



Session Program

1. Risk assessment – Introduction and concepts
2. Risk assessment process
3. Risk assessment exercise and group work
4. Conclusions

1. Risk Assessment. Introduction and concepts

Process of identifying workplace hazards, evaluating risks to workers' safety and health and control the relevant hazards.



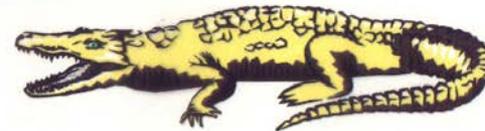
Hazard & Risk



International
Labour
Organization

Hazard and Risk

HAZARD: ANYTHING THAT
CAN CAUSE
HARM



RISK: THE CHANCE, THAT
SOMEONE WILL BE
HARMED BY THE
HAZARD



Hazard and Risk

- a **hazard** is anything that may cause harm. A hazard has the inherent potential to cause harm e.g. chemicals, electricity, working from ladders, a trailing cable, fire, unsafe buildings etc.
- the **risk** is the chance, high or low, that somebody could be harmed by a hazard, together with an indication of how serious the harm could be

Main categories of hazards

- **Safety** hazards associated with gravity (falls of people and objects); moving parts of plant/machinery and/or their loads, vehicles; electricity, fires.
- **Chemical** hazards, arising from liquids, solids, fumes, and gases.
- **Physical** hazards, such as noise, vibration, unsatisfactory lighting, radiation and extreme temperatures.
- **Biological** hazards, such as bacteria, viruses, infectious waste, etc.
- **Psychological** hazards such as job content, harassment, work demand, lack of control.
- **Ergonomic** hazards such as awkward postures, repetitiveness, long period standing.

Determining risk?

- The **risk** is the chance, high or low, that somebody could be harmed by hazards, together with an indication of how serious the harm could be
 - Likelihood of occurrence- increases the risk
 - Severity of injury - increases the risk
 - Numbers of workers exposed - increases the risk
- Risk matrices can be used to quantify risk and thus assist in prioritizing actions

Likelihood

Estimate the likelihood of occurrence

Hazard likelihood	Value	
Almost certain	5	Continual or repeating experience.
Likely	4	Common occurrence.
Possible	3	Possible or known to occur.
Unlikely	2	Not likely to occur under normal circumstances.
Rare	1	Not expected to occur but still possible.

Consequences

Estimate the **consequences** of each hazard according to its potential of the harm

Hazard Consequences	Value	
Insignificant	1	Negligible injury.
Minor	2	Requiring first-aid only (includes minor cuts and bruises, irritation, ill-health with temporary discomfort).
Moderate	3	Injury or ill-health requiring medical treatment (includes lacerations, burns, sprains, minor fractures, dermatitis and work-related upper limb disorders).
Major	4	Serious injuries or life-threatening occupational diseases (includes amputations, major fractures, multiple injuries, occupational cancers, acute poisoning, disabilities and deafness).
Disaster	5	Death, fatal diseases or multiple major injuries.

Risk Matrix

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Severe 5
Almost certain 5	Medium 5	High 10	Extreme 15	Extreme 20	Extreme 25
Likely 4	Medium 4	Medium 8	High 12	Extreme 16	Extreme 20
Possible 3	Low 3	Medium 6	High 9	High 12	Extreme 15
Unlikely 2	Low 2	Medium 4	Medium 6	Medium 8	High 10
Rare 1	Low 1	Low 2	Low 3	Medium 4	Medium 5

**3 or less residual risk Low, 4 – 8 residual risk Medium,
9 – 12 residual risk High, 15 or higher residual risk Extreme**

Hazards with long-term effects

Material

- Chemical agents
- Physical agents
- Biological agents

Dose (environmental concentration x exposure time)

- Task-related hazards (musculo-skeletal disorders, repetitive tasks, ...)

Psicosocial

2. Risk assessment process

5 steps to risk assessment

1. Identify the hazard and why present
2. Decide who might be harmed and how
3. Evaluate the risk – Identify and decide on the safety and health risk control measures
4. Record the findings and implement them
5. Review the assessment and update if necessary

5 steps of risk assessment



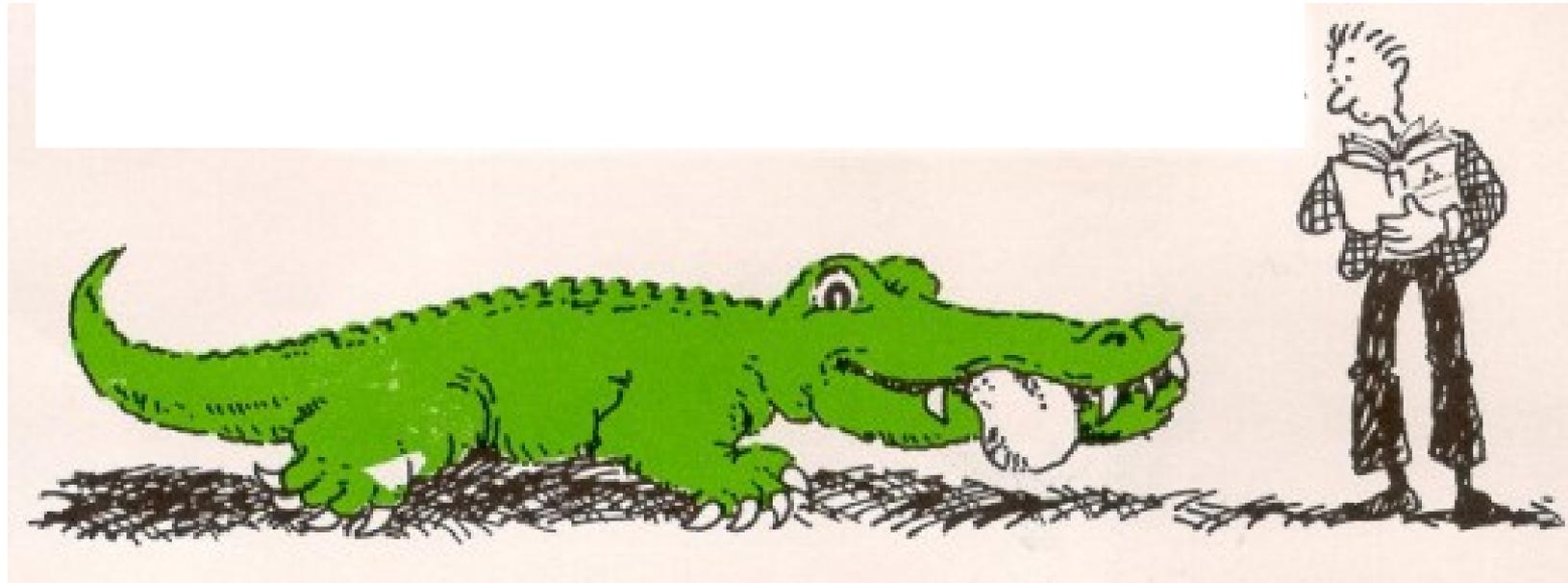
European Agency of Safety and Health at Work

