.

The power of a SHE management system which can coordinate, integrate and overlook all the SHE aspects is not yet well understood at the Authority level, where the variety of actors as well as the lack of coordination are unfavourable, for the moment, for a SHE management approach.





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**Framework for SHE  
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**Great Britain**

**Tony Hetherington**  
**Health & Safety Executive**

## **Biography of Tony Hetherington**

I am an Inspector working for the Health and Safety Executive (HSE). HSE is the primary health and safety organisation in the UK responsible for drafting regulations, developing policy and enforcing law. I have worked as a field inspector in the London area assessing construction site health and safety performance, securing compliance with legal standards and encouraging better practice. At present I work in a section of the organisation responsible for co-ordinating HSE's national efforts on construction inspection. I have had particular responsibility for managing HSE's 2 year project designed to implement the Construction (Design and Management) Regulations 1994.



**EUROPEAN CONSTRUCTION INSTITUTE**

**IMPLEMENTATION OF SAFETY HEALTH AND  
ENVIRONMENT MANAGEMENT SYSTEMS**

**THE UK'S EXPERIENCE OF THE IMPLEMENTATION OF  
HEALTH AND SAFETY MANAGEMENT SYSTEMS**

Tony Hetherington, HM Inspector, Health and Safety Executive,  
1 Long Lane, London SE1 4PG.

**Summary**

This paper reviews the development of health and safety legislation in the UK and the relationship between this legislation and the management of health and safety, with particular reference to the construction industry. It sets out HSE's view of a model for effective health and safety management and the need to certify the use of such a model. Links to quality management are also made. Costs of failure to manage health and safety are considered. HSE's experience of steps companies need to take as preparation for the introduction of any health and safety management are summarised.

**Introduction**

In the UK the approaches to health and safety and environment are dealt with by separate enforcement agencies. This paper addresses only the approaches taken to implementation of health and safety systems.

**The legal framework for all UK industry**

The UK has a long history of health and safety legislation, a significant proportion of which is relevant to construction.

Until the mid 1970s the vast majority of this legislation set detailed standards to be achieved. For example guard-rails had to be provided if a fall of more than 2 metres was possible, excavations had to be shored to prevent collapse etc. However, by the end of the 1960s there was a general feeling amongst the health and safety inspectors in the UK that even though physical precautions were well understood, the rate of accidents remained unexpectedly high.<sup>1</sup>

To investigate this the UK government commissioned a wide-ranging review of health and safety at work (the Robens Committee) at the beginning of the 1970s.<sup>2</sup> Robens considered that although the actual causes of injury were well known further detailed regulations "would not have helped because most of the accidents were associated with habits at work, general

site tidiness and human error". Such problems were not amenable to solution by the introduction of more and more detailed and prescriptive legislation.

Robens concluded "safety and health is not only a function of good management, but it is, or ought to be, a normal management function". Two essential ingredients for better health and safety management performance were identified "explicit policy objectives, and effective organisation in which individual responsibilities are clearly defined".

These principles underpinned legislation which was produced as a result of the Robens report. The Health and Safety at Work etc Act was introduced in 1974. This act applied to all work activities, including construction. It is still the foundation of the UK's health and safety legislation. It changed the focus of UK health and safety legislation away from the old prescriptive regime to a new goal-setting structure. It required that all those responsible for work activities should protect workers and the public from risks arising from those activities. Employers had to ensure,

- plant and systems of work were safe and without risks to health;
- articles and substances were used, handled and stored safely and without risks to health;
- employees were adequately trained, instructed and supervised; and
- the workplace itself and the working environment were safe and without risks to health.

Employers were also required to have a general policy with respect to the health and safety at work of their employees and to have the organisation and arrangements to carry out that policy.

The act required all aspects of the way work was undertaken to be considered and action to control risks to be taken. The act also recognised that the severity of risk was important. The greater the risk, or the difficulty of managing that risk, the more that had to be done.

It was explicit that it fell to the employer to have a system to manage risks, rather than a procedure to ensure certain precautions were in place.

For the first time, to comply with the law there had to be a health and safety management system. A system being a composite, at any level of complexity, of personnel, resources, policies and procedures, the components of which interact in an organised way to ensure a given task is performed, or to achieve or maintain a specified outcome. (BS8800).<sup>3</sup>

Thus, small companies dealing with low risk operations could use a very simple system. Large multi-site employers dealing with higher risks had to do considerably more.

The other major change introduced by this legislation was that health risks were given the same priority as safety risks. In general, prior to this, health risks had been given relatively low priority. Even today ensuring that health issues receive the same attention and priority as safety matters causes great difficulty.

The duty to establish effective arrangements for managing health and safety was made more explicit in 1992 by the Management of Health and Safety at Work Regulations. These Regulations were the UK's primary means of implementing the European Community 'Framework' Directive on health and safety.

A central theme of these Regulations is the need for risk assessment and management arrangements for risk control by employers. The process of risk assessment emphasised the existing links between health and safety management and other aspects of management and the need for health and safety to be seen as a central part of the day to day running of an organisation.

HSE believes that there are five key steps to risk assessment.

- identification of the hazards. The hazards which can reasonably be expected to cause harm should be identified. The trivial can be ignored;
- deciding who might be harmed and how. This includes employees, others working at the site and the public;
- evaluation of the risks arising from the hazards and decisions about whether existing precautions are adequate or whether more should be done. It is acknowledged that even after all precautions have been taken, some risk may remain. Any specific legal requirements and generally accepted industry standards should be in place. But more may be necessary, where further reasonable precautions are possible, they should be in place;
- recording the findings. This means writing down the more significant hazards and recording the most important conclusions;
- reviewing the assessment from time to time and revising it as necessary. This ensures that the assessment is kept up to date with the way the work is actually done, changes in machinery and equipment used, development of new risk control techniques and advances in knowledge which may reveal previously unsuspected hazards.

The law does not require employers to be able to show how they did their assessment. However, they should be able to demonstrate that.

- a proper check was made;
- all who might be affected were considered;
- the obvious, significant, hazards and the number of people affected were taken into account; and
- the precautions taken were reasonable and lead to satisfactory control of risk.



## Models for effective health and safety management

Securing more effective management of health and safety is one of HSE's priorities. The importance placed on this is illustrated by the guidance "Successful Health and Safety Management" (HS(G)65) <sup>4</sup> which was published in 1991. It is currently being revised but will still cover the same central themes. This document provides guidance on a systematic approach to health and safety management. This helps managers to see health and safety in the wider context of general strategic management and the goal setting requirements of modern UK health and safety legislation.

Many of the key aspects of "Successful Health and Safety Management" can apply more widely than just to health and safety. This gives added force in driving home the message that the core management activities which have to be undertaken to manage risk are no different to those necessary in other areas of business activity. The HSE model is not the only one, but it does pose important and penetrating questions:

- is there a clear policy on health and safety?
- does the organisation organise effectively to achieve good standards?
- is health and safety effort planned efficiently?
- is performance measured and fed back into improvements?
- does the organisation review its experiences?

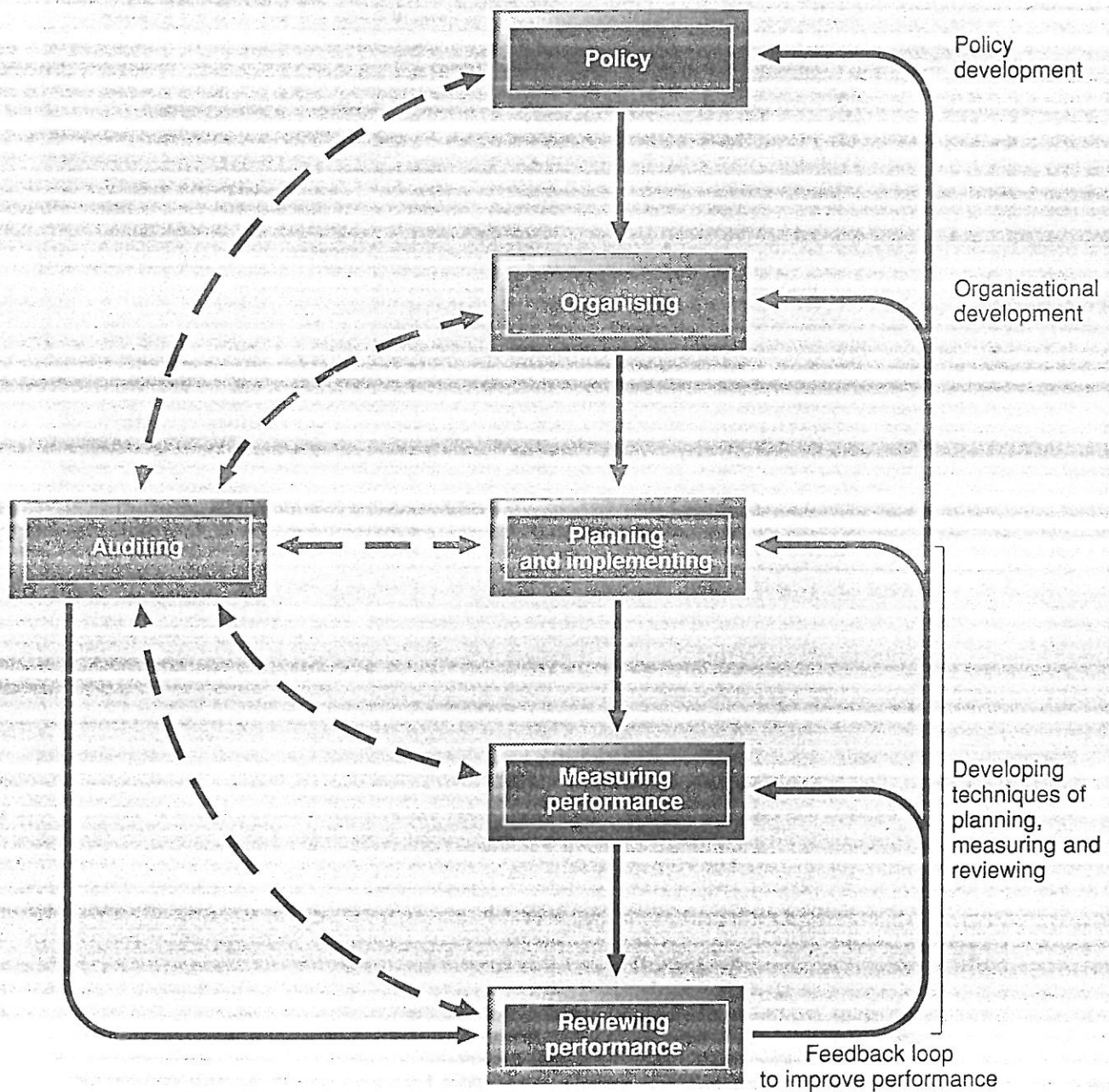
The model is illustrated in Diagram 1.

This is recognisably based upon models for quality management, but we must remember that the adoption of quality management systems will not automatically lead to high standards of health and safety, particularly where the focus is on the product or service rather than on the people producing it. There needs to be explicit consideration of health and safety issues. 'Continuous improvement' in the context of health and safety means having as the goal a risk-free working environment. Those organisations which work towards this goal are not normally acting out of purely philanthropic motives but have recognised that accidents and ill health cost money. An effective system for health and safety management will help reduce what in quality terms is known as the 'cost of non-conformance'.

This model also provides a basis for the British Standard BS8800: 1996 "Guide to occupational health and safety management systems" <sup>3</sup> and is compatible with HS(G)65. This standard is a guide and there is no certification scheme associated with it. There is no legal requirement to follow the guidance.

UK health and safety inspectors increasingly look at health and safety management systems used by companies. Use of BS8800: 1996 may help companies, but the key factor is the overall effectiveness of the arrangements for health and safety. The inspector's confidence in the health and safety management system and management's ability to control risks would be taken into account in deciding the extent of further inspection and the frequency of future visits.

**Diagram 1** Key elements of successful health and safety management



Perhaps more important for the individual organisation is the extent to which a company which has achieved an accredited or certified management standard might expect to be treated differently by inspectors. Our view in the UK is that use of standards is one indicator of how an organisation has planned its approach to health and safety management. But questions remain. Is the standard leading to active management of health and safety? Or has it been picked up simply because it's there? Is the resulting system largely a paper exercise where people go through the motions because senior management says they have to? For these reasons, use of a standard such as BS8800 would not necessarily affect the manner or frequency of inspections or signify automatic compliance with the law. Other relevant factors - such as the overall hazard/risk profile or the accident/ill health incidence rate for the industry - also come into play in influencing inspection and enforcement strategy.

### **The cost of health and safety management failures**

HSE sees no contradiction between health and safety and profitability. Those organisations which perform well and have high standards of health and safety are often the most successful, irrespective of size or industry. The common thread running through these organisations is the application of the principles of sound and effective management to health and safety, together with the integration of health and safety into their overall management agenda. An important common denominator is the adoption of a total loss control approach which seeks to identify and eliminate underlying failures of management control irrespective of whether or not they lead to personal injury.

In loss control theory, the relationship between accidents is often expressed as accident triangles. These triangles are used to show the relationships between the numbers of accidents involving fatal injuries, non-fatal injuries, property damage and near misses, forming the peak, middle and base of the triangles respectively. The severity of the outcome of an accident often depends on chance if organisations fail to properly identify hazards and control risk. Controlling the causes of the hazard has the potential to prevent a whole range of possible consequences.

An accident costings methodology has been developed by HSE. It attempts to identify the cost of all accidental losses that were considered to be preventable and that an organisation committed to loss control would aim to eliminate. To achieve this objective the methodology was based on a wide definition of the term 'accident'. An accident was regarded as any unplanned event that resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of business opportunity. For a number of months in each of five case studies, all accidents meeting this definition and involving loss above an agreed threshold were recorded. The cost of each accident was then assessed and a judgement made on whether it would have been cost effective to prevent it.

A detailed report of the study was agreed with each of the organisations concerned. The extent of financial savings which the organisations considered could be recovered by enhanced managerial control were identified. Detailed results are published in HS(G)96 The costs of accidents at work".<sup>5</sup>

The construction site studied was for a supermarket. The main contractor was a wholly owned subsidiary of an international building and civil engineering company. Work on the

contract, valued at about £8m, began in March 1991 and was completed in April 1992. Labour was provided primarily through 29 sub-contractors. A project manager was assigned to the site, along with two assistant site managers. Engineers were employed from an agency. The study took place over 18 weeks. The duration and phasing (groundworks to roofing) were chosen to cover a range of stages of the construction process and, hence, a wide range of trade contractors.

