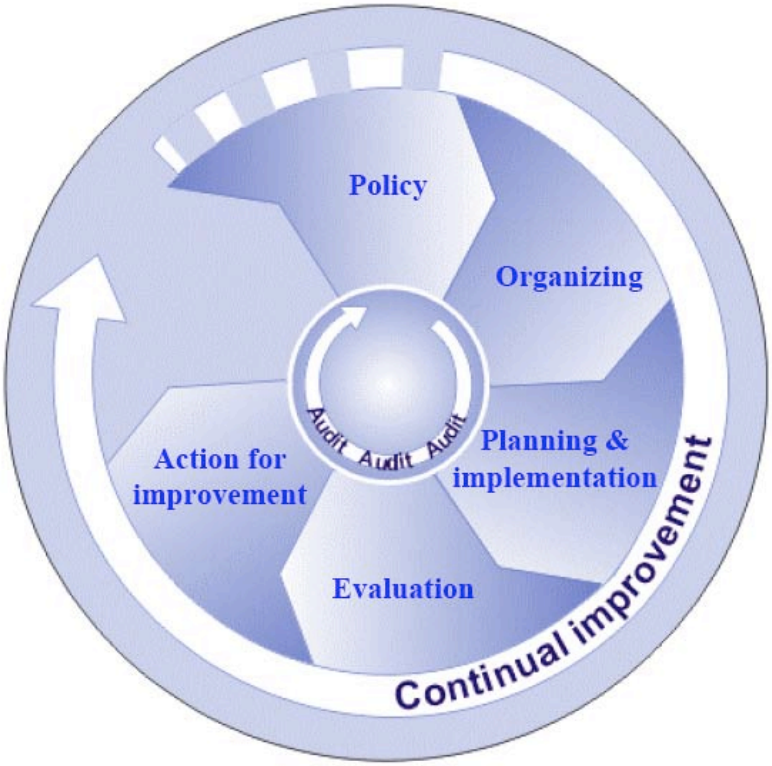
ILO CONSTRUCTION OS&H

A free, comprehensive, international, digital training package in occupational safety and health for the construction industry

THEME SUMMARY 7: PROCESSES AND SYSTEMS



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1 PREFACE

This theme sets up a systematic way of providing for effective OS&H processes, procedures and practices. Good systems are an essential part of preventing incidents and protecting the health of employees, and must be designed and implemented with care and expertise. The content is as shown in the table above.

This Theme Summary is largely based on a comprehensive text, the ILO's "Guidelines on occupational safety and health management systems", known as 'ILO-OSH 2001', which has been provided as a **Download** in **Construction OS&H**.

It begins with a simple explanation of systems theory, which leads into an explanation of the ILO's Guidelines. Modern OS&H systems are based on considerations of 'hazards' and 'risks' and these concepts are explained, followed by a description of how they can be assessed and managed. All this is then brought together in the form of a flow chart for a systematic OS&H process. Finally, ways of communicating this process are described, and an example of a contractor's safety and health policy statement is given in the Appendix.

2 BRIEF REVIEW OF SYSTEMS THEORY AND PRACTICE
'Systems theory at a glance'

A huge amount has been written on systems theory applied to management and it can become very complicated, but the essential characteristics are relatively straightforward:

1 It is important to take a broad and comprehensive view of a managerial problem, initiative or process. Individual elements should not be considered in isolation, but within a framework that takes into account the interactions with other parts of the 'system'. This concept is especially important to OS&H in the construction industry, where – as shown in other Theme Summaries – construction projects are complex and involve a wide range of organisations and individuals. Lack of care in an apparently minor detail can have catastrophic and widespread effects.

2 A 'system' comprises elements and linkages. In the case of OS&H, the 'elements' include written policies, risk assessments, method statements and communication strategies, which are linked by an agreed set of processes and procedures.

3 The 'system' is 'goal-oriented': that is, it is directed to achieve specific and usually quantified objectives. Methods, processes and procedures are formulated to achieve the desired objectives; the focus is on ends not means. This implies that there may be a number of different ways in which the desired goals can be achieved, and that it is important to examine these alternatives carefully so as to take the most effective decisions and actions.