1. Identifying hazards and those at risk
2. Evaluating and prioritizing risks
3. Deciding on preventive action
4. Taking action
5. Monitoring and reviewing

Health and Safety Executive

1. Identify the hazards
2. Decide who might be harmed and how
3. Evaluate the risks and decide on precautions
4. Record your significant findings
5. Review your assessment and update if necessary

Hazard identification



Process of finding and identifying:

- **hazardous agents** (situations, products etc.) that could contribute to provoking an occupational accident or/and disease
- the groups of **workers potentially exposed** to these hazards.

2.1. Identify the hazard

- Walk about - identify what could be expected to cause harm, look, listen, smell ..
- Watch the work activity understand why its necessary
- Talk to those who work in the area
- Compare equipment operating instructions, accepted systems of work to actual working practices
- Accident history

Hazard sources

- OSH **legislation**, codes of practices, guidance documents provided by national and international institutions and organizations.
- Information from national, sectoral or enterprises **statistics** on the prevalent occupational accident or/and diseases and the hazards involved.
- Information or **safety data sheets** provided by manufacturers and suppliers of machinery, equipment, tools, products and substances.
- Information from the **workers**, workers' representatives and joint OSH committee through consultations, observations, complaints, etc.
- Workplace and job **inspections** and analysis.
- Review of history of **accidents** (including incidents and “near misses”) and occupational illnesses, accident/disease investigations and data from workers' health surveillance, undertaken in the enterprise or in other enterprises.
- Advice, opinions and judgment of competent internal and external OSH **professionals**

Examples of hazards that commonly cause injuries (i)

- Falls
 - This includes falls from and falls into/onto, i.e. from ladders & roofs, into reservoirs & trenches, onto sharp objects
- Transport -Material handling equipment
 - Reversing vehicles, lifting loads & persons, excessive speed
- Mechanical hazards
 - Unguarded cutting tools, e.g. Circular saws, hand held grinders.
 - Unguarded belt and pulley drives e.g. on generators
 - Being struck by ejected parts e.g. split rims when changing tires

Examples of hazards that commonly cause injuries (ii)

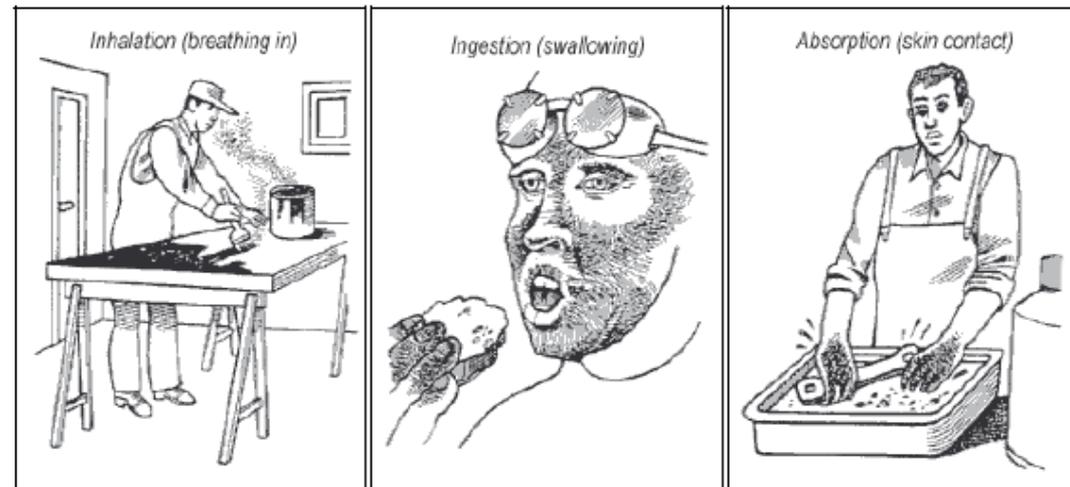
- Slips and trips
 - Poor house keeping, many falls are initiated by a slip or trip, lack of banisters
- Manual handling
 - Lifting, carrying, pushing heavy loads e.g. warehouse activities, manual mixing of concrete, poorly maintained handling aids
- Electricity
 - Electric shock, ignition, overheating/fire, unexpected start up, failure to operate
- Fire and explosion
 - Burns, smoke inhalation