All accidents which met the accident definition were above a threshold value of £5, and were considered by the main contractor to be preventable, were recorded for the whole site. A total of 3626 accidents were recorded which met this definition and resulted in direct financial losses of £87,507. Opportunity costs, mainly wages paid during periods of no production, amounted to a further £157 586, making a total loss of £245 075. Assuming that accidents occurred at this rate throughout the entire contract, total losses were estimated to be in the order of £700 000, or approximately 8.5% of the £8m tender price. Losses of this order are clearly important and particular so in a recessionary climate, with tight margins for tenders in the construction industry. The financial costs alone represent significant lost potential for profit.

During the study no one suffered major or catastrophic loss. It is to the company's credit that no major injuries, dangerous occurrences or over-3-day injury accidents occurred during the study period. Nor were there any fatal injuries, prosecutions or significant civil claims, all of which could have increased the levels of loss well beyond those recorded. A separate analysis of the accidents showed that over 80% were judged to have the potential for serious consequences such as fatalities, multiple injuries or catastrophic loss.

### **The legal framework for construction**

But this all relates to all industry, what about the particular problems of construction? In construction in the UK large numbers of organisations are involved in all projects of any size. The nature of the work being undertaken, the type of risk to be managed, the size and sophistication of the company and its management style and structure are very variable. Two factors are of particular relevance. First, especially amongst contractors, the workforce themselves may have no lasting relationship with their employer. Second, the designers, who decide on the risks, act in isolation from the contractors who must manage the risks.

In developing a legal framework to secure the management of construction health and safety throughout all stages of a project the UK has developed construction-specific legislation following the model set out in the Temporary and Mobile Construction Site Directive. The regulations are the Construction (Design and Management) Regulations 1994 (CDM). CDM recognises that all parties to a construction project, the client, the designers and the contractors can, and should, play their part in the management and control of construction risk.

The framework which has been adopted relies on a number of key principles,

- all those at work on the project should be competent and resourced to deal with the health and safety risks associated with it. Part of resourcing and



competence of an organisation is a skilled and trained workforce working to a suitable management system;

- designers should review their designs to eliminate hazards and reduce risks. This means that designers who have no links to those actually at work on site must now take account of the risks inherent in their design. They must contribute to the risk assessment and control process fundamental to the management of health and safety risks; and
- information should be made available to all those who need it in time for them to react to it. For example, designers need to know about specific hazards on site eg ground contamination, before they can properly analyse the hazards and risks constructing their design will entail.

CDM, as with other UK legislation, is a framework for action. It sets goals to be achieved. For example,

- the client has to make relevant health and safety information available;
- designers have to eliminate hazards and reduce risks;
- a plan detailing project health and safety information for contractors must be provided; and
- a contractor has to be appointed to manage and co-ordinate health and safety during the construction phase.

There are no standards directly applicable to the management of this process. Clearly, existing quality standards can be useful for ensuring that key steps are taken at appropriate stages. However, there is, as yet, no clear consensus in the UK as to how the desired ends should be achieved. The variations in approach are wide. In view of the many organisations which interact systems which interlock easily and produce compatible outputs may be more beneficial to achieving better project standards than any particular set of rules or procedures which are suitable for only certain types of company, or dutyholder.

Thus, the general UK view that health and safety management systems are of value but should not be pursued unless there is clear demand from industry is reinforced. At present a wide range of approaches to CDM is developing. Which approaches are compatible over a range of designers and contractors and compatible across the designer: contractor interface, remains to be seen. Imposing a standard, whether certified or not, is likely to be counter productive until this happens. The competence of individuals involved is at least as important as the detail of the process followed.

In fact, some in industry express the view that rather than evolve separate standards for health and safety management, environment and quality, a single integrated management standard appropriate to ensuring compatibility between all the players in a construction project for all these inter related issues may be the most appropriate direction in which to proceed.

## **The practical implementation of systems**

HSE has very wide experience of working with companies to implement health and safety management systems and procedures. A number of key steps and issues for anyone considering implementing any system need to be addressed.

**Commitment from the top** - For success, there has to be senior management commitment. This commitment must be long-term and continuously driven.

**Key appointments** - A senior manager should be made responsible for health and safety. The appointee must provide the motivation to implement the system. A second key appointment is to make someone responsible for the implementation process. This person can be the same as the first and could be viewed as the architect or project manager of the system. In some companies this is often the health and safety manager.

**Pre appraisal** - Most organisations do not start from a zero baseline. In most cases it will help to know what arrangements already exist and identify any significant gaps. In some cases this may involve carrying out a baseline audit, or site management and the health and safety advisor undertaking an informal assessment.

**Policy** - It is at this stage that the company health and safety policy is normally developed or amended and introduced. It is also important to determine and communicate the principles upon which the implementation will be based, for example: involvement of the workforce; showing people that management care; and that health and safety is seen as being important as production.

**Communication of intent and demonstration of commitment** - It is important to communicate to the workforce how the company intended to manage their health and safety responsibilities. In some cases this may include a presentation by the Senior Site Manager to demonstrate his/her personal commitment.

**Organise** - The first thing that many organisations do is set up a Steering Committee to direct the implementation. The Steering Committee is normally made up of Senior Managers from different functions and this can also be a step in transferring ownership from the safety advisor to the line managers. It also allocates responsibilities and acts a problem solver.

**Plan** - This involves producing a plan to drive and control the implementation. The plan will normally be produced by the Steering Committee.

**Training** - Training will normally be required for both managers and supervisors. The detail and duration of training will often increase as it is extended down the management line.

**Selection and appointment of co-ordinators** - These are department or local champions of the health and safety management system. Where possible they should be individuals who have credibility with their peers and have an interest in health and safety.

At this stage the application of the principles set out a HS(G)65 and BS8800 may be implemented. Without this preparatory work experience of working with industry has shown the introduction of any new system, whatever its inherent quality, will be less effective. The system and procedures chosen should, as far as possible, align with other management systems already in place. This will then allow the eventual integration of all existing systems into a single structure.

## References

1. 1969 Annual Report of HM Chief Inspector of Factories. Cmnd 4461, HMSO 1970.
2. Safety and Health at Work, Robens Committee Report. Cmnd 5034, HMSO 1972 ISBN 0 10 150340 7.
3. BS8800: 1996 Guide to Occupational Health and Safety Management Systems. British Standards Institution, 1996. ISBN 0580 25859 9.
4. Successful Health and Safety Management: HS(G)65. HMSO ISBN 0 7176 0425X 1993.
5. The Costs of Accidents at Work: HS(G)96 ISBN 011 886374 6.

October 97.





**Implementation of Safety Health and  
Environment Management Systems**

**A Comparison of German, French, Italian  
and British Approaches**

**Wednesday 22 October 1997**

**Framework for SHE  
Management Systems -  
National Perspectives**

**Germany**

**Thomas Lögler**  
**TÜV Rheinland**



# **Implementation of Safety, Health and Environment (SHE) Management Systems**

## **The German Approach**

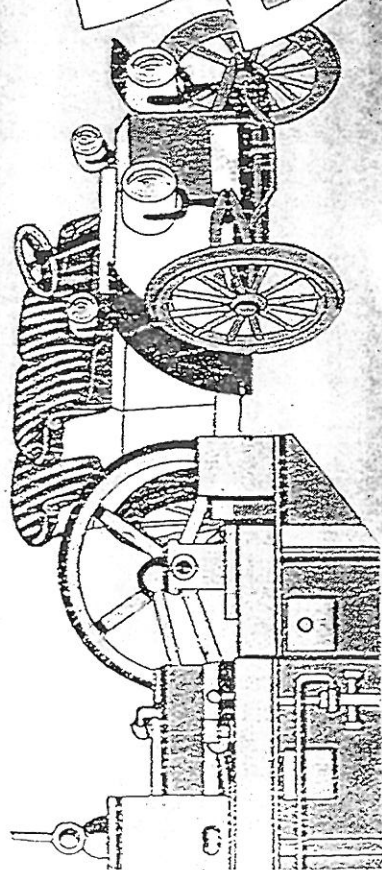
Dipl. Ing. (FH) Thomas Lögler  
TÜV Managements Systems GmbH  
Büro Mainz

ECI Meeting, 1997-10-13

**Group of Companies  
TÜV Rheinland**

Am Grauen Stein  
D-51105 Cologne (Poll)  
Telephone +49 (0) 221/806-3090  
Telefax +49 (0) 221/806-3093

# History



1872

Formation of the  
Steam Boiler  
Inspectorate (DÜV),  
based in  
Elberfeld/Barmen

1905

The first motor  
cars are tested  
by the DÜV



1969

Establishment of  
the first own  
subsidiaries, e.g.  
for services in the  
fields of training  
and engineering  
consultancy



1974

Establishment of  
the first foreign  
subsidiaries

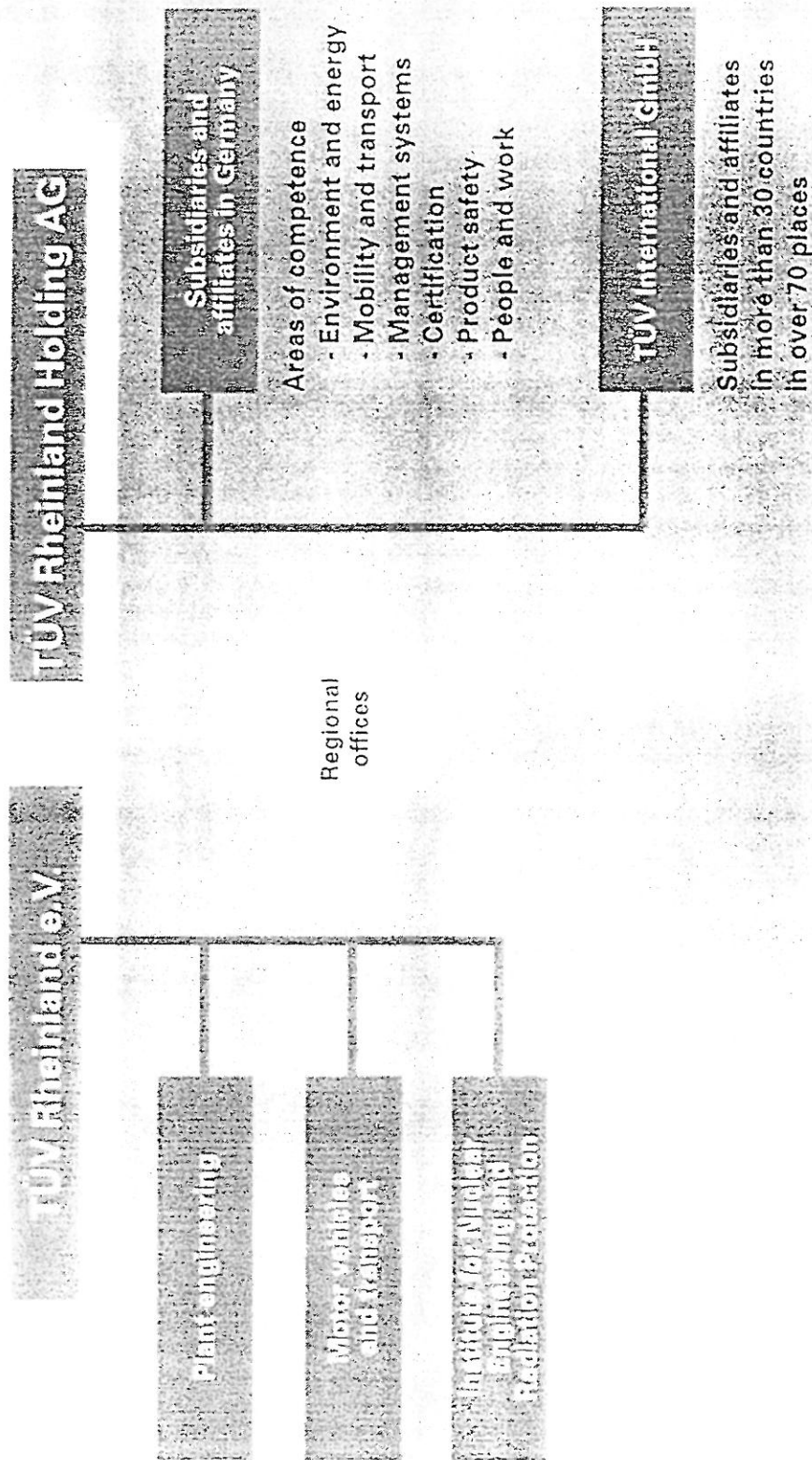
1993

Restructuring of  
the group to take  
international  
market  
requirements  
into account

A modern structure  
for new markets



## The TÜV Rheinland Group

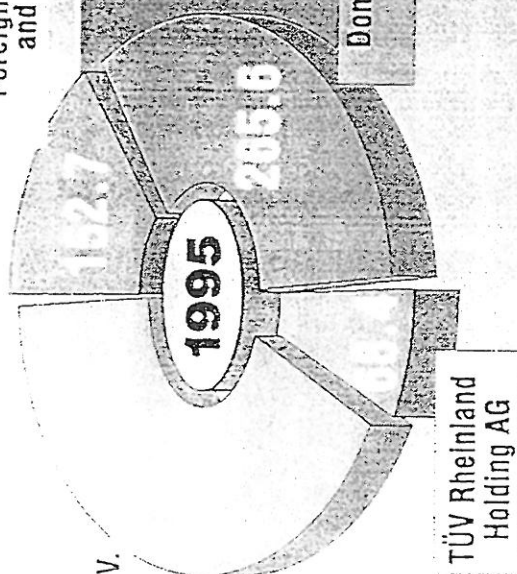




# Statistics at a glance



Foreign subsidiaries  
and affiliates



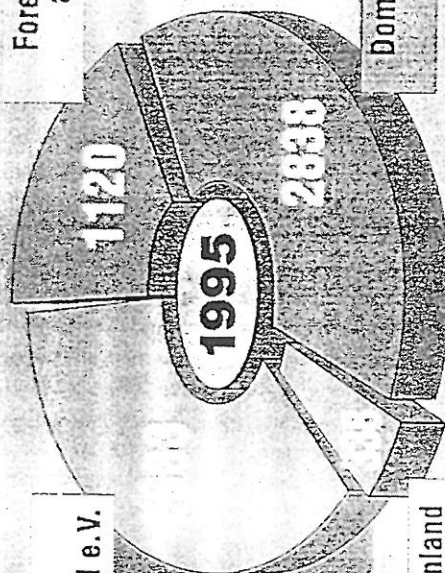
Sales (DM million) \*

882.4

Domestic subsidiaries  
and affiliates

TÜV Rheinland  
Holding AG

Foreign subsidiaries  
and affiliates



TÜV  
Rheinland e.V.