4 There is an element of what would now be called 'learning' within the system; that is, provision for review and feedback is built in to the processes and procedures. The system is, therefore, 'dynamic' and continually developing and improving.

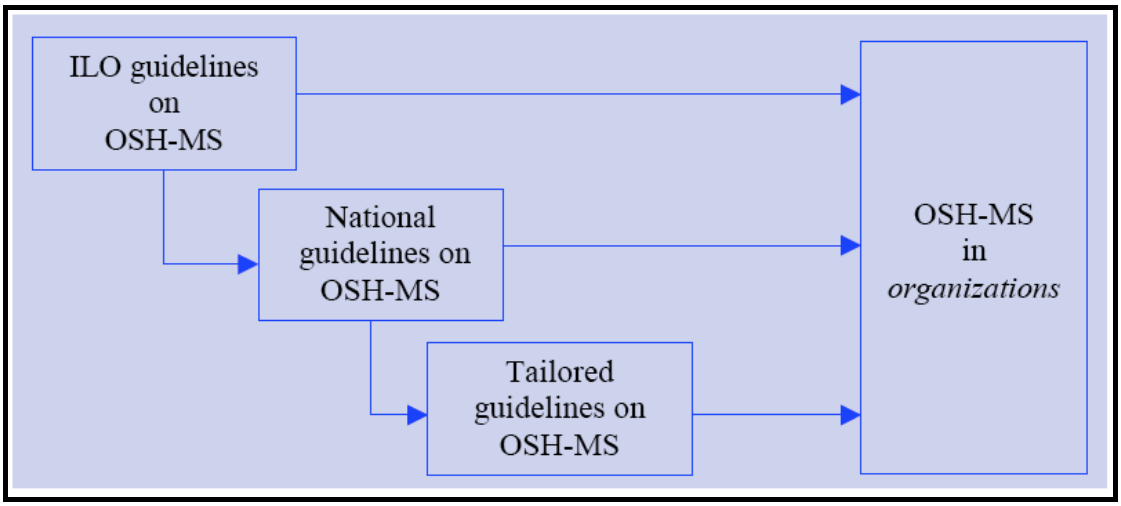
This is 'systems theory at a glance' and so represents a simplification, but is offers a simple framework for further development within **Construction OS&H**.

3 ILO-OSH 2001: GUIDELINES ON OCCUPATIONAL SAFETY & HEALTH MANAGEMENT SYSTEMS

The ILO has published these Guidelines for the following purpose:

"These guidelines should contribute to the protection of workers from hazards and to the elimination of work-related injuries, ill-health, diseases, incidents and deaths."

These Guidelines provide a comprehensive set of recommendations for effective OS&H systems at the levels shown in the diagram below. The overall aim is for the international guidelines to be progressively implemented at national level and then at the level of an organisation.



The system is shown diagrammatically as follows:

ILO-OSH 2001 relates to 'systems theory at a glance' as follows:

1 It takes a broad and comprehensive approach
2 The system comprises five main 'elements', which are linked within a process
3 The goal is to improve the safety and health of people at work in whatever ways are appropriate
4 'Learning' is through 'evaluation' and action for improvement. 'Continual improvement' and 'audit' are built in to the processes

The five element structure for OS&H systems offered by the Guide has been adopted in **Construction OS&H. Since Construction OS&H** is intended to be used within organisations (Client, Designers and project managers, Construction companies) and by workers and their organisations, the focus will be on the **organisational level**. The content of each part is summarised briefly below.

Policy

All the organisations involved in the execution of a construction project should have a written and agreed OS&H policy. The policy should be:

- Written specifically by and for the organisation
- Formulated with the participation of employees and their representatives
- Adopted positively at all levels, especially by senior management
- Be clearly stated and effectively communicated to all
- Continually reviewed and up-dated

The policy should include the following:

- A strong commitment to protecting the safety and health of all members of the organisation
- A statement of compliance with all relevant laws, regulations and agreements
- A management structure of organisation and responsibility
- Comprehensive consultation processes and procedures
- Comprehensive review, audit and feedback processes, and a firm commitment to continual improvement
- Must be compatible with other management systems or embedded in them

An example of an OS&H Policy statement by a contractor is given in the Appendix in Section 8.