Examples of hazards that commonly cause injuries (iii)

- Chemicals
 - Cleaning materials, fuels, lubricants, degreasers, acids
- Dusts
 - Wood dust, stone dust
- Noise and vibration
 - Generators, fuel pumps, concrete breakers, chainsaws
- Pressure
 - Airlines, hydraulic hoses, autoclaves
- Biological
 - Blood, pathogens, excrement
- Temperature
 - Hot and/or cold

2.2. Decide who might be harmed and how

- Who: Group workers exposed to the hazard i.e. riggers, warehouse staff
- How can be harmed: i.e. store men may suffer back injury from repeated lifting of boxes
 - knowledge about health risks of these agents
 - the routes and patterns of exposure (how they may be harmed).
- Some workers have particular requirements.

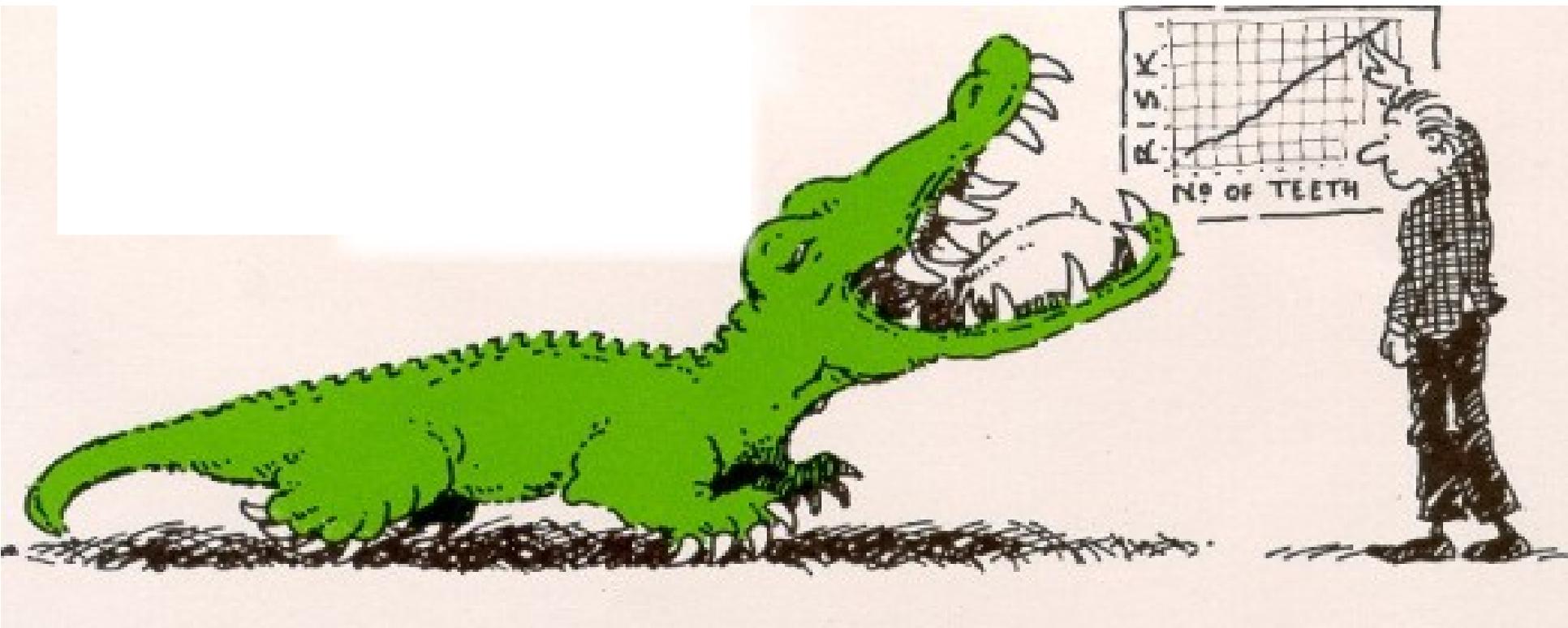


2.3. Evaluate the risk – Identify and decide on OSH risk control measures

Consider the following steps

1. Can the work activity / hazard be removed??
2. Evaluate the risk. Remember: $\text{risk} = \text{severity} \times \text{likelihood}$
3. Do the current controls sufficiently reduce the risk so harm is unlikely?
4. If not, what further controls are needed??

Evaluation of risk



Likelihood

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Hazard likelihood	Value	
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**3 or less residual risk Low, 4 – 8 residual risk Medium,
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Compare the rating with a criterion

- **Low (1-3):** tolerable, but warn team of hazards. Frequent review and monitoring of hazards are required to ensure that the risk level assigned is accurate and does not increase over time.
- **Medium (4-8):** Consideration should be as to whether the risks can be lowered, where applicable, to a tolerable level. Controls implemented within a defined time period.
- **High (7-8):** Unacceptable. Risk reduction measures should be implemented urgently. Under consideration, the suspension or restriction of the activity, or the application of interim risk control measures, until permanent measures have been completed.
- **Very High (9-10):** totally unacceptable; stop work immediately; resume only when controls have reduced the risk to tolerable levels.