Employees (number)

882.4

Domestic subsidiaries  
and affiliates

TÜV Rheinland  
Holding AG

\* Sales revenues not consolidated

## Contents

⇨ Historical development of labour protection in Germany

⇨ Traditional approach

⇨ Legal bases for labour protection

⇨ Today's approach

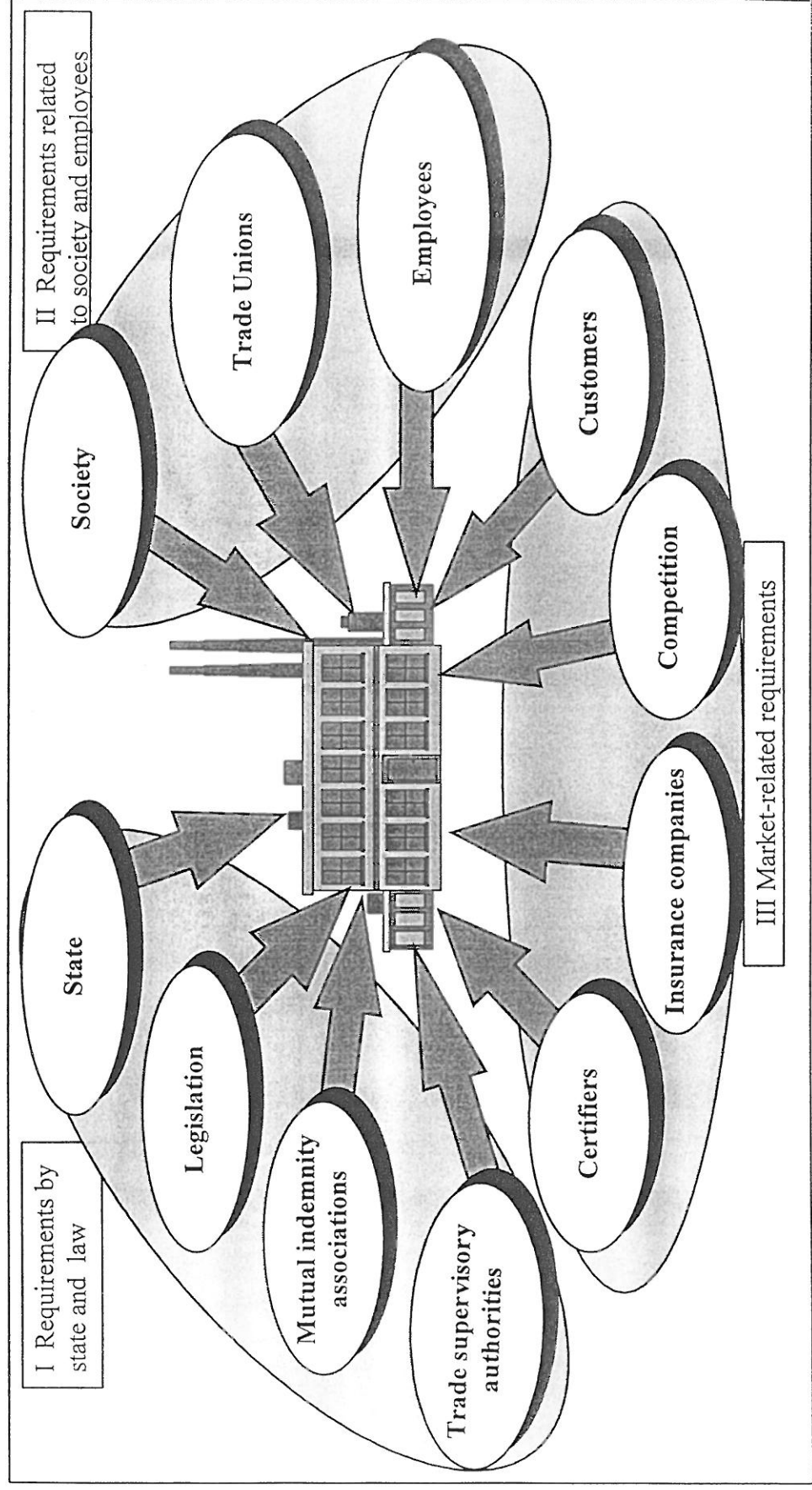
⇨ Implementation of the demands on labour protection

⇨ Preview

## Historical development

1839	Regulation on the employment of young workers in factories
1845	Prussian Trade Regulations (GewO)
1885	Social welfare legislation by Bismarck
1911	German National Insurance Code (RVO)
1919	Working time regulation (8 hours/working day, 48 hours/week)
1960	Reform of the legislation on facilities requiring supervision (in section 24 GWO)
1973	Labour Safety Act (ASiG)
1986	Ordinance on Hazardous Materials
1996	Law on the Implementation of the EU Framework Directive Labour Protection and Additional Directives on Labour Protection
1997	SGB VII Seventh Volume Social Legislation Legal Accident Prevention

## Labour safety-related groups of claimants



Source: In analogy to Stahlmann, V. (1994) p. 27

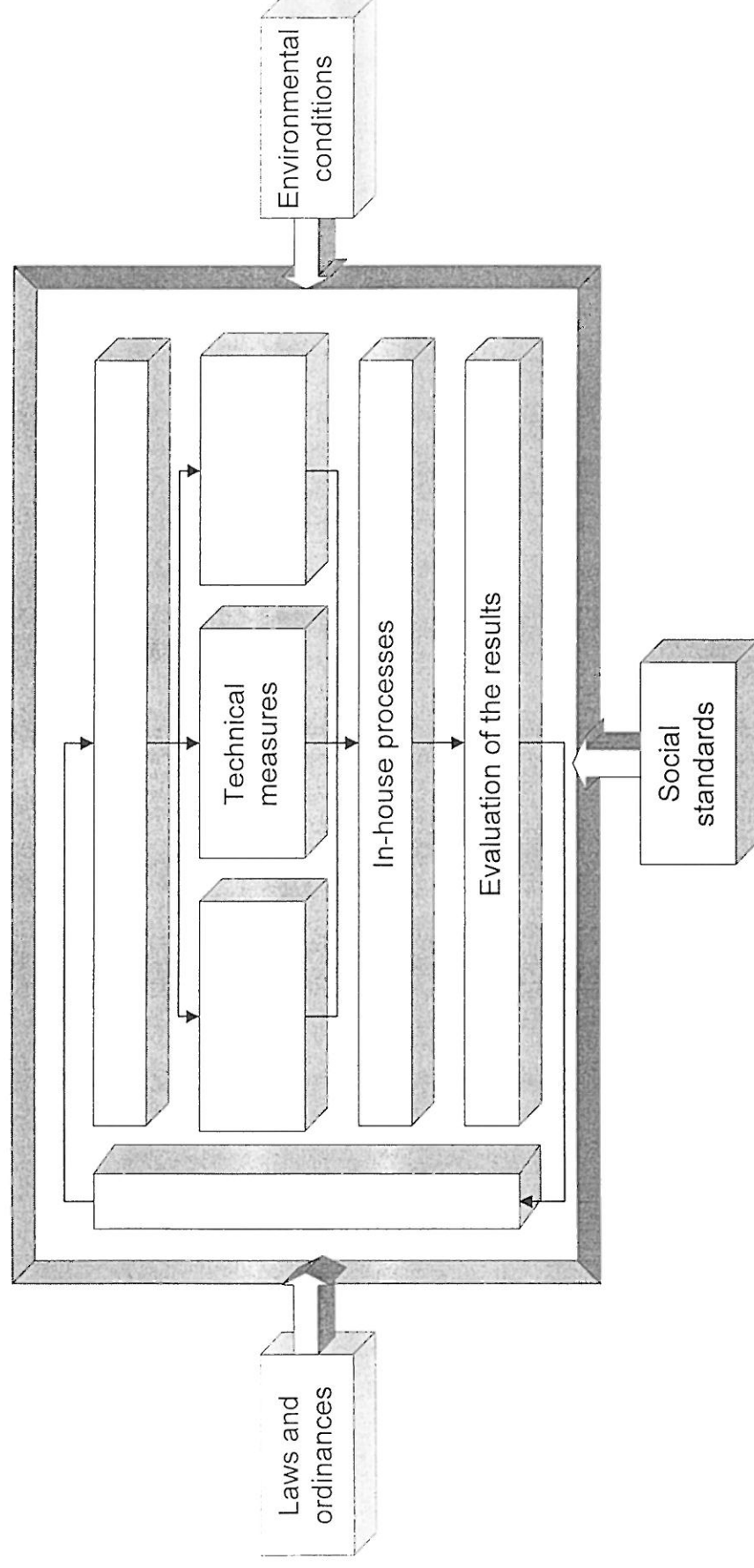
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# Factors influencing In-house Labour Protection

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## Traditional approach

- ⇒ Labour protection on high technical level
  - 30% of accidents technique-related
  - 70% of accidents person-related
- ⇒ Orientation towards "after-care", approx. DM 90bn p.a. for curing measures
- ⇒ Related to parts of the organisation, safety specialist, company doctor, etc.

### **Legal framework conditions (II)**

- ⇒ "Directive of the Council of 12 June 1989 on the Implementation of Measures for the Improvement of Safety and Health Protection of Employees during Work (EC Directive 89/391/EEC)
- ⇒ "Directive of the Council of 25 June 1991 supplementing the Measures for the Improvement of Safety and Health Protection of Employees with Employment Relationships Limited in Time or in Loan Employment (EC Directive 91/383/EEC)
- ⇒ Law on the Implementation of the EU Framework Directive Labour Protection and Additional Directives on Labour Protection (ArbSchG)

## Today's approach (I)

- ⇒ The employer is responsible for in-house safety
- ⇒ Early consideration is placed on all hierarchy levels
- ⇒ Measures of labour protection include:
  - preventing accidents during work
  - preventing work-related health hazards
  - measures to design work to suit human requirements



## Today's approach (II)

- ⇒ Assessment of health hazards by the employer  
at the work places  
during in-house activities
- ⇒ Required labour protection measures are  
implemented  
tested for their efficiency  
adapted to new developments and findings  
documented in a suitable manner

### Today's approach (III)

- ⇒ Advantages of the documentation of labour protection-related activities
  - Guarantee of the continuity of the in-house labour protection policy
  - Facilitated information on facts of the responsible parties
  - Simplified orientation of supervisory authorities
- ⇒ Guaranteeing proper labour protection-related instructions for foreign workers
- ⇒ Suitable protective measures for hazardous situations

## Today's approach (IV)

- ⇒ Obligation to make arrangements for  
First Aid, fire fighting and evacuation
- ⇒ Information, hearing and cooperation on health hazards  
and protective measures
- ⇒ Employees' tasks
  - Active support of the employer
  - Proper handling of the devices
  - Using available protective equipment
  - Reporting hazards

## Safety organisation

- ⇒ Corporate management
- ⇒ Supervisors
- ⇒ Safety engineers, specialists for labour safety
- ⇒ Company doctor
- ⇒ Works council
- ⇒ Safety commissioners
- ⇒ Technical commissioners
- ⇒ Labour protection committee



## **SUMMARY**

Demand for own initiative of the responsible parties for labour protection in the factories and enterprises and their motivation for

### **systematic prevention**

Although no concrete demand for labour protection management system

But explicit requirements for a labour protection management system as far as contents are concerned

**Basic features of the demand to be designed by the enterprises**

## Implementation of the demands on labour safety

### ASCA

(Labour safety in chemical facilities)

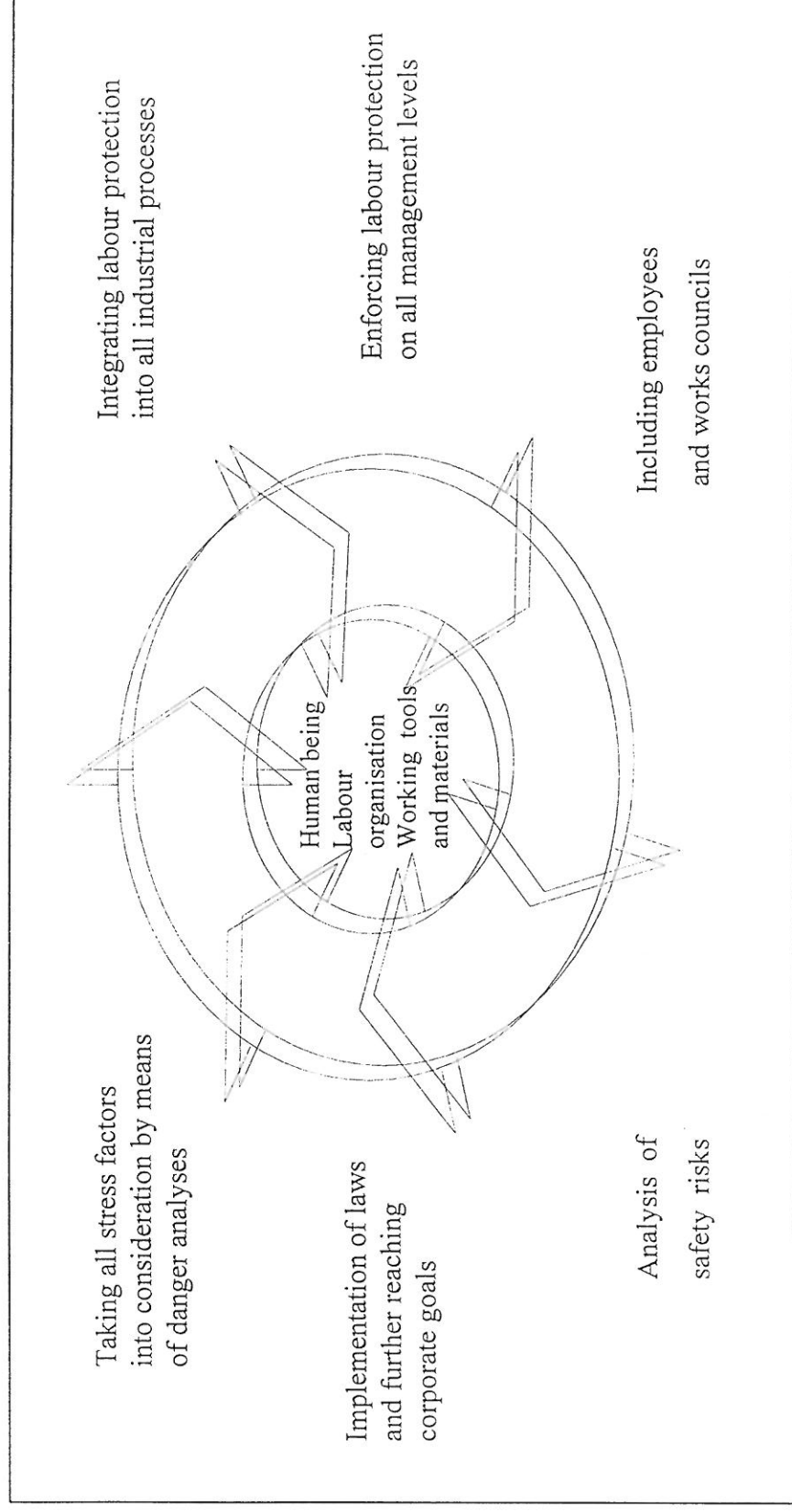
### SCC

(Subcontractor certification)

### ASM System

(Labour protection management system)

## The ASCA model of integrated labour protection



Sources: Schröder, P./Albracht, G./Brückner, B./Gillich, P./Troja C. (1995), p. 11.