Organising

Employers have overall responsibility for OS&H and must take the lead in ensuring that employees are adequately protected. Employers and senior managers should set up effective management structures for the practical implementation of the organisation's OS&H Policy.

These structures should:

- Ensure that the effective management of OS&H is part of the job of all managers and supervisors, and is clearly accepted as such
- Engage the workers in positive and effective participation processes
- Establish clear, easily comprehensible, achievable and measurable aims and objectives for OS&H performance
- Provide adequate resources
- Communicate the aims, objectives, responsibilities, practices and procedures clearly to all
- Promote OS&H in positive ways
- Establish effective ways of identifying, eliminating or controlling hazards and risks

Employers must ensure that all employees are properly trained and competent to undertake the tasks to which they are allocated. Their physical ability (e.g. physique, age, state of health) must also be taken into account.

All of the above must be effectively documented and records kept as follows:

- How the above requirements were implemented, including all communications used
- Details of work-related injuries, ill-health, diseases and incidents, including their causes
- Reports of monitoring and audit processes

Planning and implementation

An effective OS&H plan should comprise:

- Clear, measurable and prioritised objectives
- A plan for achieving each objective
- A process for assessing achievements against the objectives
- Specification of the human, physical, financial and environmental resources required

Hazards and risk should be identified and eliminated or controlled (see Sections 4 and 5 below for further information).

Improving OS&H performance usually requires changes, so it is important to have a plan for ‘managing change’.

Emergency prevention, preparedness and response arrangements should be established and maintained.

Procurement procedures and contracts for contractors, materials and services should ensure that the requirements of the Policy and Plans established by the organisation, as above, are effectively carried through to all elements of the construction project.

Evaluation

Procedures to monitor, measure and record OS&H performance on a regular basis should be developed, established and periodically reviewed. Responsibility, accountability and authority at different levels in the management structure should be allocated.

Accidents, incidents and other non-complying occurrences should be competently investigated and reported, and these reports used within the evaluation.

The purpose of evaluation is to assess the effectiveness of the whole provision of protective measures for all employees and others involved in a construction company or project, and to stimulate improvements.

Action for improvement

These actions should be initiated by comprehensive audits by competent persons, internal to the organisation but independent of the specific project or section of the organisation; or preferably by persons external to the organisation. ILO-OSH 2001 gives a useful set of checklists for audit.

In parallel with audit, ILO-OSH 2001 recommends the use of managerial reviews, which make a strategic and analytical study of the effectiveness of the whole OS&H provision within an organisation. Detailed guidance is given in the ILO-OSH 2001 document.

4 HAZARDS AND RISKS

The following definitions are taken from ILO-OSH 2001:

A **hazard** is the inherent potential to cause injury or damage to people's health

Hazard assessment is a systematic evaluation of hazards

Risk is a combination of the likelihood of an occurrence of a hazardous event and the severity of injury or damage to the health of people caused by this event

Risk assessment is the process of evaluating the risks to safety and health arising from hazards at work

These definitions provide the basis for a systematic approach to OS&H in organisations. In everyday conversation the terms 'hazard' and 'risk' are often used interchangeably, but in OS&H terminology they have distinct meanings.

OS&H hazards and construction projects

Consideration of the 'project matrix', which is being used as one of the basic structures of **Construction OS&H** and is shown again below, allows a number of categories of hazard to be formulated, as shown in the table.