2.4. Record your findings and implement them

In recording the assessment you show;

- a proper check was made
- you asked who might be affected
- you dealt with all the significant hazards, taking into account the number of people who could be involved
- the precautions are reasonable, and the remaining risk is low and
- you involved your workers and/or their representatives in the process

Example risk assessment for a butcher's shop

What are the hazards?	Who might be harmed and how?	What are you already doing?	What further action is necessary?	Action by who?	Action by when?	Done
Knives	Staff risk deep cuts or amputations from contact with blade.	<ul style="list-style-type: none"> Staff trained in the safe use, maintenance and storage of knives. Staff use the right knives for the job. Knives kept sharp. PPE (chain mail gauntlet/apron) provided and staff know how to wear it and for what jobs. Sufficient space for staff to work safely. 	<ul style="list-style-type: none"> Remind staff not to distract colleagues when they are using knives. 	Owner	20/7/07	17/7/07
			<ul style="list-style-type: none"> Check that shop first-aiders are trained in first aid for stab wounds. 	Owner	20/7/07	17/7/07
Infection	Staff risk zoonotic infection from absorbing raw meat.	<ul style="list-style-type: none"> Good personal hygiene from all staff. Good washing and welfare facilities. Food waste stored in closed containers. Staff trained in washing out puncture wounds and covering cuts with food-grade plasters and dressings. 	<ul style="list-style-type: none"> Remind staff to clean and disinfect waste buckets every time they are emptied. 	Manager	20/7/07	17/7/07
Work at height Changing light bulbs or displays	Falls from any height can cause bruising/fractures.	<ul style="list-style-type: none"> Suitable stepladder in good condition provided, and staff know how to use it safely. 	<ul style="list-style-type: none"> None. 	Manager	20/7/07	17/7/07
Contact with bleach and other cleaning chemicals	Staff doing cleaning risk skin irritation or eye damage from direct contact with cleaning chemicals. Vapour may cause breathing problem.	<ul style="list-style-type: none"> Mops, brushes and strong rubber gloves are provided and used. Staff shown how to use cleaning products safely, eg follow instructions on the label, dilute properly and never transfer to an unmarked container. 	<ul style="list-style-type: none"> Replace 'irritant' chemicals with milder alternatives, where possible. 	Manager	20/7/07	20/7/07
			<ul style="list-style-type: none"> Staff reminded to check for dry, red or itchy skin on their hands. 	Manager	20/7/07	20/7/07
			<ul style="list-style-type: none"> Staff reminded to wash gloves before taking them off carefully and storing in a clean place. 	Manager	20/7/07	20/7/07
Electrical Faulty building wiring, faulty electrical appliances	Staff could get electrical shocks or burns from faulty electrics, including portable electrical equipment – heaters, fans etc.	<ul style="list-style-type: none"> Staff trained to spot and report any defective plugs, discoloured sockets, damaged cable and on/off switches and to take defective equipment out of use. Staff know where the fuse box is and how to turn electricity off in an emergency. Clear access to the fuse box. Only qualified electricians work on electrical installation. 	<ul style="list-style-type: none"> Manager to do visual check of plugs, sockets, cables and on/off switches every three months. 	Manager and all staff	20/7/07	First check done on 18/7/07

Risk Assessment template

Enterprise:

Section/Unit:

Date:

**STEP 1
What are the hazards?**

Spot hazards by:

- walking around the workplace;
- asking workers what they think;
- checking manufacturers' instructions;
- contacting your trade association.

Don't forget long-term health hazards.

**STEP 2
Who might be harmed and how?**

Identify groups of people.

Remember:

- some workers have particular needs;
- people who may not be in the workplace all the time;
- members of the public;
- if the workplace is shared think about how the work affects others present.

Say how the hazard could cause harm.

**STEP 3
What are you already doing?**

List what is already in place to reduce the likelihood of harm or make any harm less serious.

What further action is necessary?

Make sure that risks have been reduced 'so far as is reasonably practicable'.
An easy way of doing this is to compare what is already being done with good practice. If there is a difference, list what needs to be done.

**STEP 4
How will the assessment be put into action?**

Remember to prioritize. Deal with those hazards that are high-risk and have serious consequences first.

Action by whom	Action by when	Done
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STEP 5 Review date:

- Review the assessment to ensure OSH management is still improving, or at least not sliding back.
- If there is a significant change in the workplace, remember to check the risk assessment and where necessary, amend it.

Assessment Completed by:

Signature:

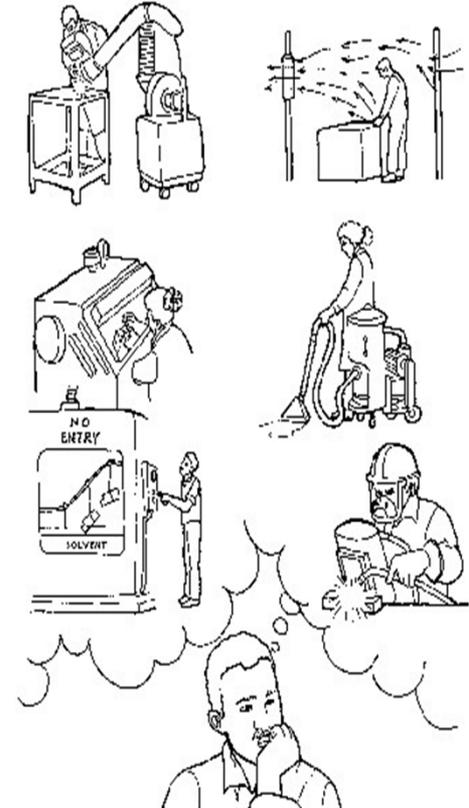
Department:	RA Leader:	Approved by Signature: Name: Designation: Date:	Reference Number
Process/Activity Location:	RA Member 1:		
Original Assessment date:	RA Member 2:		
Last review date:	RA Member 3:		
Next review date:	RA Member 4:		