## **SCC Structure of the Check List**

---

System ready for certification with integrated high standards for

**S**afety

**H**ealth

**E**nvironmental protection

for contractors in the mineral oil industry



## SCC Structure of the Check List

Chapter	Number of questions	Points
1. SHE programme and organisation, inclusion of management	15	71
2. Selection of employees	4	24
3. Information, training and communication	8	40
4. Purchase of materials, services; acceptance of materials/equipment	6	36
5. (General) inspections, observations on SHE	4	22
6. Rules, provisions, project safety plan	4	24
7. Reporting, investigating and recording accidents, incidents and unsafe situations	5	37
8. Risk recording	5	35
9. Preparing emergency situations	6	19
10. SHE communication and meetings	7	41
	64	349

# Factors influencing In-house Labour Protection

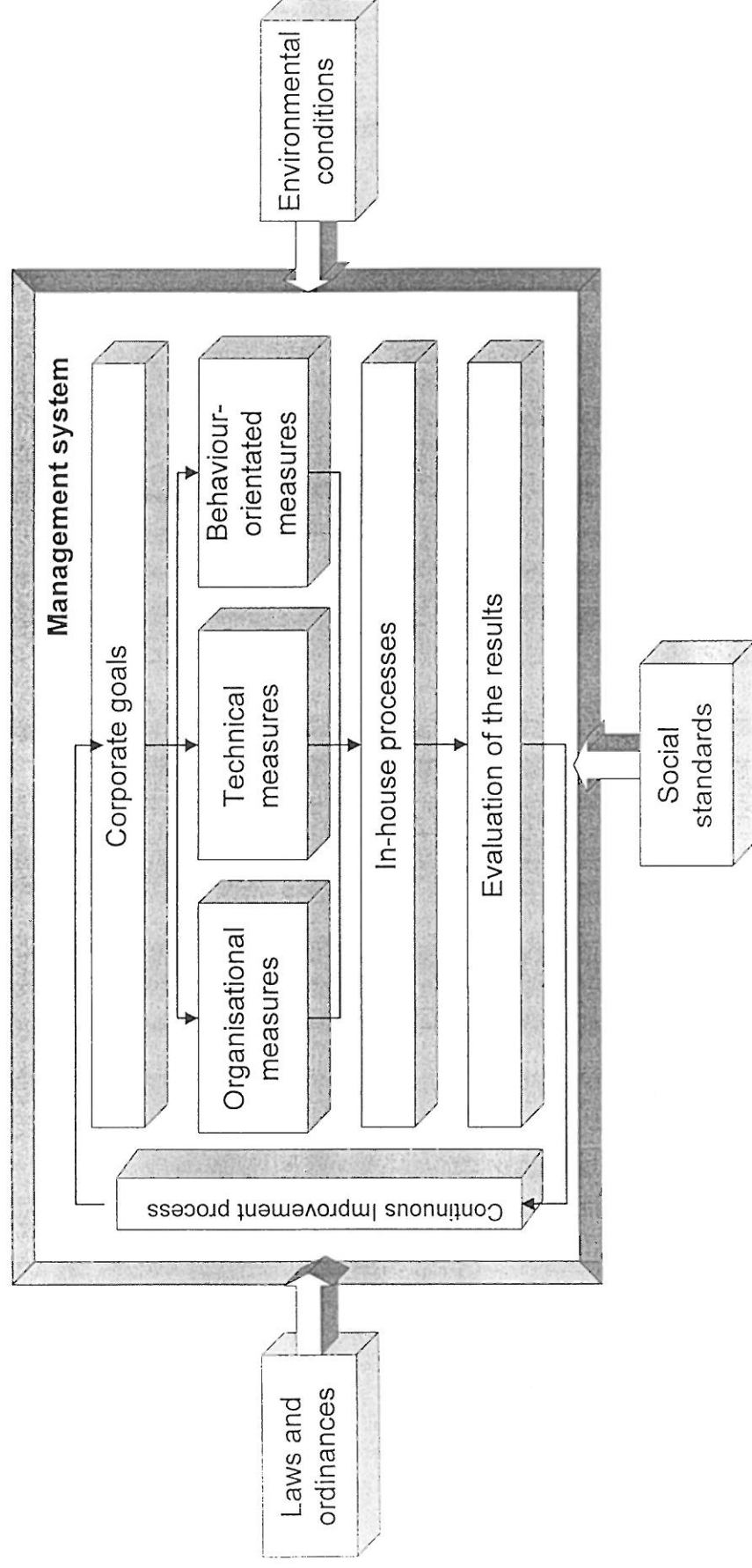
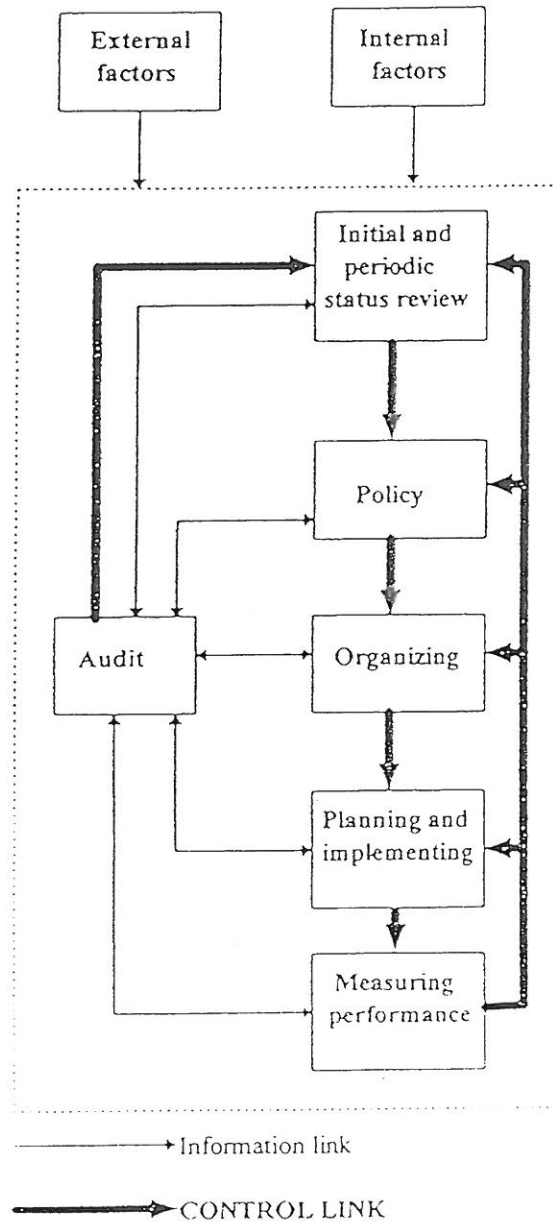
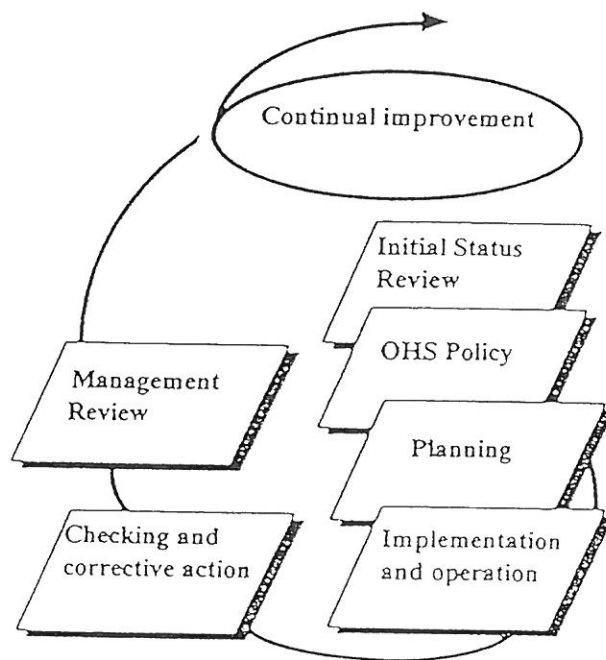


Figure 1. Elements of successful health and safety management based on the approach in HS(G)65



Based on the BS EN ISO 140001 approach

Figure 1. Elements of successful health & safety management based on the approach in BS EN ISO 14001





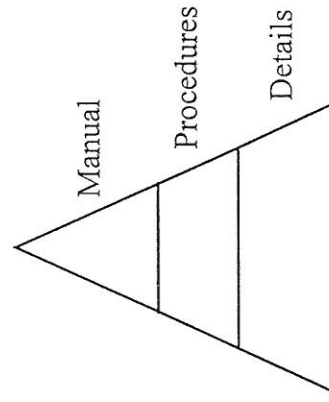
## Preview

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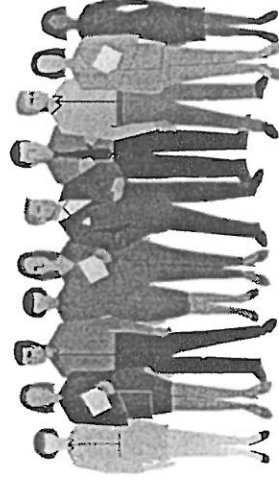
### Integrated Management Systems

$$(QM + EM + SHE = IM)$$

Documentation



Measures





**Implementation of Safety Health and  
Environment Management Systems**

**A Comparison of German, French, Italian  
and British Approaches**

**Wednesday 22 October 1997**

**Implementation of SHE  
Management Systems -  
Organisational Perspectives**

**Paul Stolwijk**  
**ABB Lummus Global BV**





## **Resume Paul Stolwijk**

Paul Stolwijk graduated in Chemical Engineering at the Technical University of Eindhoven (1971), worked several years at the University of Louvain (Department for Industrial Chemistry and Environmental Technology) and worked 18 years for Exxon Chemical in Engineering and Operations Management functions.

At Exxon Paul Stolwijk was involved in the design and implementation of the Company "Operations Integrity Management System", now in use at all ESSO and EXXON plants throughout the world.

After that he worked on similar systems for the implementation of Total Quality Management for Exxon Chemical in Europe.

In 1996 Paul Stolwijk joined ABB Lummus Global at The Hague, the Netherlands.

He has been working on the integration of Safety, Health and Environment Management into the Company Quality Management System. This effort will be completed by the implementation of the ABB Lummus Global new "Company Management Manual", with integrates SHE and Total Quality Management.

## **Implementation of Safety, Health and Environment Management Systems at ABB Lummus Global**

by ir. Paul Stolwijk,  
ABB Lummus Global B.V.,  
The Hague,  
The Netherlands

### **European Construction Institute**

workshop organized by the ECI SHE taskforce:

Implementation of Safety, Health and Environment Management Systems:

"A comparison of German, French, Dutch, Italian and British Approaches"

Headquarters of Lurgi Öl Gas Chemie GmbH,  
Frankfurt, Germany

22 October, 1997



## Slide 1

**Implementation of Safety, Health and Environment Management Systems at ABB Lummus Global.**

Some background on ABB Lummus Global B.V. at The Hague:

ABB Lummus Global Inc. is an engineering and construction company, originally founded in 1907 and still having its head office in Bloomfield, New Jersey, USA. It now is a wholly owned subsidiary of ABB Norway, headquarters of ABB Oil, Gas and Petrochemicals and forms with a total staff of over 5,500 a major unit of Asea Brown Boveri Ltd.

ABB Lummus Global is offering engineering, procurement and construction services, including licensing of process technology, basic design, commissioning, training, maintenance and project management of complete facilities or revamp and modernization of existing facilities.

ABB Lummus Global has served the oil and gas and process industries continuously since 1907. Activities include projects ranging from oil & gas, refinery, petrochemicals, chemicals and power generation. These projects range from feasibility studies to turn key production facilities and are performed for clients all over the world.

ABB Lummus Global B.V. was established in The Hague in 1954 and presently has a total home office staff of over 1,100. Since its inception, ABB Lummus Global has carried out over 500 major projects throughout the world and has gained an international reputation in the conceptual engineering, detail engineering and design, procurement and construction of all types of process plants.

All work at ABB Lummus Global B.V. is performed in accordance with its Company Management Manual, which also includes requirements from ISO 9001, ISO 14001 and SHE -systems certified by Lloyd's, based on Dutch legislation and "VCA" SHE Management guidelines.

## Slide 2

**Objectives for SHE management systems**

In today's society, the public, customers, in-plant personnel, and government regulatory agencies all demand that companies (in the first place operating companies) take necessary actions to reduce the possibility of incidents. This applies in general, but more specifically so for the industry, which processes hazardous materials. As designers and constructors of the plants for these industries we have a major impact on the "intrinsic" process safety<sup>1</sup> of such plants and share with our Clients the responsibility to minimize and control any risks associated with the construction and operation of these plants throughout their entire lifecycle. This can be formulated in the following objectives for SHE management:

- design plants, which are safe to operate and which minimize the effect on the Environment
- execute construction in a safe and environmentally responsible way
- protect people from any harmful (SHE) impact (from operation and products of these plants)
- agree with the future operators (our Clients), the SHE design and operating standards, as well as the methods on how to implement these (i.e. the SHE Management System)

Note:

<sup>1</sup> when stated safe or safety, read in general "SHE" (safety, health and environment)

## Slide 3

**Driving Forces for SHE Management**

The hazards and potentially large risks associated with the processing and storage of chemicals and petrochemicals have been recognized for long in the chemical and petrochemical industry. Technical solutions for reduction and prevention of risks, mitigation of effects and emergency response are developed within this industry from the beginning of this century.

In the seventies and eighties several major catastrophe's (Flixborough, Seveso, Mexico city, Bhopal, Chernobyl, Sandoz etc.) indicated the need for improved approaches. The operating industry started to introduce more sophisticated ways to manage process safety.

These systems consist out of policies, procedures and practices designed to ensure that measures for containment of risks are in place, are known by the operating people and are used effectively. These management systems integrate process safety concepts into the ongoing activities of everyone involved in the operation, maintenance and modification of facilities.

The operating industry realized that third party involvement with their operation (e.g. supply of materials or services like maintenance or engineering and construction activities) introduced an additional risk factor. So the process industry took the lead in putting pressure on third parties to also manage their own safety practices or to integrate SHE management systems in joint activities.

Because of the major impact of several of the catastrophe's on the surrounding communities, also society and governments started to interfere.

By now extensive legislation has developed, which, as we have seen, differs from country to country. This certainly justifies harmonization efforts to which we can contribute.

## Slide 4

**ABB Lummus Global Response to the business safety requirements**

## Historical:

As an engineering and construction company working specifically for the oil, gas and process industry, we have developed our own safety and environmental expertise from the beginning of our business. Also during construction activities we have built in cooperation with our Clients expertise in construction safety management and emergency response.