THOSE INVOLVED	PROJECT STAGES				
	Briefing	Design	Procurement	Construction	Commission
Client					
Authorities					
Project managers					
Local communities					
Designers					
Contractors					
Other consultants					
Sub-contractors					
Suppliers					
Workers					
Users					

CATEGORY OF HAZARD	EXAMPLES
Hazards that may affect the project due to its location	Weather, flooding, active utilities, difficult access, aggressive neighbours
Hazards that may affect the location due to the project	Pollution from site activities, danger to public from site activities and traffic
Hazards that may be caused by project briefing and design (by actions or negligence)	OS&H not considered at the outset, client and designers only consider end result not process of construction
Hazards that may be caused by project management and organisation (by actions or negligence)	Lack of senior management awareness and commitment, failure to implement diligent OS&H practices
Hazards inherent in construction methods ('active hazards')	Safety of workers not considered in the method statement, unsafe equipment
Hazards inherent in construction components and materials ('embedded hazards')	Materials contain injurious chemicals, components need heavy or require excessive force or special techniques
Hazards that may be caused by human behaviour	OS&H not taken seriously by managers, financial pressures on workers and supervisors
Wholly unpredictable or 'latent' hazards *Only such hazards cause 'accidents', all others cause preventable incidents*	Chemical or structural defects which were quite unknown at the briefing or design stage

5 ASSESSMENT AND MANAGEMENT OF HAZARDS AND RISKS

A European Directive provides good guidance on risk assessment, as given below:

Extract from: European Council Directive 89/391/EEC of 12 June 1989 (see http://osha.europa.eu/en/data/legislation/1) on the introduction of measures to encourage improvements in the safety and health of workers at work.

2. The employer shall implement the measures referred to in the first subparagraph of paragraph 1 on the basis of the following general principles of prevention:
(a) avoiding risks;
(b) evaluating the risks which cannot be avoided;
(c) combating the risks at source;
(d) adapting the work to the individual, especially as regards the design of work places, the choice of work equipment and the choice of working and production methods, with a view, in particular, to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health;
(e) adapting to technical progress;
(f) replacing the dangerous by the non-dangerous or the less dangerous;
(g) developing a coherent overall prevention policy which covers technology, organization of work, working conditions, social relationships and the influence of factors related to the working environment;
(h) giving collective protective measures priority over individual protective measures;
(i) giving appropriate instructions to the workers.

3. Without prejudice to the other provisions of this Directive, the employer shall, taking into account the nature of the activities of the enterprise and/or establishment:
(a) evaluate the risks to the safety and health of workers, inter alia in the choice of work equipment, the chemical substances or preparations used, and the fitting-out of work places.
Subsequent to this evaluation and as necessary, the preventive measures and the working and production methods implemented by the employer must:
- assure an improvement in the level of protection afforded to workers with regard to safety and health,
- be integrated into all the activities of the undertaking and/or establishment and at all hierarchical levels;
(b) where he entrusts tasks to a worker, take into consideration the worker's capabilities as regards health and safety;
(c) ensure that the planning and introduction of new technologies are the subject of consultation with the workers and/or their representatives, as regards the consequences of the choice of equipment, the working conditions and the working environment for the safety and health of workers;
(d) take appropriate steps to ensure that only workers who have received adequate instructions may have access to areas where there is serious and specific danger.

5. Measures related to safety, hygiene and health at work may in no circumstances involve the workers in financial cost.

(The ILO is grateful to the European Commission for the use of this quotation. It is 375 words long, so has been used under the convention of 'Fair Use' which allows a maximum of 400 words to be used without seeking formal permission.)

Can risks be quantified?

A further, quantified development of risk assessment is described in a large number of publications. The basic concept is derived from the definition of risk given below from ILO-OSH 2001:

Risk *is a combination of the likelihood of an occurrence of a hazardous event and the severity of injury or damage to the health of people caused by this event*

The essential principles are given in the table below, which presents a simplification of what can become a complex analysis. The 'likelihood of an occurrence of a hazardous event' can be given a numerical value. On some construction projects, this value can be determined from statistical data; for example, if a cofferdam is to be constructed in a river that is liable to flooding, the probability of a cofferdam of a specific height being over-topped can be determined from water level records. But more often such data are not available, so the process is based on probabilities derived from the experience of those involved in making the judgement; quite sophisticated processes are sometimes used to 'quantify' these 'subjective' judgments. In the case of the table below, these judgements have been made on an integer numerical scale of 1-5.