HAZARD IDENTIFICATION				RISK EVALUATION				RISK CONTROL						
Ref	Work Activity	Hazard	Possible injury/ill-health	Existing risk controls	S	L	RPN	Additional Controls	S	L	RPN	Implementation Person	Due Date	Remarks
1														
2														
3														
4														
5														
6														

Hierarchy for risk control

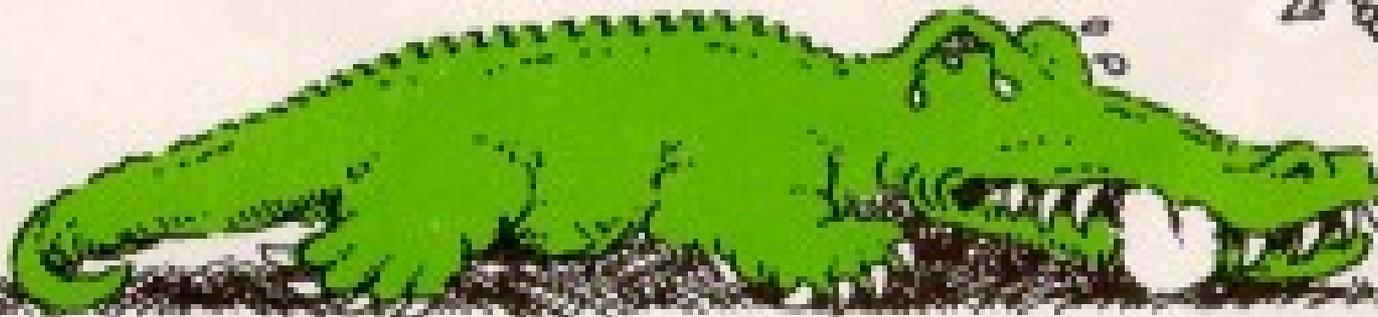
- When controlling risks, apply the principles below, if possible in the following order:

1. Elimination
2. Substitution
3. Engineering controls - Isolation
4. Administrative controls
5. Personal protective equipment



I.- ELIMINATE HAZARD

Whenever possible, the best way to eliminate the risk is to completely remove the hazardous item or substance or work practice.



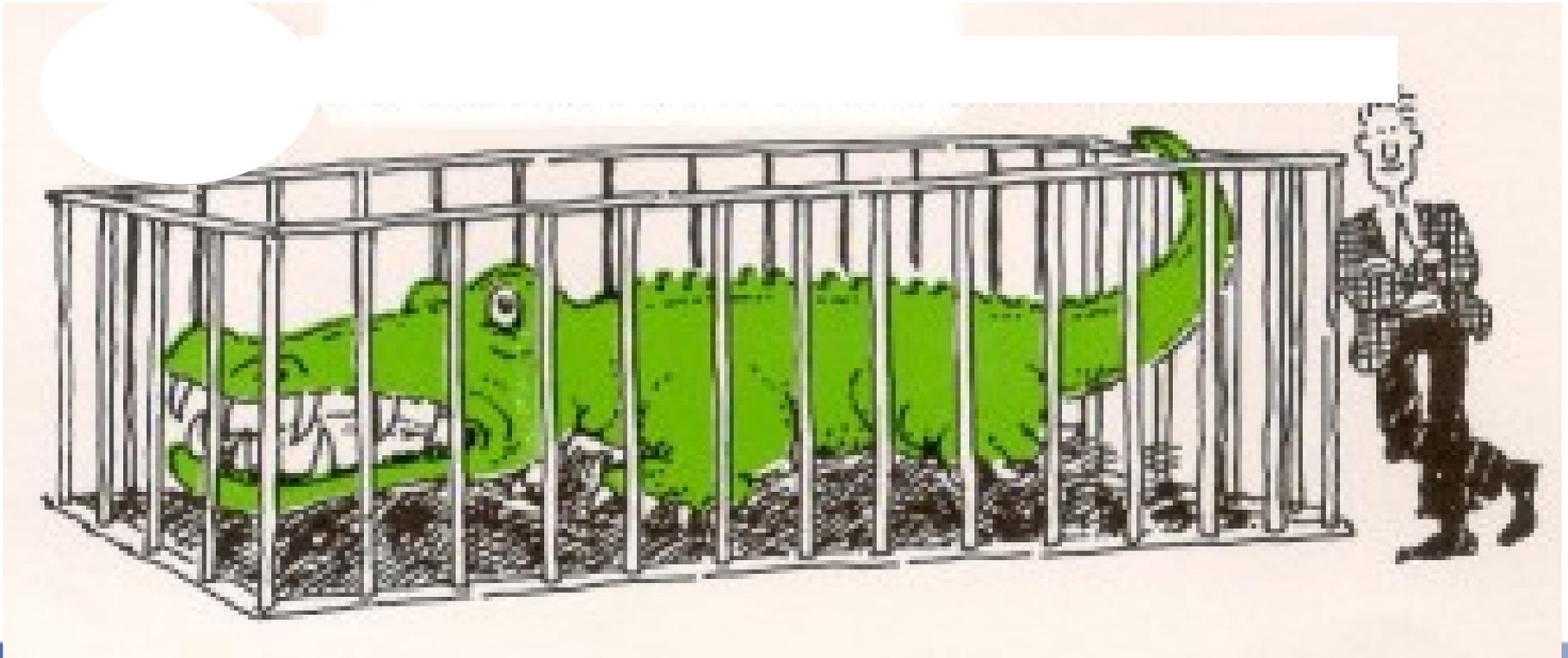
II.- SUSTITUTION OF HAZARD

If it is not possible to get rid of a hazard completely, the most effective control option to minimize the risk is to substitute the hazardous processes or substance or work practice with a safer, harmless alternative.