Containment of risks from hazardous materials has become an important and integrated aspect of design and engineering, therefore we developed our own dedicated specialists, also from the beginning of this business. Our knowledge has been documented in checklists, standards, rules, regulations and manuals to ensure consistent application and integrity of our designs. Some critical concepts of safety management systems, like reviews (e.g. Hazan, hazop etc.), have already been practiced in our business for some thirty years.

In case of major safety problems we have often provided expert services in these fields to our Clients and governmental bodies.

## Slide 5

**ABB Lummus Global Response to business safety requirements**

Step-up activities as from early eighties:

---

**IMPLEMENTATION OF SHE- MANAGEMENT SYSTEMS**

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As stated we have built important experience and knowledge in SHE-matters Still has our Company recognized that improved management techniques are required for an organization to be able to mobilize this knowledge at all times in order to maintain continuity and fault-free performance in these fields. To stress the organization's crucial responsibility and need for adamant attention for SHE matters, our Company management has committed its dedication to SHE objectives in policy statements already for decades.

Being committed to learn about new developments and to share own experiences, we have traditionally participated in many activities of various branch associations.

This commitment to SHE-matters is also reflected in the assignment of dedicated SHE engineering functions on project teams and Safety officers on construction teams.

At those years emphasis was however mainly on enforcement of rules and regulations.

**Slide 6****ABB Lummus Global Response to business safety requirements**

step-up activities as from mid eighties - early nineties

In this time frame Quality Management principles were introduced at many places in industry including in our type of business. ABB Lummus Global The Hague initially trained the whole organization in the application of "Crosby Quality concepts" and documented all its work processes (including SHE) in procedures and practices. Result from this exercise was a more pro-active planning approach and better control of activities.

In order to further step up in attention for SHE matters also at the management level, a full time SHE manager was appointed on the ABB Lummus Global Management team in 1993. One of his assignments was to prepare the organization for certification of our SHE management system.

In follow-up of some international major disasters, which required quick and pre-planned management response, ABB Lummus Global established a Management Emergency Team at the European Board level.

**Slide 7****ABB Lummus Global Response to business safety requirements**

Implementation results

The result of the quality initiatives of the preceding years was rewarded by the certification of our work procedures according the ISO 9001 requirements (December 1993).

Certification of the ABB Lummus Global SHE management system according to the Dutch "VCA"-requirements followed in April 1994.

Dutch VCA requirements resemble ISO 9000; topics of attention are listed in attachment 1.

**Slide 8****ABB Corporate Environmental Management Program**

In 1992 the United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro, Brazil. 178 National governments adopted the "Rio Declaration" on Environmental protection.

As a follow up to this, the ABB mother company adopted the principles for Environmental Management as laid down in the "ICC Business Charter for Sustainable Development" (see attachment 2).

Also a Policy statement on Environmental Protection was formulated, which is applicable for all about 1000 operating companies of ABB.

In an initial review of all these operations, the company has made an assessment of priorities for action. All companies are required to implement an Environmental Management System and to commit for continuous improvement in this field.

The company has chosen for ISO 14001 as the standard for its Management System.

Slide 9

### **Actual ABB Lummus Global SHE Management Implementation**

The flowchart (attachment 3) shows how requirements for SHE are included in the Company Management Manual.

How these requirements should be implemented is detailed in organizational procedures and practices for SHE management. Project execution plans detail the implementation of these requirements and integrate any Client preferences and (local) legislation in specific Project (Engineering) SHE and Construction SHE Plans.

Slide 10

### **Typical Project organization SHE functions**

The attached organization chart (attachment 4) shows how projects are typically staffed with officers responsible for implementation of the planned SHE arrangements.

Slide 11

### **ABB Lummus Global Response to business safety requirements**

#### **new step-up activities (in progress)**

In follow up of the company requirement for implementation of an Environmental Management System, ABB Lummus Global is now preparing for certification according to ISO 14001.

It is our target to qualify by the end of this year (1997).

Parallel to this exercise we are transforming the Company Quality System into an integrated Management System for all work processes. This is an important element of the Management commitment to implement Total Quality Management at ABB Lummus Global in the Hague.

Slide 12

### **ABB Lummus Global Response to business safety requirements**

#### **Total Quality Management (TQM)**

The objectives of the mentioned transformation to TQM are as follows:

- Integrating ISO 9001 and ISO 14001

## IMPLEMENTATION OF SHE- MANAGEMENT SYSTEMS

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- Integrating safety and health requirements (VCA)
- Incorporating opportunities for TQM-enhancement (improvement culture, organizational involvement, project/Client focus etc.)
- Improvement of the management cycle:  
from: Plan, do, check, act (Demming)  
to: **Plan, control, assure (i.e. measure and report), review and improve**  
(compare the ISO 14001 "logo": attachment 5)
- Improve communication to Clients and own people
- Simplification, clarity and effectiveness of the management system

Slide 13

### ISO 14001/TQM Implementation Process

In order to introduce new concepts or a new system into an organization it is very critical to devote appropriate attention to the implementation process. See attachment 6 for the ABB Implementation Process for ISO 14001, which can be applied for the implementation of SHE Management in general.

Some critical implementation aspects:

- Corporate and local Management commitment and support is a must. This commitment should be made visible.
- Clear responsibilities have to be established.
- The organization must be made aware of the importance and critical functions must be trained.
- The system must be started and made to work continuously (reporting, management review and follow up)

Slide 14

### Implementation status to date:

- new Company Management System built, reviewed with management and endorsed
- responsibilities ("ownership") reconfirmed (see attachment 7)
- gaps versus requirements identified
- (missing) procedures and instructions development in progress
- implementation reinforcement plan ready



Slide 15

**Summary/Conclusion**

- ABB LG has been devoting professional attention to SHE-matters since 90 years
- ABB LG has implemented better she control through "Quality" Management since 15 years
- ABB LG has implemented a certified SHE Management System 5 years ago
- ABB LG is implementing ISO 14001  
(66 companies certified today; 246 including ABB LG by end of 1997)
- ABB LG is integrating SHE-Management in one integrated Total Quality Management system now

ABB Lummus Global SHE Management Program, covering Engineering, Procurement and Construction activities copes with today's Safety, Health and Environmental requirements and constitutes a base to meet those of tomorrow.

VCA** Safety Checklist Construction Companies	
chapter	
1	SHE Policies, Organization and Management Commitment
2	Risk identification and evaluation
3	Selection of Personnel
4	SHE induction, training and instruction
5	SHE communication and committees
6	Rules/Regulations, Project Safety Plan and Emergency Preparedness Plan
7	SHE Inspections/Observations
8	Company Health Care
9	Purchasing and Inspection of materials, equipment and services
10	Reporting, registration and investigation of incidents and accidents, unsafe work methods and situations

## ICC Business Charter for Sustainable Development Principles for Environmental Management

### 1. Corporate priority

To recognise environmental management as among the highest corporate priorities and as a key determinant to sustainable development; to establish policies, programmes and practices for conducting operations in an environmentally sound manner.

### 2. Integrated management

To integrate these policies, programmes and practices fully into each business as an essential element of management in all its functions.

### 3. Process of improvement

To continue to improve corporate policies, programmes and environmental performance, taking into account technical developments, scientific understanding, consumer needs and community expectations, with legal regulations as a starting point; and to apply the same environmental criteria internationally.

### 4. Employee education

To educate, train and motivate employees to conduct their activities in an environmentally responsible manner.

### 5. Prior assessment

To assess environmental impacts before starting a new activity or project and before decommissioning a facility or leaving a site.

### 6. Products and services

To develop and provide products or services that have no undue environmental impact and are safe in their intended use, that are efficient in their consumption of energy and natural resources, and that can be recycled, reused, or disposed of safely.

### 7. Customer advice

To advise, and where relevant educate customers, distributors and the public in the safe use, transportation, storage and disposal of products provided; and to apply similar considerations to the provision of services.

### 8. Facilities and operations

To develop, design and operate facilities and conduct activities taking into consideration the efficient use of energy and materials, the sustainable use of renewable resources, the minimisation of adverse environmental impact and waste generation, and the safe and responsible disposal of residual wastes.

### 9. Research

To conduct or support research on the environmental impacts of raw materials, products, processes, emissions

and wastes associated with the enterprise and on the means of minimizing such adverse impacts.

### 10. Precautionary approach

To modify the manufacture, marketing or use of products or services or the conduct of activities, consistent with scientific and technical understanding, to prevent serious or irreversible environmental degradation.

### 11. Contractors and suppliers

To promote the adoption of these principles by contractors acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise; and to encourage the wider adoption of these principles by suppliers .

### 12. Emergency preparedness

To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with the emergency services, relevant authorities and the local community, recognizing potential transboundary impacts.

### 13. Transfer of technology

To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.

### 14. Contributing to the common effort

To contribute to the development of public policy and to business, governmental and intergovernmental programmes and educational initiatives that will enhance environmental awareness and protection.

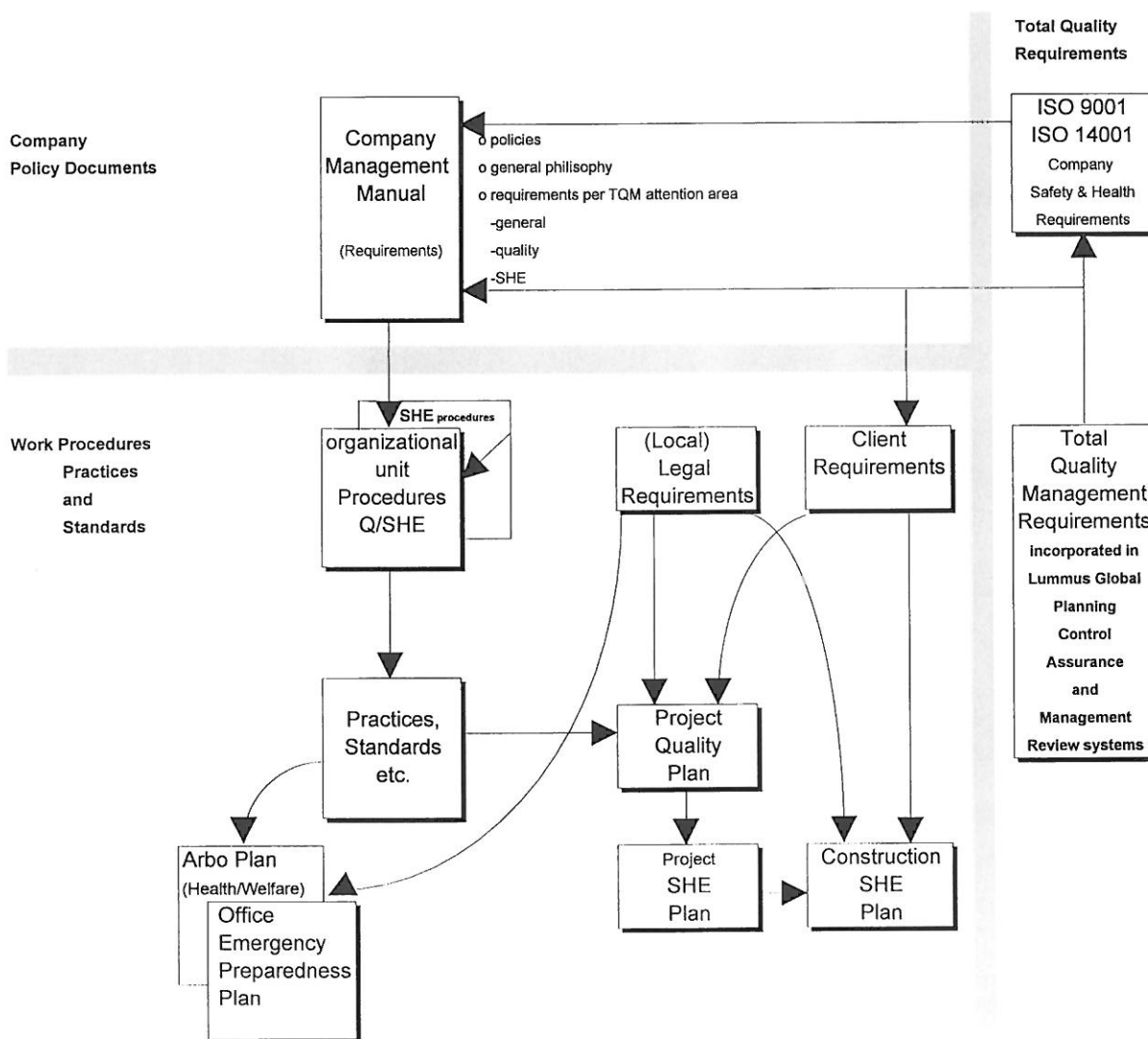
### 15. Openness to concerns

To foster openness and dialogue with employees and the public, anticipating and responding to their concerns about the potential hazards and impacts of operations, products, wastes or services, including those of transboundary or global significance.

### 16. Compliance and reporting

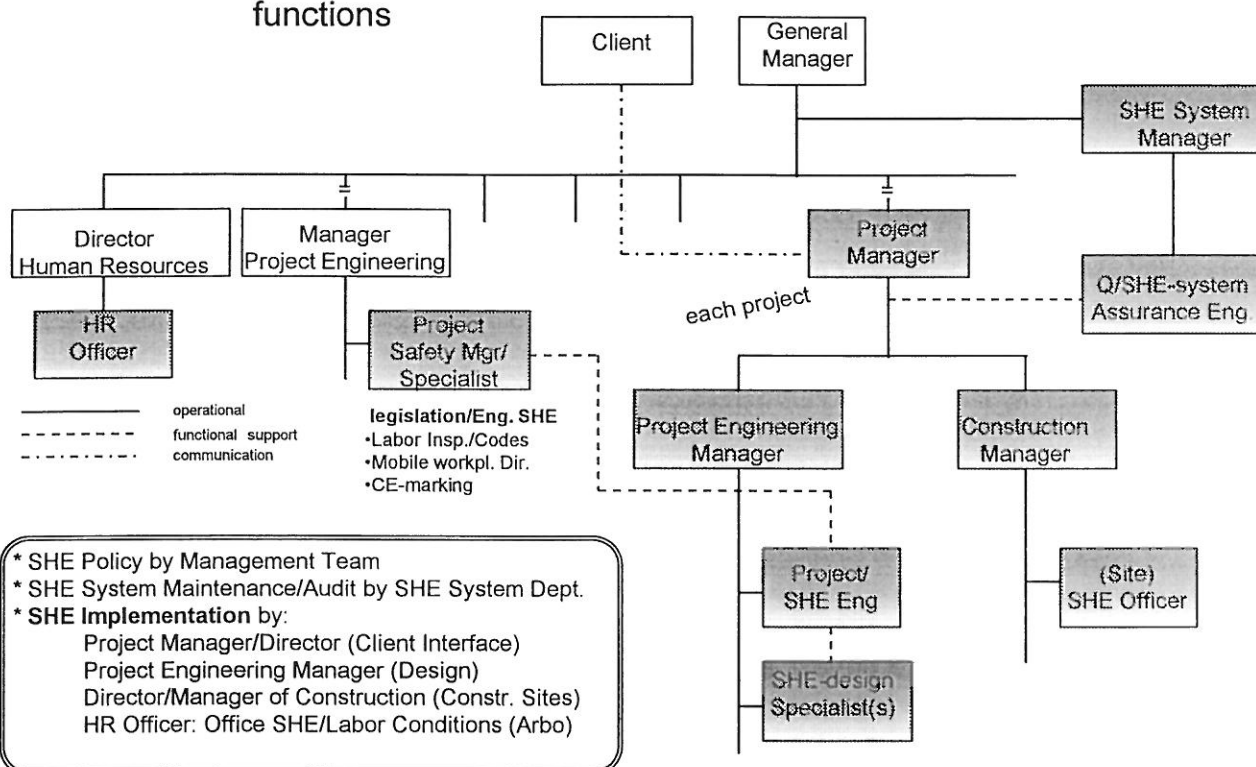
To measure environmental performance; to conduct regular environmental audits and assessments of compliance with company requirements, legal requirements and these principles; and periodically to provide appropriate information to the Board of Directors, shareholders, employees, the authorities and the public.