Similarly, in some cases objective data from statistical records may be available on which to assess the severity of injury or damage, or these values may be assessed by experienced judgement. In the table below, they are shown on a scale of 1-5.

Thus, from the definition of risk as a combination of two factors, multiplying these two values for each cell in the matrix can complete the table.

LIKELIHOOD OF OCCURRENCE		**SEVERITY OF INJURY OR DAMAGE**				
		Very unlikely				Almost certain
		1	2	3	4	5
Low	1	1	2	3	4	5
	2	2	4	4	8	10
	3	3	6	9	12	15
	4	4	8	12	16	20
High	5	5	10	15	20	25

5 or below = 20%
6-10 = < or = 40%
12-25 = 60% or >

Even at this simple level, the analysis is informative. The table above illustrates the meaning of 'risk' as a 'combination' rather than a singular concept and how this combination can have catastrophic results. This is an important concept to be understood when considering hazards and risks, which can help those involved to take a more comprehensive view of their assessments.

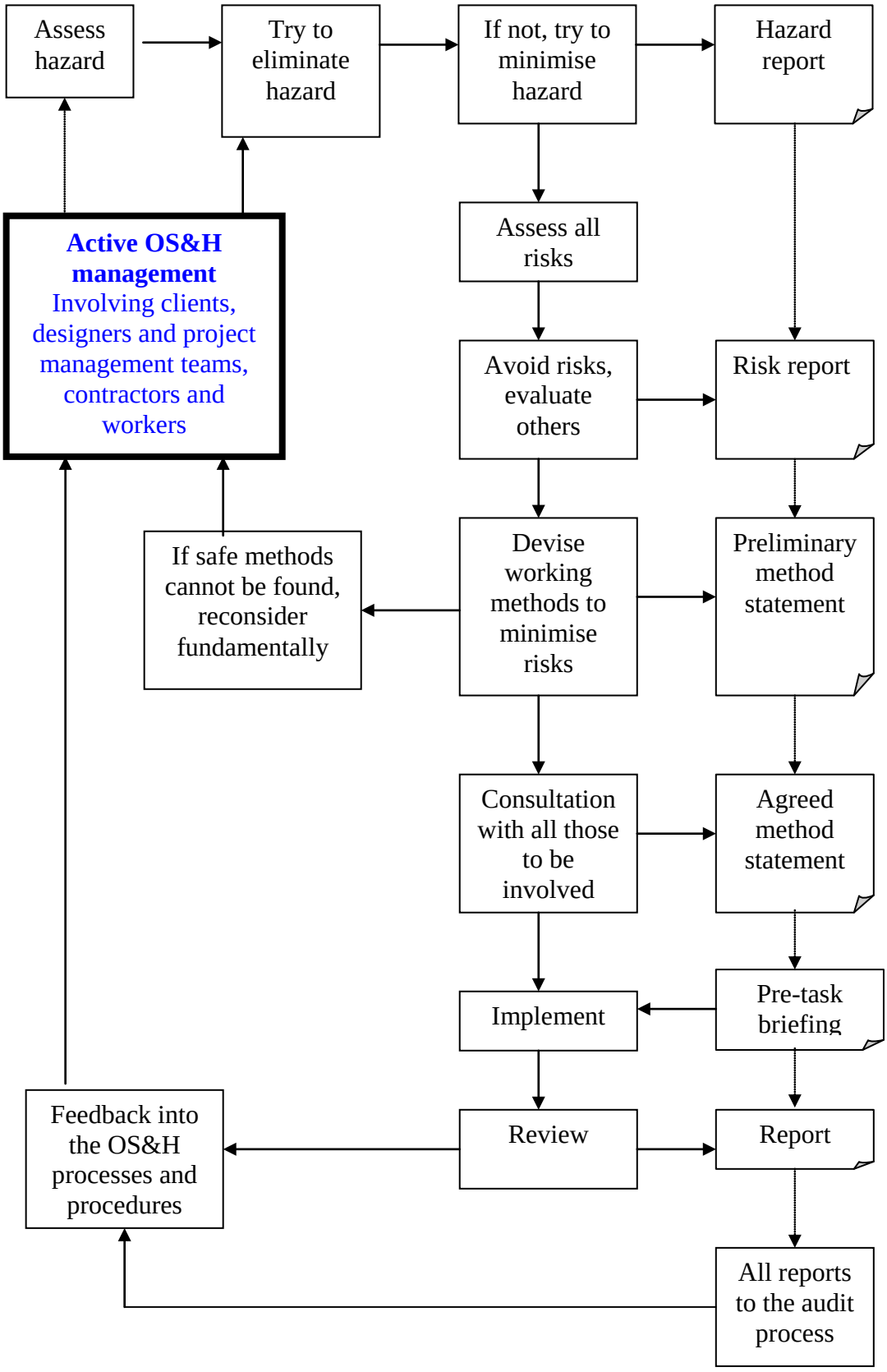
Nevertheless, as a practical tool this type of analysis has two limitations in the context of Construction OS&H:

1. The availability of 'hard data' is generally very limited, so frequently the analysis has to be based on values derived from personal judgment. Although this is often the case in all risk assessments, the use of 'subjective data' can give a false impression of precision, which can be misleading and instil unwarranted feelings of confidence rather than caution.
2. Implicit in the analysis is the acceptance that some level of risk of injury or damage to health is 'acceptable', and this is in conflict with the aim of 'zero incidents'.

6 THE SYSTEMATIC CONSTRUCTION OS&H PROCESS

To put ILO-OSH 2001 and the other parts of this Theme into practice requires a more detailed and systematic process. The diagram below, 'The systematic Construction OS&H Process', brings together the main requirements summarised in the preceding sections into a chart for 'active OS&H management'.

THE SYSTEMATIC CONSTRUCTION OS&H PROCESS
Elements and linkages



The Method Statement is of crucial importance to this process. This should comprise, as a minimum requirement, a clear, fully documented and agreed statement of the way in which a specific construction element shall be built, taking into account such aspects as:

- The assessment of the hazards and risks inherent in the construction of this element
- The sequence of construction and the plan of work
- The materials and components to be used
- The construction plant and equipment to be used
- Temporary works and their possible effects on the finished element
- Provision of safe access, egress and work places
- The sequence of dismantling, removal and in some cases disposal, of all the plant, equipment, temporary works and waste
- A full statement of compliance with the policy and other requirements of the OS&H plan
- A full statement of all those who will be involved, their roles and confirmation that all have been fully consulted and properly briefed. (Note Theme 8: "Welfare and project site" explains the necessary requirements for communication, participation, training and other aspects of organising the full involvement of all concerned).

Another crucial aspect of the process is that it is not a linear sequence. ILO-OSH 2001 lays out a comprehensive and systematic approach, but the implications from the way it is presented may give the impression that this is a process that can simply be worked through from start to finish. Although for straightforward and well-understood construction elements this may be the case, in many cases this simple process will be inadequate.

In the process diagram given above, 'competent persons' devise the working methods to produce a preliminary Method Statement, which is then discussed with all those involved (or their appointed representatives). This consultation has two possible outcomes; either an agreed, safe and healthy Method Statement or a decision that no acceptable method can be found so the whole process has to be reconsidered fundamentally, starting with an assessment of the inherent hazards. It is through engaging in an iterative processes such as this that difficult problems may be solved.

7 COMMUNICATION SYSTEMS TO IMPROVE OS&H

This topic is only covered briefly in Construction OS&H because it is quite specialised and the information and software available is extensive and varied. Essentially, these systems are available in two forms:

General web-based information for downloading

There are some very useful aids available, many of them free, including;

- Standard forms and detailed guidance for many OS&H functions, such as policies, risk assessments, accident reports and audit reports. These may offer a good starting point for organisations who do not already have these procedures in place.
- Training programmes that may be downloaded, often in the form of PowerPoint presentations. These may also provide a good starting point for an organisation, or may be used selectively to augment other presentations.
- Statistics, case studies, accident reports, government policies and other good general background information.