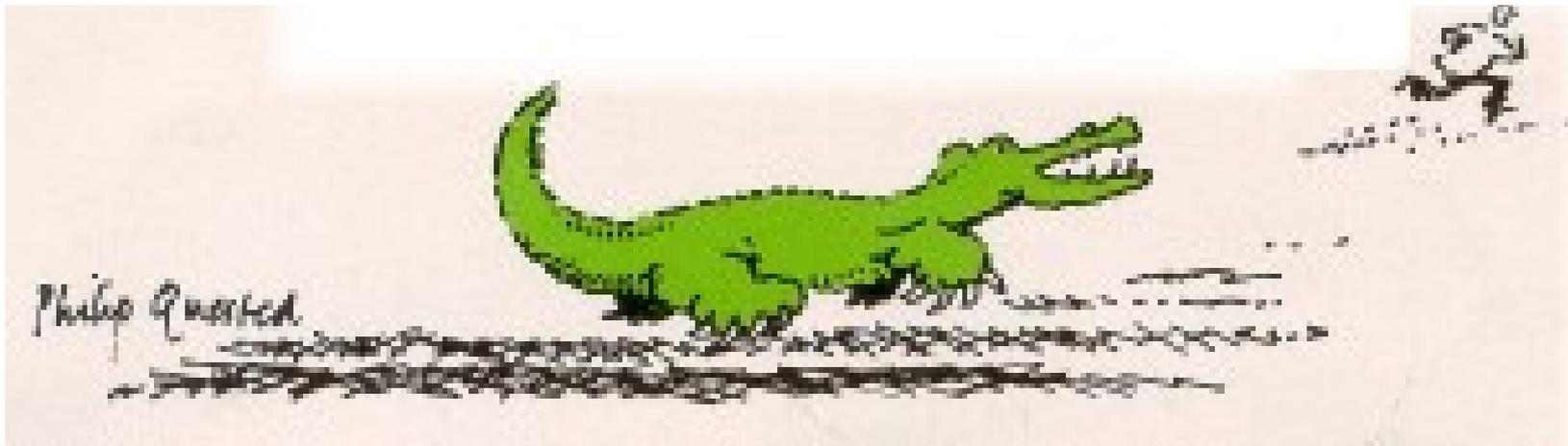
III.- ENGINEERING CONTROLS

Where the elimination or substitution of hazardous substances is not practicable, technical measures should be applied to prevent access to the hazard by **enclosing it completely** to prevent the hazard from reaching the worker.



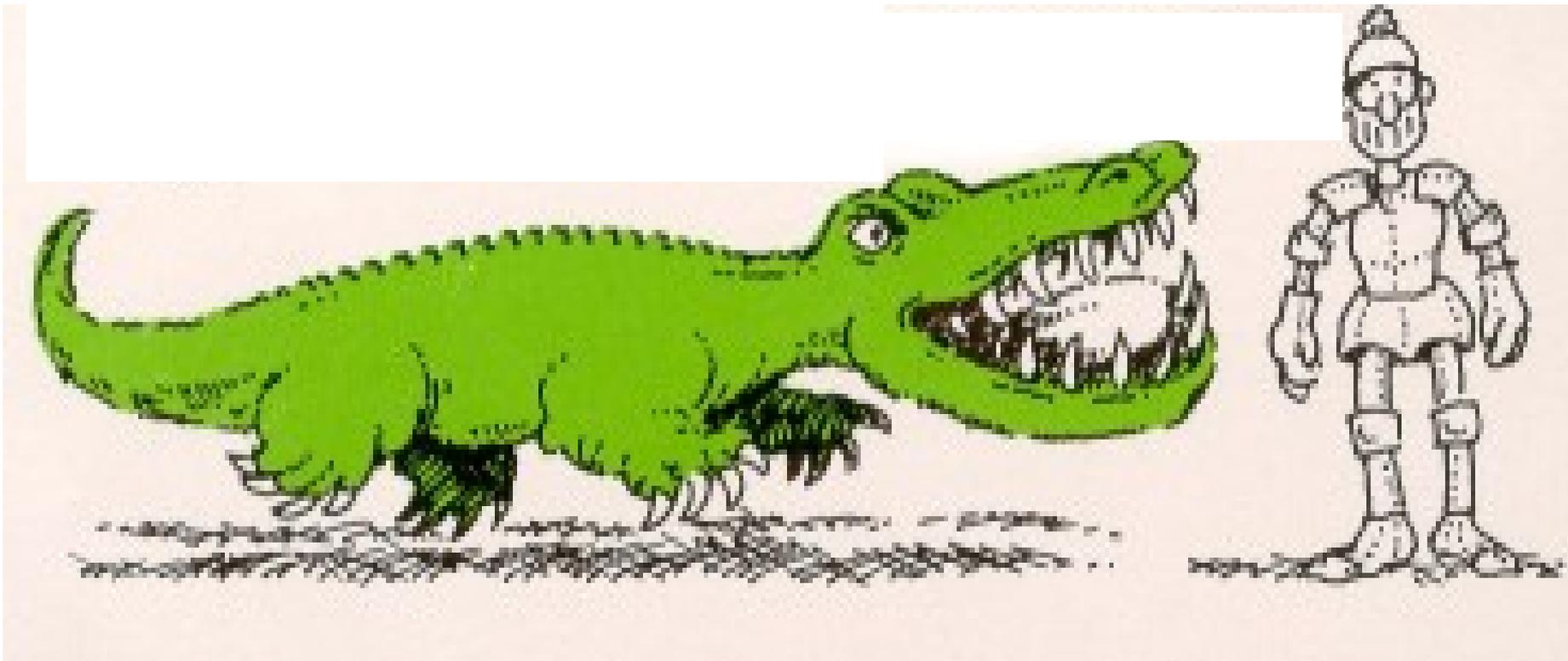
IV.- ADMINISTRATIVE CONTROLS

- **Developing and enforcing safe work methods and practices to minimize exposure to a hazard and hence to reduce the risk of injury or harm**