ABB Lummus Global Company/Project Quality and SHE Management System



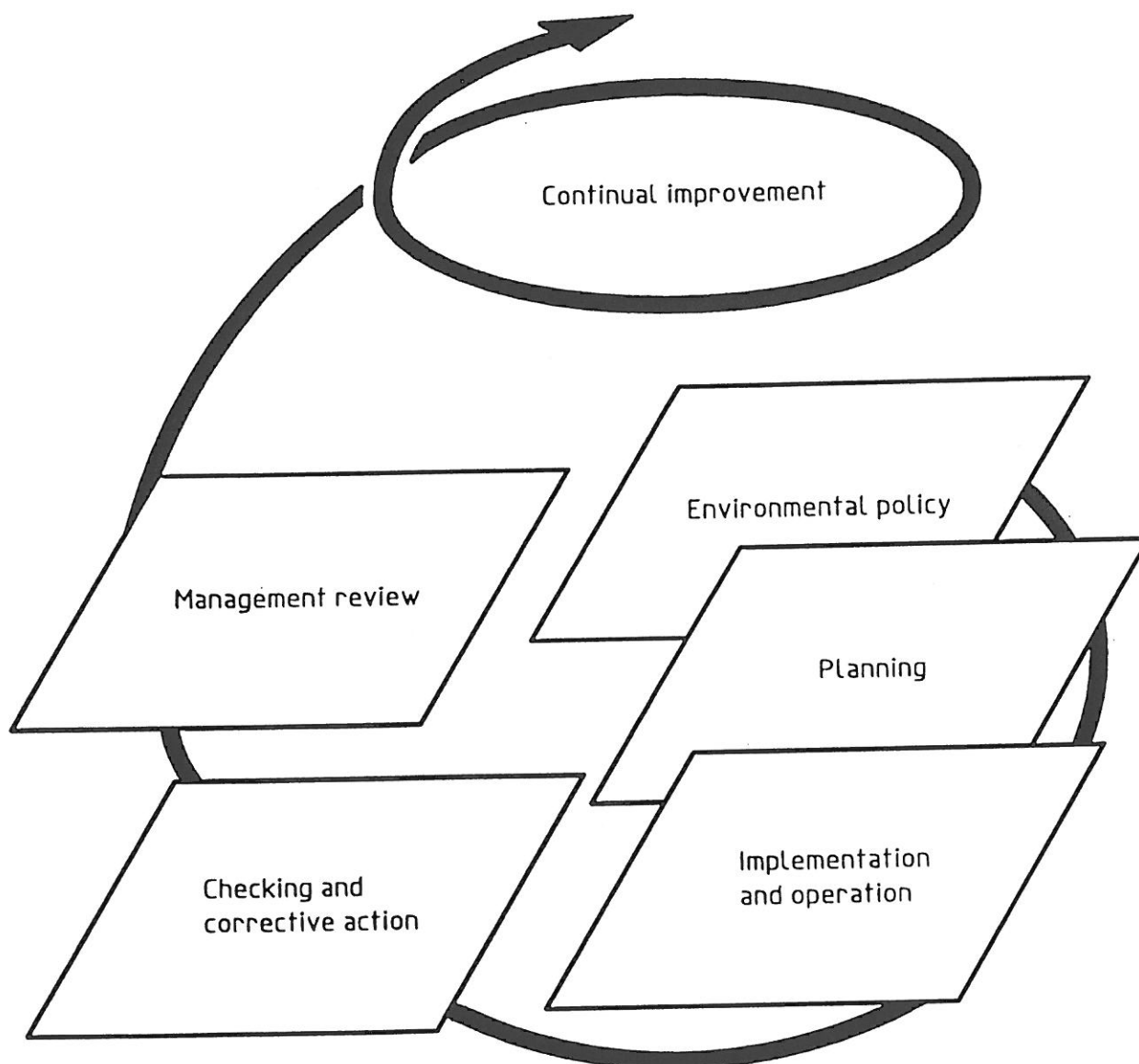
# IMPLEMENTATION OF SHE- MANAGEMENT SYSTEMS

## SHE Implementation functions





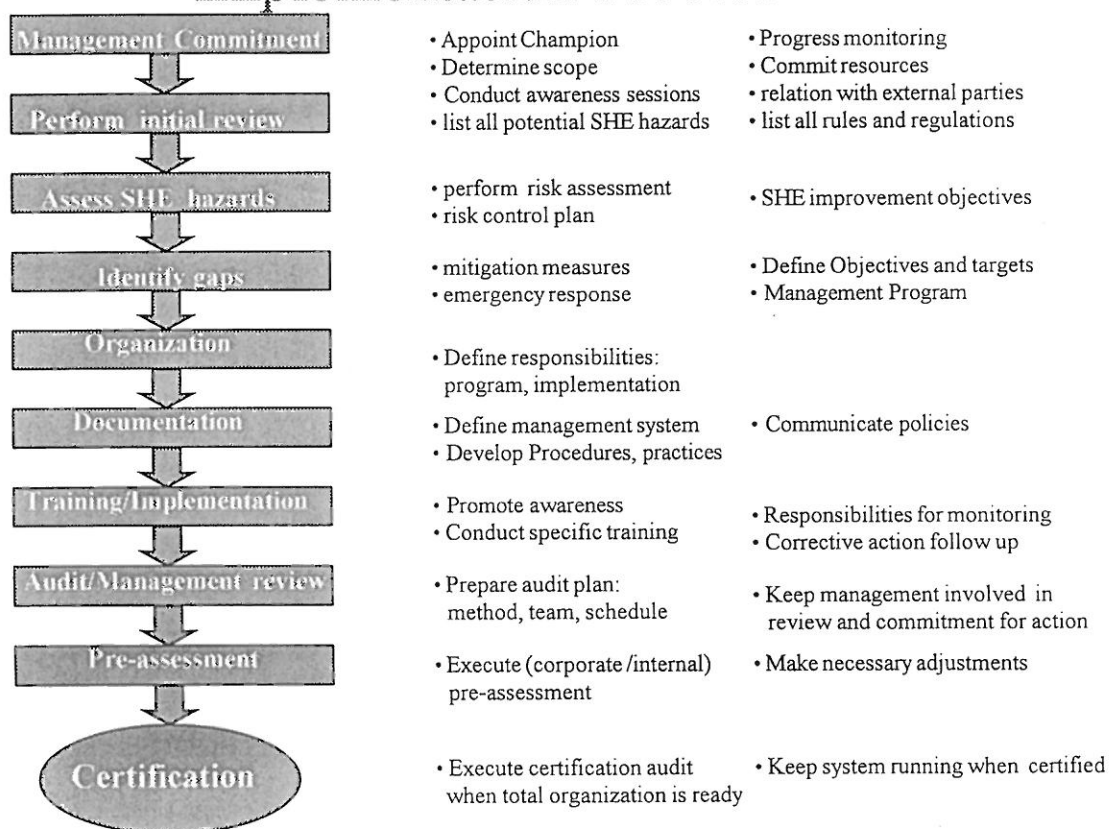
## ISO 14001 "LOGO"



Environmental management system model for the  
ISO 14001 International Standard

Attachment 5

## ABB Lummus Global SHE Management Implementation Process



## IMPLEMENTATION OF SHE- MANAGEMENT SYSTEMS

### Company Work Processes/ Responsibilities for SHE

a)	Product and Service generation Processes	Owner Function
4.9.1	Sales	VP Sales
4.9.2	Proposals	Comm. Director
4.9.3	Project Management + Company SHE representation	VP Project Mgt.
4.9.4	Process Technology/ incl. SHE development	VP Proc. Techn.
4.9.5	Engineering } including SHE	VP Engineering
4.9.6	Procurement } application/integration	Dir. Procurement
4.9.7	Construction	VP Construction
4.9.8	Document Management	VP Engineering
b)	Supporting processes	
4.9.9	Regulatory Compliance Management	Company lawyer
4.9.10	Quality Assurance and SHE System M&A	Q & SHE Mgr.
4.9.11	Human Resource Management	Dir. HR & Adm.
4.9.12	Welfare ("Arbo") and Absence Management	idem
4.9.13	Construction SHE Management	VP Construction
4.9.14	Communication Management, including SHE	VP & Gen. Mgr.
4.9.15	Project Controls and estimating	Comm. Director
4.9.16	Information System Design Management	ISD Mgr
4.9.17	Office support and Emergency Planning	Dir. HR & Admin.
4.9.18	Secretarial Support	idem
4.9.19	Library Management/support	VP Engineering
4.9.20	Information Technology Services	idem
4.9.21	Accounting/Treasury and Tax Management	Financial Director





**Implementation of Safety Health and  
Environment Management Systems**

**A Comparison of German, French, Italian  
and British Approaches**

**Wednesday 22 October 1997**

**Implementation of SHE  
Management Systems -  
Organisational Perspectives**

**John Howlett**  
**Technip**

**Paper not available at time of  
publication**

**For further information on this  
Presentation  
Please contact the ECI**





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**AMEC Process and Energy Ltd**

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**Implementation of SHE  
Management Systems -  
Organisational Perspectives**

**Giuseppe Nicoletti**  
**Snamprogetti**

## **Biography for Giuseppe Nicoletti**

Graduated in Political Science at the University of Pavia. Upon graduation he commenced work in the Economic Department of the University with responsibility for research into the possible re-organisation of public sector activities.

Acted as a Consultant in the possible purchase/management buy-outs of public and private sector companies for five years.

Employed by the ENI group as a manager of the labour and industrial relations department. Represented ENI in a Ministry of Interior task force concerned with the setting up of an operational and emergency technical code relating to gas and oil trunk lines.

At present he is the Manager of the Safety Construction Department in Snamprogetti.

He is the author of many papers in the safety area and has been a speaker in the Italian Conferences.



## **EUROPEAN CONSTRUCTION INSTITUTE**

### **Implementation of Safety, Health & Environment Management Systems**

#### **ABSTRACT**

#### **FRAMEWORK FOR HSE MANAGEMENT SYSTEMS - ORGANISATIONAL PERSPECTIVES**

**Dr. Giuseppe Nicoletti (Snamprogetti S.p.A. - Italy)**

La salute e la sicurezza dei lavoratori e della popolazione, la tutela dell'ambiente e la salvaguardia dei beni materiali sono parte integrante del patrimonio culturale della Snamprogetti S.p.A..

Questo obiettivo è espresso nella HSE Policy di Società e viene realizzato tramite l'adozione e l'applicazione del HSE Management System che consiste principalmente nel:

- definire le attività, gli obiettivi, le modalità e l'organizzazione per singolo progetto;
- rispettare le norme di legge e di buona tecnica in materia di sicurezza, salute ed ambiente;
- migliorare costantemente le proprie performance in relazione anche all'evoluzione dei tempi, delle conoscenze scientifiche, degli strumenti di gestione e delle tecnologie;
- coinvolgere tutti i livelli del management e dei dipendenti;
- assicurarsi che gli Appaltatori ed i Fornitori attuino standard in materia di salute, sicurezza ed ambiente in linea con la politica della Snamprogetti.

Le linee di attuazione vengono dettagliate nel HSE Manual e, per singolo progetto, nel HSE Plan.

Snamprogetti si è dotata di strutture organizzative specifiche per:

- l'elaborazione e l'aggiornamento del HSE Manual;
- l'attuazione della Policy e del HSE Manual;
- i controlli e gli audit.



## **EUROPEAN CONSTRUCTION INSTITUTE**

### **Implementation of Safety, Health & Environment Management Systems**

#### **FRAMEWORK FOR HSE MANAGEMENT SYSTEMS - ORGANISATIONAL PERSPECTIVES**

**Dr. Giuseppe Nicoletti (Snamprogetti S.p.A. - Italy)**

##### **1 Introduction**

Snamprogetti places great emphasis on implementing and maintaining the highest possible standards of health and safety with regard to both Company employees and of other persons involved in the execution of projects and the subsequent operation of plants. Similarly Snamprogetti is committed to environmental protection both in the execution of its projects and the subsequent operation of plants. Compliance with legislation is seen by Snamprogetti as a minimum objective only.

Consequently Snamprogetti has established a HSE Management System which permeates throughout the business practices of the organisation and controls all Company operations.

The aim of this document is to summarise the main characteristics of the Snamprogetti HSE Management System.

##### **2 HSE Management System**

The objectives of the HSE Management Systems are:

- to minimise the possibility of accidents and/or damage occurring during all phases of the project and to guarantee a safe working environment for people in compliance with the project Health, Safety and Environment Specifications and National and International Regulations;
- to ensure compliance with the acceptability criteria stated for the project;
- to identify all potential hazards associated with the project, and to develop prevention, control and mitigation measures to eliminate or minimise harm to people, damage to plant or equipment, or adverse environmental damage;
- minimise the risk associated with the plant based on ALARP (As Low As Reasonably Practicable) justification;

- to review all project activities from the aspect of HSE, identify the impact and interface of HSE requirements upon the project activities, communicate the findings to the project team and resolve any identified problems in accordance with the project scope of work and procedures;
- to encourage the adoption of a positive, proactive and committed safety culture throughout all phases of the project.

In order to maintain the highest possible standards Snamprogetti has established clearly defined policies and practices which permeate throughout the business practices of the organisation and control all Company operations. The frame work and arrangements for such policies and practices are described collectively as the Snamprogetti Health, Safety and Environmental Policy Statement.

Snamprogetti Health, Safety and Environmental policies are applied to all parts of the business through policy statements, employee participation, effective company communication and the correct allocation of resources.