Software systems for the management of OS&H

Comprehensive software systems are available for managing the OS&H function of an organisation. These will guide the user through all the stages given in ILO-OSH 2001 and much more. Functions include:

- Generating forms for the formulation of policies, procedures and all the systems required
- Prompting for updating these records
- Offering periodic reviews and reports according to an agreed format and timescale
- Holding data on employees
- Operating emergency procedures

The use of these systems should only be considered after careful study and it would be prudent to seek independent expert advice in choosing, installing and implementing such systems.

8 APPENDIX: AN EXAMPLE OF AN OS&H POLICY STATEMENT BY A CONSTRUCTION COMPANY

Taken from http://www.bmcc.ie/policies/safety.html on 22 12 2009. The ILO is very grateful to Brian McCarthy Contractors Ltd for permission to use this statement.

Health and Safety

Brian McCarthy Contractors Ltd. have been awarded SAFE-T-CERT accreditation for our Safety Management System. The SAFE-T-CERT accreditation system was developed jointly by the Construction Industry Federation in Dublin and the Construction Employers Federation in Belfast and takes account of 'best practice' guidelines for health and safety.

Brian McCarthy Contractors Ltd are committed to providing a safe and healthy working environment. All reasonable measures are taken to minimise risks to those directly involved in our activities and also to those who may be indirectly affected by these activities. Our commitment to Health and Safety is set out in our Safety, Health and Welfare Policy statement. Our safety & health procedures are implemented in the form of a Safety Management System which includes the requirement for stringent safety planning, effective communication, site inspections, safety training and review of performance.

Safety Planning

As part of our planning process a Project Safety Manual is prepared by the Contracts Manager in conjunction with our Safety Department for each project where we are appointed as Project Supervisor for the Construction Stage. This is the plan for how safety, health and welfare issues will be managed for each project. Persons with responsibility for safety are identified as part of this planning process and they are made aware of their responsibilities. The Project Safety Manual contains the Preliminary and Construction Stage Health and Safety Plans as well as information such as site rules, site specific risk assessments, method statements, site induction programmes, first aid arrangements, emergency procedures and traffic plans.

Risk assessments are prepared, reviewed and amended both at the planning stage and during the construction phase of each project. We ensure that risk assessments are carried out for all site activities. Over the years we have developed an extensive library of risk assessments which can be referenced and amended to meet the specific requirements of each project / activity.

Communication

We continually strive to ensure effective communication regarding health and safety matters. There are a number of mechanisms we use to communicate safety issues such as discussions with Safety Representatives, toolbox talks, training, site inductions, safety meetings, annual performance reviews and informal discussions.

On each of our sites with more than 20 persons we facilitate the election of a Site Safety Representative who may consult, and make representations regarding safety, health and welfare matters.

Site Inspections

The company employs full time site-based Safety Inspectors on its larger sites and visiting Safety Inspectors on the others. These inspectors carry out regular safety inspections and audits and advise and assist site management in ensuring that the highest safety standards are maintained.

Our Safety Manager co-ordinates the team of Safety Inspectors and is engaged in a process of constantly reviewing safety related matters with a view to continuous improvement in safety standards throughout the Company's operations.

Management Safety Training

All our Contracts Directors, Contracts Managers, Site Supervision and Safety Inspectors have completed the "Managing Safely in Construction" course. This course in construction safety & health management is approved and validated by the Institution of Occupational Safety & Health (IOSH), and run by the Construction Industry Federation with input from the Health and Safety Authority. Site Supervisors are also trained in Management and Inspection of Scaffolding. Other safety training such as Occupational First Aid Training is provided as required.

Occupational Safety Training

All employees must successfully complete the "Safe Pass" course before commencing work on site. A range of courses including Site Inductions, Tool Box Talks, Manual Handling, Abrasive Wheels Instruction and Defensive Driver Training Courses are provided regularly and as required. Toolbox talks are given on subjects which have particular relevance to site activity.