The Project HSE is of primary importance in ensuring that safety issues are comprehensively addressed at all stages of a specific project and that all design choices and decisions are reviewed with regard to the safe performance of work and other activities undertaken during the construction, operation, modification and decommissioning of plants. The Project HSE Plan is a “living document” and shall remain in force throughout the complete project cycle from the detailed design phase through construction and commissioning. The HSE Plan will be continually reviewed to ensure that appropriate alterations or additions are made to accord with circumstances arising during the project.

### **3 Key elements of HSE Management System**

The key elements of HSE Management System are:

- Policy and strategic objectives
- Organisation, Resources and Documentation
- Hazard Analysis and Risk Assessment
- Planning
- Implementation and Monitoring
- Auditing and Reviewing

## **4 Policy and strategic objectives**

Snamprogetti has defined the strategic objectives of its HSE policy as follows:

- The health and safety of personnel directly or indirectly involved in works; the safe use of materials, goods and equipment; and the identification and use of all measures necessary to protect the environment.
- The systematic capability of offering products/services which can satisfy both legal and Client requirements with regard to health, safety and environmental issues. This capability is recognised as a major priority in the success of the company.
- The constant development and improvement of personnel capabilities and production processes to ensure that future process plants provide an increasingly safer environment for the plant operators and for the populace as a whole and that the operation of the plants is compatible with and causes as little long term disturbance to the environment as is practical. The foregoing is a fundamental policy of the company and is also necessary to comply with the enhanced expectations and demands of the market place and society which is increasingly sensitive to issues of health, safety and the environment.

## **5. Organisation, resource and documentation**

### **5.1 Organisation**

The policy and the HSE Management System is implemented through line responsibility requiring the active participation of management and supervision at all levels. Each position is identified and the scope of responsibility and authority of each position is established. A typical organisation of Snamprogetti's HSE Management System is outlined in Figure 1.

### **5.2 Resources**

Appropriate health, safety, environmental and other resources, including adequate and competent personnel, are provided to assist management in fulfilling the responsibilities of the HSE Management System.

Procedures are in place to ensure the correct selection of both company staff and Subcontractors. Particular attention is paid to the selection of Subcontractors including the specific assessment of each Subcontractor's HSE policy, practices and performance. The selection procedures are applied to both the initial recruitment of staff or the approval of Subcontractors and to specific projects or new fields/activities of operation.

Notwithstanding the above mentioned selection procedure, the expertise of employees in the field of health, safety and environmental risk management are monitored and assessed and areas of possible improvement are identified. Where expertise can be enhanced appropriate training is undertaken and the effectiveness of the training is monitored and confirmed.

Snamprogetti ensures that Subcontractors and Suppliers have responsibility for the safety of their operations and products and further ensures that they operate in accordance with the Snamprogetti HSE Policy.

### **5.3 Documentation**

Snamprogetti maintains the following controlled documentation:

- HSE Policy, Plans and Manual
- Operating Procedures and Work Instructions for key activities
- Emergency Plans
- Results of HSE evaluation and Risk Management

## **6 Hazard Analysis and risk assessment**

Snamprogetti carries out a hazard analysis and implements procedures designed to assess health, safety and environmental risks so that its business and any other business which the hazard analysis indicates may be effected are operated, equipped and maintained in a manner which does not compromise the integrity of persons and facilities. The analysis covers all activities from project inception through commissioning, start up and initial operations.

The analysis considers the probability of occurrence of any event and the severity of its consequences for employees, the general populace, the facilities and the environment.

An evaluation includes a review of hazards which might arise from the following:

- exposure to physical, chemical and biological agents;
- drowning, asphyxiation and electrocution;
- noise, dust and vibration;
- climatic and atmospheric conditions;
- equipment and machinery;
- impacts and collisions;
- ergonomic factors.

Snamprogetti has procedures in place to select, evaluate and implement measures which eliminate or reduce the risks and effects of any hazard arising from the above.

Personnel at all levels in the organisation are involved in the identification of hazards, their possible consequences and of preventional and/or protective measures which may

be implemented to lessen their effect. Special attention is given to safety critical and non - routine operations.

Procedures are in place to provide an opportunity for employees to report possible environmental, safety and health problems without fear of retribution and such procedures are communicated to employees.

## **7 Planning**

By systematic review and analysis procedures are devised for the purpose of identifying foreseeable emergencies in the execution of a project. A record of such identified potential emergencies is made and updated at appropriate intervals and passed to employees, Subcontractors, the emergency services and other parties which may be effected by the emergencies to ensure effective response to them.

During the construction phase Snamprogetti carries out a weekly review of the construction planning of work activities for the purpose of minimising risk and the construction plan is amended as required. For example, the risk associated with the parallel execution of one or more work activities is assessed and if considered to be too high suitable measures are taken to manage and lessen the risk. Risk management during construction includes suitable planning of the scheduled operations, management of change and developing emergency response measures. Authority to carry out changes to the construction programme is vested in the Resident manager with the assistance of the HSE manager.

## **8 Implementation and monitoring**

Activities must be conducted according to procedures and work instructions developed at the planning stage or earlier in accordance with HSE Policy.

The responsibility of management for the implementation of policies and plans includes for ensuring that the HSE objectives are met and that performance criteria and control limits are not breached.

At the work-site level the Resident Manager is responsible for the implementation of the HSE Manual and of work instructions issued in accordance with defined safe systems of work (permits to work, simultaneous operations procedures, etc.)

Procedures are in place for monitoring relevant aspects of HSE performance and for establishing and maintaining records of the results. These procedures include reporting of accidents, incidents and complaints, as per standard forms. Appropriate records are maintained and appropriate action taken to minimise the reoccurrence of such events. The causes and the risk control measures implemented in response are communicated to senior management to enable similar operations the opportunity to better manage risk at locations or operations exposed to similar hazards.



## **9 Auditing and reviewing**

Audit procedures are defined, documented and implemented to assess compliance with applicable contract requirements and with HSE Policy and HSE Manual.

The procedures include:

- specific activities to be audited;
- planning and frequency of auditing specific activities;
- methodologies for conducting and documenting the audits;
- responsibilities for auditing specific activities;
- system for auditing and tracking implementation status of audit recommendations;
- distribution and control of audit reports

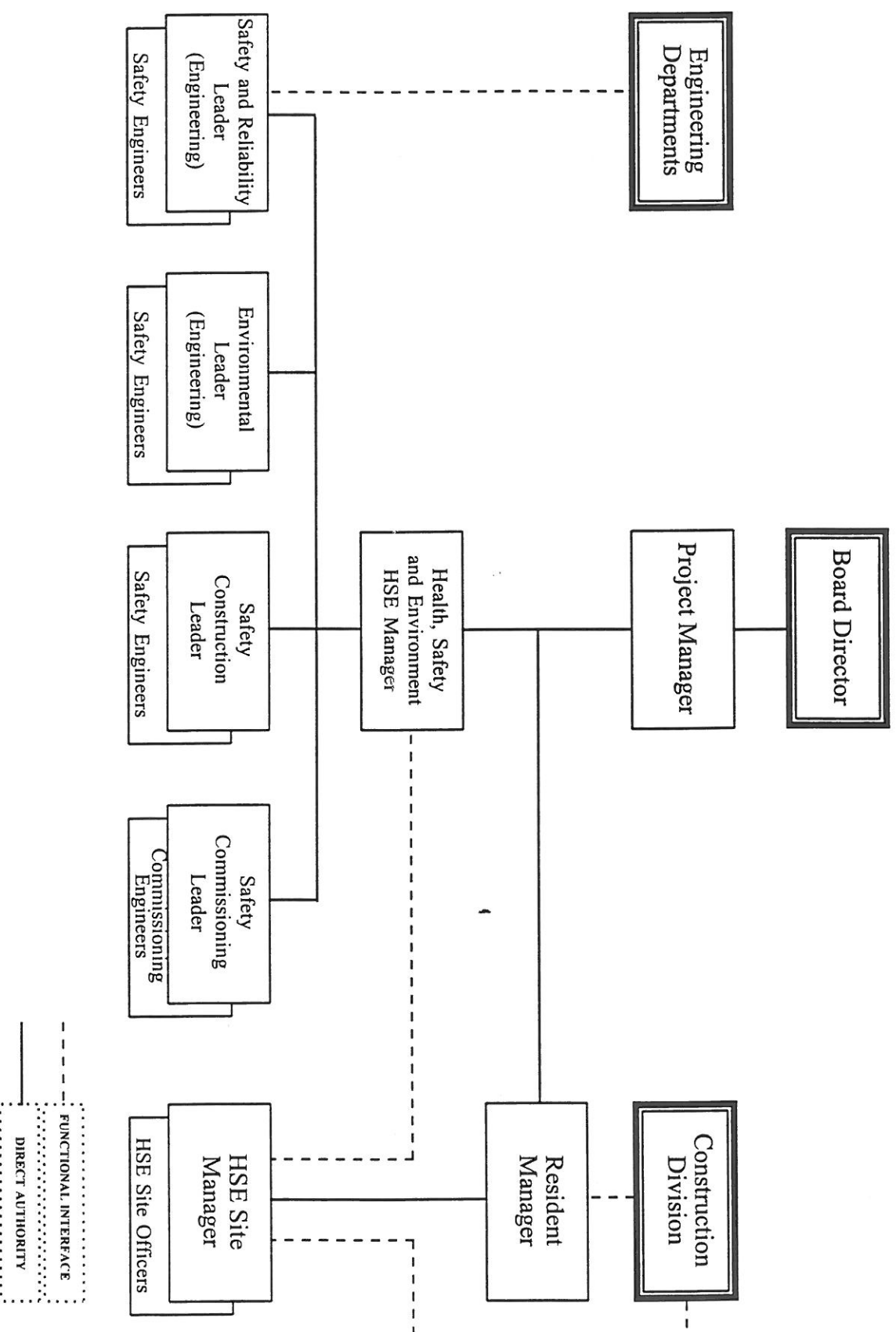
Senior management reviews at appropriate intervals the HSE Management System and its performance to ensure its continuing suitability and effectiveness.

The reviews are used to reinforce continuous efforts to improve HSE performance.

## **10 CONCLUSION**

Snamprogetti's Health, Safety and Environment Management System is described above in general terms. The HSE System is reviewed in the circumstances of each project to ensure that it is project specific and meets all local, national and Client requirements. Measures are taken to ensure familiarisation of company and Subcontractor's employees with the project specific HSE System thereby increasing its overall effectiveness as a management tool.

Figure 1. Typical Organization of Snamprogetti's HSE







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**Implementation of SHE  
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Organisational Perspectives**

**Joseph Rutters**  
**Lurgi Öl Gas Chemie GmbH**



**IMPLEMENTATION OF A  
(Health, Safety and Environmental)  
HSE MANAGEMENT SYSTEM**

**Lurgi Öl · Gas · Chemie GmbH**

**European Construction Institute Workshop**

**Frankfurt am Main, October 22, 1997**

## **1 Company Profile**

Lurgi is a worldwide operating engineering and contracting company with a focus on plants for the oil, gas and chemical industries, and offers the following services:

- ◆ plan, engineer and build turnkey plants, plant units and equipment as well as
- ◆ perform consulting, engineering and management as a package or individually.

While doing this Lurgi fulfills the Client's requirements and complies with all relevant HSE legislation, rules and regulations. Construction activities are performed by well-selected and qualified Subcontractors.

## **2 Background and Considerations**

Engineering & Construction Contractor Companies are increasingly requested to submit written proof of a HSE Management System by Clients and Owners and chemical and similar industries in general.

If you want to compete in our business you have to show increasingly your strenght in managing HSE and maintaining its momentum. Apart from this, managing H, S and E by providing adequate and appropriate measures, is a moral responsibility towards employees, the public and the environment.

No issue in bussiness is so important, not even profits, to find a reason not to pay adequate and appropriate attention, time and money for peoples', safety, health and our environment during the core activities of our company.

Besides, elimination of injuries, property loss and environmental damage is very important for Lurgi's image, the ultimate profitability, as well the public interest.

Accidents can cause social and economic loss, impair individual and group activity, and finally inefficiency in some way.

No question that they are costly to industry as well as to society.

Real HSE pressure on industry in the European Community has been developed since the mid 70's.

Finally, in June 1992 the European Union presented a Council Directive 92/57/EEC on the implementation of: Minimum Safety and Health Requirements at temporary or Mobile Construction Sites'.

The aforementioned Directive had to be implemented into the individual national legislation of EC Member States by January 1, 1994, but currently still not in Germany.

The Directive emphasizes the need for systematic HSE management, thus stimulating Lurgi to develop a HSE Management System.

Besides, Lurgi was already and is still increasingly facing the tightening demands of Authorities and Clients towards proven HSE Performance, which shall preferably be based on sound management.

Apart from the fact that proven HSE performance has other benefits than pleasing the Client, Lurgi is convinced that sound HSE Management also offers economic and social advantages.

While developing the HSE Management System it was Lurgi's experience that existing and conventional wisdom was replaced by a structured system of organizing health, safety and environmental efforts.

This means an approach to design and build facilities, that provides greater value, especially for HSE, to all involved.

Design was just mentioned because 'HSE in design' is also covered by the HSE Management System, thus completing our HSE mission until the hand over to the Client or Owner.

A recognized fundamental weakness of Lurgi's HSE management in the past was lack of formalized commitment, thus hardly motivating Lurgi's site management & supervision which in turn influences Subcontractors' HSE performance.

For Lurgi site management to improve HSE performance it is important to recognize the business implications of dealing with HSE as a strategic concern.

Cost effective investment in management controls like the recently developed HSE Management System is the only acceptable way to minimize any loss.

An non-organized approach is increasingly in conflict with the need to provide improved HSE performance.

In the past Lurgi's HSE performance reporting was in general typically limited to meeting regulatory requirements.

However, we are now convinced a HSE Management System can be seen as a potential effective means of communicating positive HSE performance, thus providing the necessary feedback for managerial and Management System improvements.

Lurgi is cultivating a vision for the future that elevates HSE concerns and effectively integrates them into the overall corporate Management System.

Our efforts aim at a corporate strategy which means HSE issues, and HSE management be incorporated into all business processes.



However, we realize that line organization continues to carry full responsibility, authority and accountability for the HSE performance of their engineering activities and site operations.

HSE is measured and communicated throughout the project organization and beyond.

Lurgi's HSE vision is fundamentally based on the concept that existing interfaces during each Construction project are linked and managed.

We want to deliver superior performance, which is based on a set of recognizable issues like: sound HSE procedures and working documents, adequate and appropriate resources, and understanding and improving cultural and organizational characteristics.

Future performance satisfaction might also require improvements to critical processes which traverse our organization as a whole, creating links between different areas.

In the past HSE was more or less treated as an entity, away from the corporate management system.