Measuring and Reviewing Performance

The weekly operations management meeting includes a review of site safety inspection reports as well as any incident reports. A review of the effectiveness of the Safety Management System is held on an annual basis. Progress against improvement targets is reviewed as part of this review process.

Company Safety, Health & Welfare Policy Statement

It is the policy of BRIAN MCCARTHY CONTRACTORS LTD to do all that is reasonably practicable to ensure a safe and healthy working environment. All reasonable measures will be taken to minimise risks to those directly involved in our activities and also to those who may be indirectly affected by these activities.

It is the intention of our company to comply with the requirements of the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare (Construction)

Regulations 2006, the Safety, Health and Welfare (General Application) Regulations 2007 and all other legislation.

All employees, subcontractors and others working on our sites are expected to comply with this policy and all other parts of the company's OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM.

In particular, the company will:

- Provide supervisors and managers who will value the health and safety of all personnel, lead by example and respond to all reasonable health and safety concerns.
- Employ people who are competent and capable of carrying out their work safely.
- Provide training, re-training, information, instruction and supervision as necessary to enable employees to work safely, effectively and with the minimum risk to health and safety.
- Prepare risk assessments and safety statements that take account of the general principles of prevention when implementing necessary safety, health and welfare measures.
- Make use of plant and equipment that is as safe as is reasonably practicable.
- Provide and maintain a safe and healthy place of work with proper access and egress to it, supported by a good standard of housekeeping and adequate facilities for health and welfare.
- Make available all necessary safety devices and protective equipment, and to maintain such equipment in good order.
- Ensure safety and minimisation of risk to health and safety, in connection to noise, vibration, radiation and with the use, handling, storage and transport of goods and substances.
- Plan, organise and maintain safe systems of work.
- Prevent improper conduct in the workplace.
- Prepare and revise emergency plans and measures to be taken when there is an emergency or risk of serious or imminent danger.
- Report to the Health & Safety Authority any notifiable accidents, disease and dangerous occurrences.
- Obtain, where necessary, the services of a competent person for the purpose of ensuring the safety, health and welfare of employees.

The company further commits to:

- Communicate this policy to its employees and interested parties.
- To implement and maintain its documented OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM, including this policy.
- To strive to continually improve the OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM.
- To regularly review our OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT SYSTEM, to ensure its continued relevance and effectiveness.

9 RELEVANT ELEMENTS OF THE KNOWLEDGE BASE

Title	Guidelines on occupational safety & health management systems
Author(s)	ILO SafeWork In Focus programme
Type of source	Report
Publication or other source details	ILO-OSH 2001
Date & ISBN/ISSN	2001. ISBN 92-2-111634-4
Summary of contents	The positive impact of introducing occupational safety and health (OSH) management systems at the *organization1* level, both on the reduction of hazards and risks and on productivity, is now recognized by governments, employers and workers. These guidelines on OSH management systems have been developed by the International Labour Organization (ILO) according to internationally agreed principles defined by the ILO's tripartite constituents. This tripartite approach provides the strength, flexibility and appropriate basis for the development of a sustainable safety culture in the *organization.* The ILO has therefore developed voluntary guidelines on OSH management systems which reflect ILO values and instruments relevant to the protection of workers' safety and health. The practical recommendations of these guidelines are intended for use by all those who have responsibility for occupational safety and health management. They are not legally binding and are not intended to replace national laws, regulations or accepted standards. Their application does not require certification. The employer is accountable for and has a duty to organize occupational safety and health. The implementation of an OSH management system is one useful approach to fulfilling this duty. The ILO has designed these guidelines as a practical tool for assisting *organizations* and competent institutions as a means of achieving continual improvement in OSH performance. The Guidelines cover national policy and OS&H systems in the organisation.
Comments on relevance	Very fundamental set of principles
Other information	These Guidelines are the foundation of this training package. They have been downloaded (‘Downloads’ folder)