We are now busy to implement our HSE Management System, which means that old steps may be eliminated and new ones are introduced.

It is the only viable long-term solution.

One should however realize that the basis for acceptance of a new Management System is determined by the extent to which employees do have confidence in their senior management, viz. are convinced of the benefits of the change or concept being presented.

Example setting by senior management improves the motivation and does reinforce the identification with the company or organization of all involved.

A company culture which is recognized as 'strongly dominating' can be a barrier for Management System changes or modifications.

If a company culture is expected to be changed or modified short term it should be considered to develop a HSE Management System that excludes issues which can hardly be combined within the existing corporate Management System's culture.

Depending on the magnitude of the difference between 'current status' and the preferred 'future situation' a decision is needed on how to influence the company culture in favor of the implementation.

One should however also bear in mind that a successful implementation of a new strategy may additionally require a thorough analysis of the existing company culture, which means long term gradually fine tuning towards the new strategy.

However, thru a gradual step by step process even a non-company culture-like strategy will long term change, and I am thinking in terms up to 5 years, the existing company culture.

Finally the HSE Management System gives Lurgi parameters, which make performance measurable.

Incremental or band-aid solutions no longer make sense for us.

Prevention of workplace injury and illness can only be accomplished thru a complete evaluation of the construction site management process.

HSE is going to be an integral part of engineering and construction project management and can no longer operate as an entity, separate from the overall business process.

However, from drawing board to integrated operation takes time, but progress has been made within Lurgi and everybody here is watching this progress.

### **3 Key Issues of Lurgi's HSE Management System**

The effectiveness of the HSE Management System is based and expected to be guaranteed by the equality principle laid down in the HSE Policy statement of Lurgi Senior Management.

In order to ensure uniformity of HSE management throughout a project the engineering as well as the construction phase are included.

Performance standards, covering organizational procedures and the control of specific risks, were established.

They are based on thorough analysis of Lurgi's needs in it's specific types of operation, viz. engineering, construction and commissioning.

For the construction sites, amongst others, performance standards were established for aspects like organization, cooperation, control, communication, competence, hazard identification, risk control, etc., whereas for the engineering activities the system contains a multi-disciplinary Checklist HSE in Design and a customized Engineering HSE Plan.

While implementing the Engineering HSE Plan the assigned HSE Project Engineer is expected to ensure that local and Client HSE requirements are also met, and additionally assists the Project Manager to maintain the HSE momentum during the project.

Lurgi's Central HSE Department renders consultation and development services.

Selection of Subcontractors is done thru an extensive 'Questionnaire to Subcontractors', evaluation of the answers automatically selects the subcontractors meeting Lurgi's HSE requirements.

A Model Construction Site HSE Plan is issued for each new construction site in a customized version and reflects all relevant legal HSE rules and regulations, including additional Client requirements.

Lurgi's and the Client's HSE training requirements are laid down in a matrix; construction site HSE Introduction is conducted prior site entrance by means of an interactive CD-ROM HSE video program.

A multiple choice questionnaire is to be answered by the attendance.

#### **4 Implementation, Cultural Impact.**

Formal and informal presentations are an important aspect of spreading the message and boosting the implementation. The HSE Management System is distributed thru a monthly HSE Flash and can be received on the Company's PC-network.

Audits have been conducted at construction sites in 3 different countries, viz. Germany, Belgium and Indonesia in order to surface aspects which might need an anticipated approach for smooth implementation.

Subsidiaries in 3 continents are visited and offered subsequent support if deemed necessary by them.

We, Lurgi's Central HSE Department, at the Headquarter in Frankfurt will be available for any assistance and consultation to make the mission of the implementation successful.

Implementation of the HSE Management System is done on a basis of pragmatism and should give all whom it belongs adequate time to absorb the news. Implementation does also mean getting used to something by understanding it and practicing it.

Active monitoring of the HSE Management System during implementation is essential because this provides feedback on performance and needs for change or modification.

Active monitoring involves checking compliance with performance standards and the achievement of specific company objectives. Monitoring is performed thru inspections, audits, observations and formal and informal meetings.

Site management and supervision should be formally given the responsibility, viz. be actively involved, in monitoring the achievement of HSE objectives and measuring compliance with those standards for which they and their subordinates are responsible.

Basically this means those responsible for the direct implementation of standards are expected to monitor compliance in detail.

However, acceptance of a new strategy fully depends on the extent to which employees trust their senior management.

Trust is a basic condition for a 'society'.

It is an age-old formula that example setting by Senior Management significantly increases the motivation and momentum for acceptance by the employees, which also includes a tendency towards stronger identification with the Company and its HSE targets.

Management style and Company culture are fully linked.

Company culture can not be believed if it only sticks to preaching it, without example setting Senior Management in order to show that it is an integral part of any business process or activity.

The grounds for not adequately implementing HSE as mentioned above are sometimes, amongst others, presented like: 'we do not have the money' or 'we do not have the time for it', or whatever the reason is.

One should never take them at face value. The basic reason is a lack of motivation and/or appropriate attitude.

It is of significant importance to quickly release field results to the employees and other people involved, thus motivating them and meanwhile increasing the acceptance for further efforts towards the goals set as Corporate HSE Performance.

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Joseph Rutters has a chemical engineering background.

He is a Certified Safety Professional with extensive experience and expertise in chemical process safety and construction safety.

He held supervisory positions in HSE at Rank Xerox Ltd and Du Pont de Nemours Inc, and was president of his own HSE Consulting Agency from 1983 till 1991.

He is currently working as a Senior Consultant.

His experience represents 23 years of HSE in four of the six continents.



# Organization of Lurgi AG



## Lurgi AG

### Lurgi Metallurgie GmbH

- Iron and Steel
- Non-ferrous Metallurgy

### Lurgi Öl-Gas-Chemie GmbH

- Hydrocarbon Technology
- Petrochemistry and Inorganic Chemistry
- Gas Technology
- Renewable Resources and Fine Chemicals

### Lurgi Umwelt GmbH

- Municipal Waste Disposal
- Sewage Sludge / Hazardous Waste
- Gas Cleaning in Industrial Processes
- Water, Waste Water and Adsorption Technology

### Lentjes AG

- Complete Power Plants
- Industrial Steam Generators
- Flue Gas Cleaning Systems
- Structural Steel Engineering
- Technical Service

### Zimmer AG

- Polymers
- Synthetic Fibres
- Thermoplastics
- Recycling Processes

### In-house services

- Payroll Accounting
- Patents
- Administration



# **HSE Management System**



# **HSE Management System Elements (1)**

- ◆ **Structure**
  - HSE organization is identical to the line organization
- ◆ **Management Review/Feedback**
- ◆ **Organization and Responsibilities**
  - Executive Vice President Engineering Division
  - Central HSE Department
  - HSE Discipline Expert
  - Project Manager
  - HSE Project Engineer

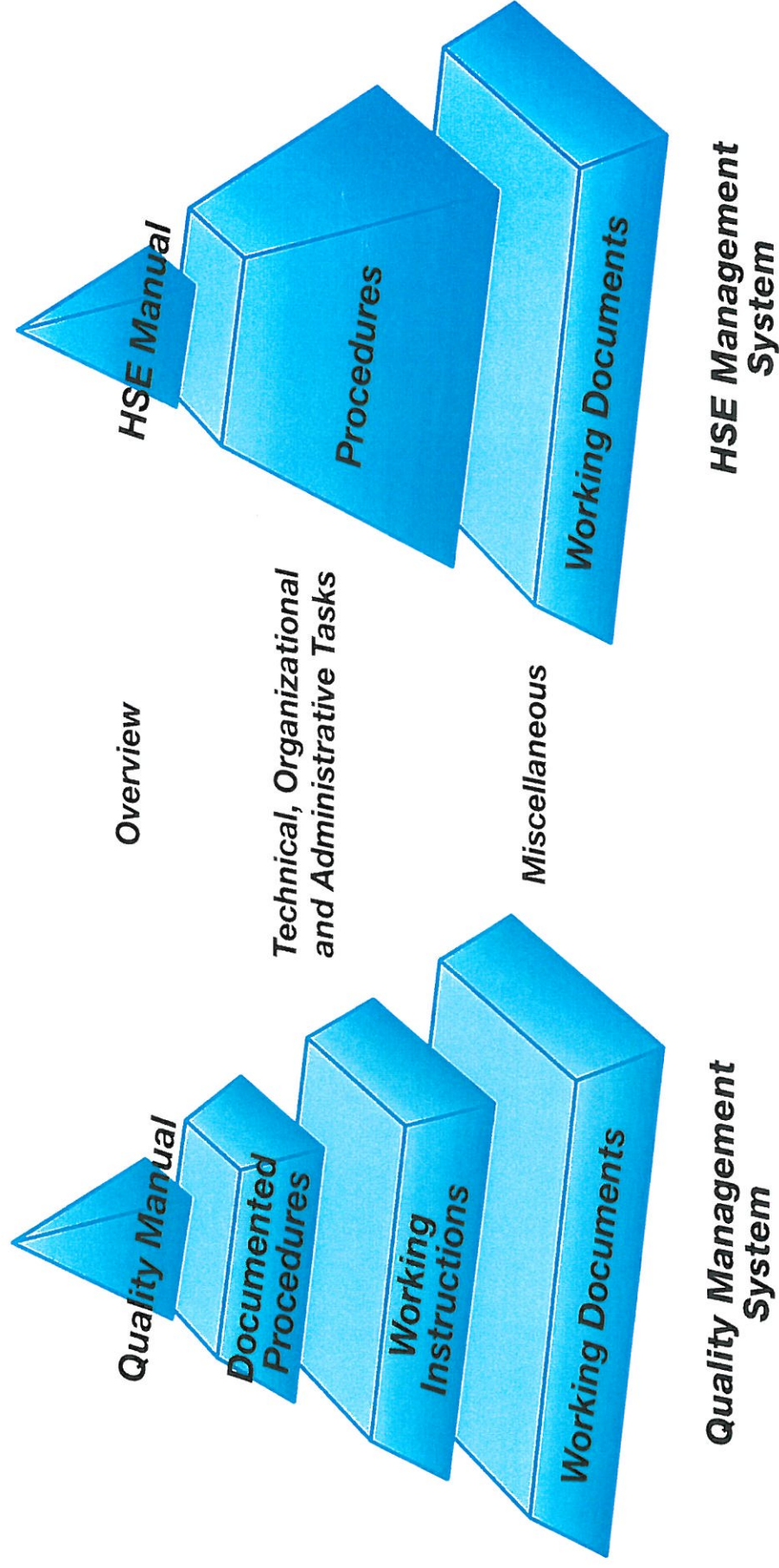


## **HSE Management System Elements (2)**

- ◆ **Organization and Responsibilities (continued)**
  - Lead Engineer
  - Head of Construction Department
  - Construction Manager
  - Construction HSE Manager/Construction HSE Engineer
  - Discipline Supervisor
- ◆ **Project HSE Plans**
  - (Model) Engineering HSE Plan
  - (Model) Construction Site HSE Plan

# Structure of Management Systems

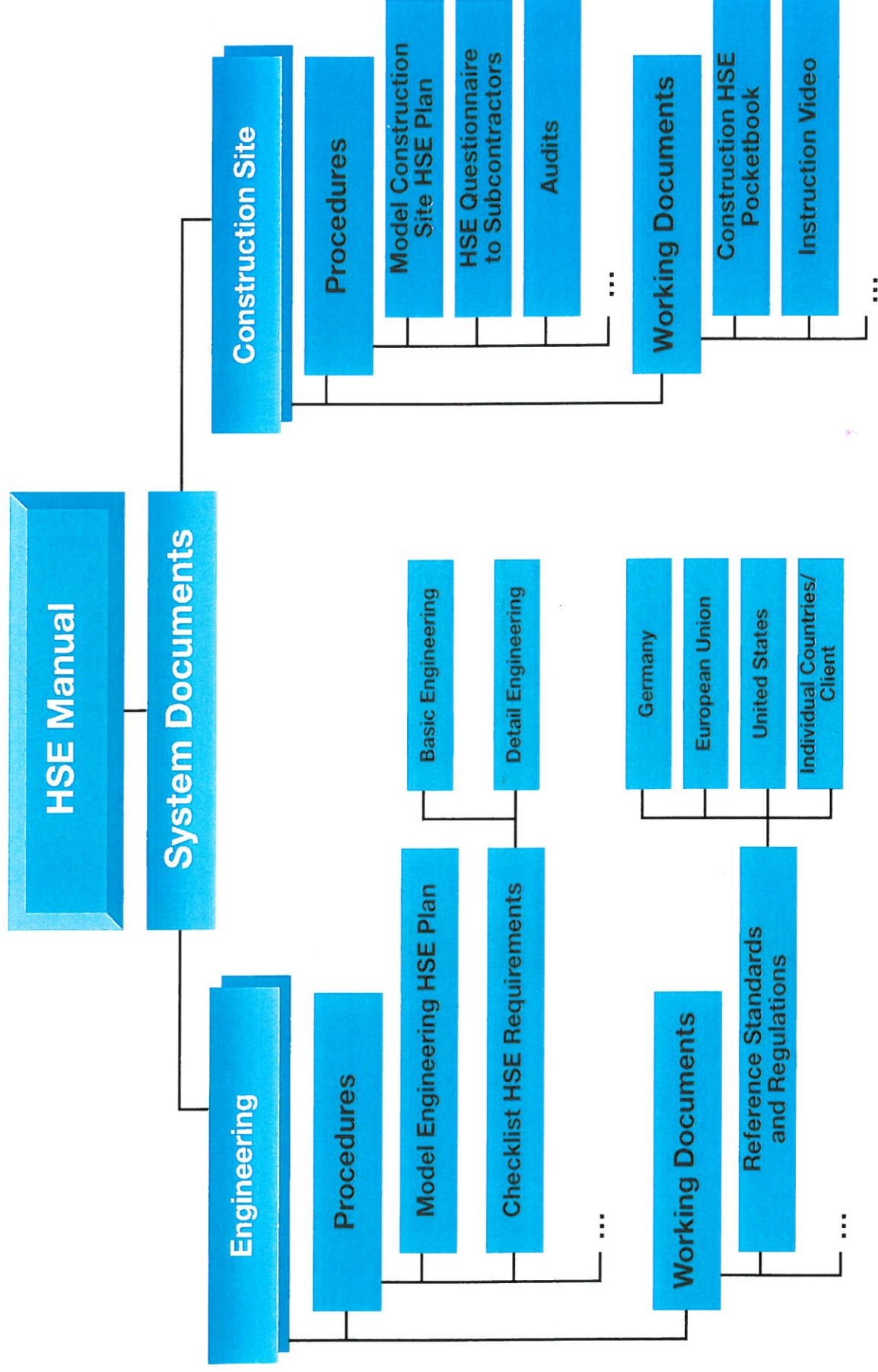
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# HSE Management System

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