V.- PERSONAL PROTECTION EQUIPMENT

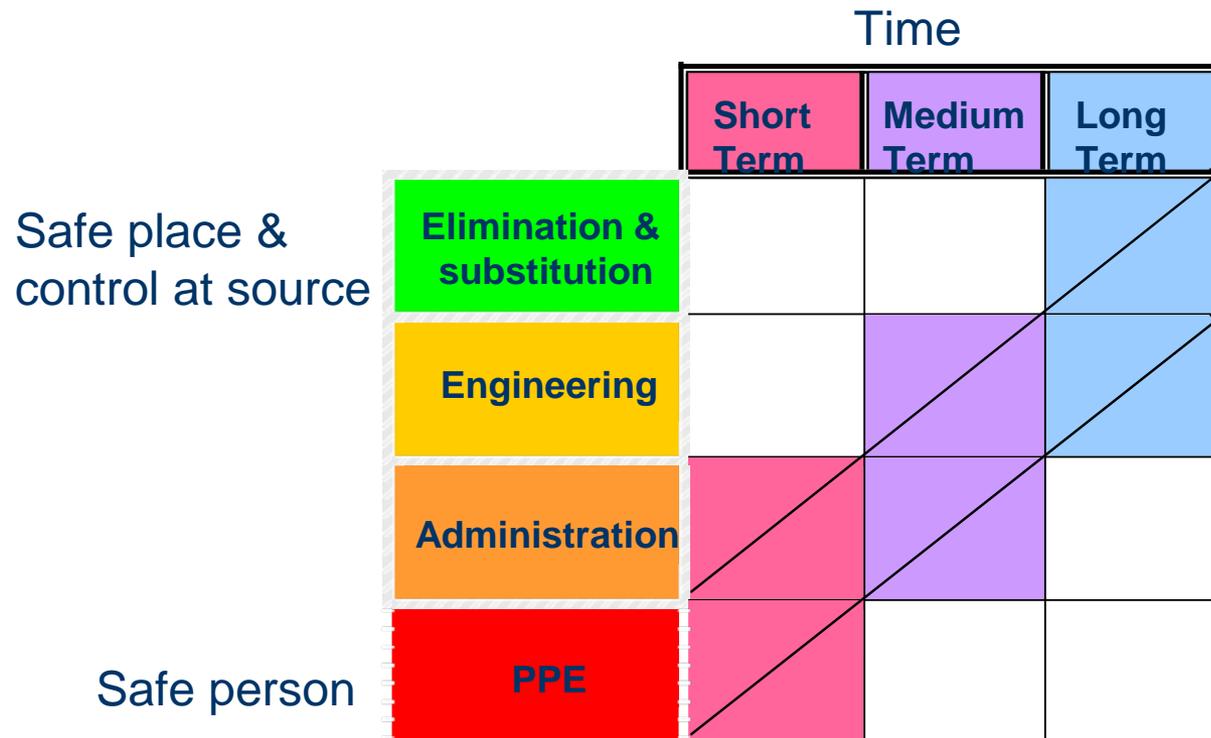
Covering and protecting a worker's body from hazards. When none of the above approaches is feasible, or when the degree of safety achieved is considered inadequate.



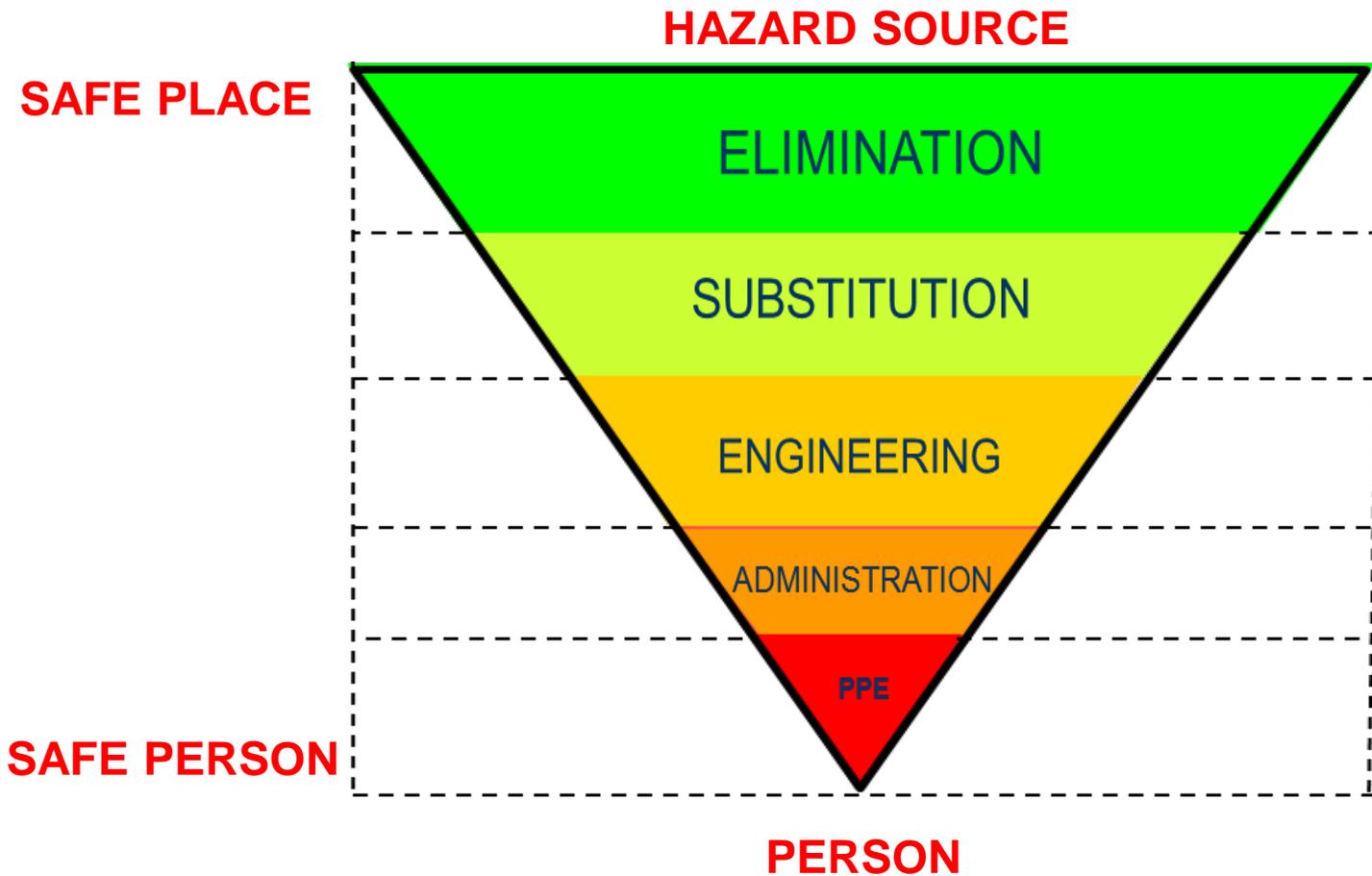
A good plan of action often includes a mixture of different things such as:

- a few cheap or easy improvements that can be done quickly, perhaps as a temporary solution until more reliable controls are in place
- long-term solutions to those risks most likely to cause accidents or ill health
- long-term solutions to those risks with the worst potential consequences
- arrangements for training employees on the main risks that remain and how they are to be controlled
- regular checks to make sure that the control measures stay in place
- and identifies responsibilities – who will lead on what action, and by when

Timeframe for implementation



Effectiveness or reliability of the control



It is necessary to communicate to the employees the following:

- The hazards in the workplace
- Information on any new control measures implemented and how to use them.
- Any emergency procedures developed.
- The employees duties.

Communication means that employees understood what to do and the respond accordingly

2.5. Review assessment and update it

- Conducting a risk assessment is not a one off procedure is necessary to set review dates
- Monitoring: Ensures that measures are being implemented.
- Review: Ensures that the assessment is still effective in reducing risk

When reviewing and updating the risk assessment

Whenever

- there is any significant changes to workplace processes or design.
- new machinery, substances or procedures are introduced.
- there is an injury or incident as a result of hazard exposure.
- anytime you feel it is inadequate.
- at lest, once every 3 years*.

* According the law of some countries

3. Risk assessment exercise

- Conduct a risk assessment on a single work activity
- During an inspection a worker is noted using a disc cutter

1. Identify the hazards

Use of disc cutter



Identify the Hazards



Identify the Hazards



Inventory of hazards

- Dust
- Contact with disc
- Being struck by material ejected by cutter or fragmentation of disc
- Musculoskeletal disorders
- Noise
- Electricity

2. Who might be harmed and how?

- 
- Operator
 - Inhalation of dust leading to respiratory issues
 - Cutting hand on unguarded disc
 - Being struck by material ejected by cutter or fragmentation of disc as no guard present
 - Back problems due to working posture
 - Exposure to excessive noise leading to loss of hearing
 - Electrical shock due to inappropriate insulation
 - Other workers in vicinity
 - Being struck by material ejected by cutter or fragmentation of disc as no guard present

3. Evaluate the risk – Identify and decide on the OSH risk control measures

- What is already being done - what controls are in place?
 - No controls are in place with regards to the hazards identified
- What further action is required:
- What is the current level of risk?
- What can be done to reduce the risk?

Evaluate the risk

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Severe 5
Almost certain 5	Medium 5	High 10	Extreme 15	Extreme 20	Extreme 25
Likely 4	Medium 4	Medium 8	High 12	Extreme 16	Extreme 20
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**3 or less residual risk Low, 4 – 8 residual risk Medium,
9 – 12 residual risk High, 15 or higher residual risk Extreme**

Evaluate the risk



- Operator

- exposure to dust - likelihood almost certain 5 * consequence major 4 = 20 residual risk extreme
- cutting hand on disc - likelihood possible 3 * consequence severe 5 = 15 residual risk extreme
- struck by material ejected by disc or the disc if it fragments likelihood possible 3 * consequence major 4 = 12 residual risk extreme

(The list is not exhaustive)

This level of residual risk will help to prioritize actions

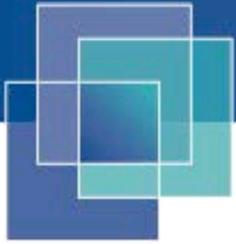
Identify and decide on the OSH risk control measures

What further action is required

- Ensure machine adequately guarded
- Provision of appropriate personal protective equipment dust mask, ear and eye protection
- Refresher training to operator
- Refresher training to supervisor
- Increase frequency of workplace inspections 1/week
- Ensure correct electrical connections and insulation

(The list is not exhaustive)





4. Record your findings and implement them

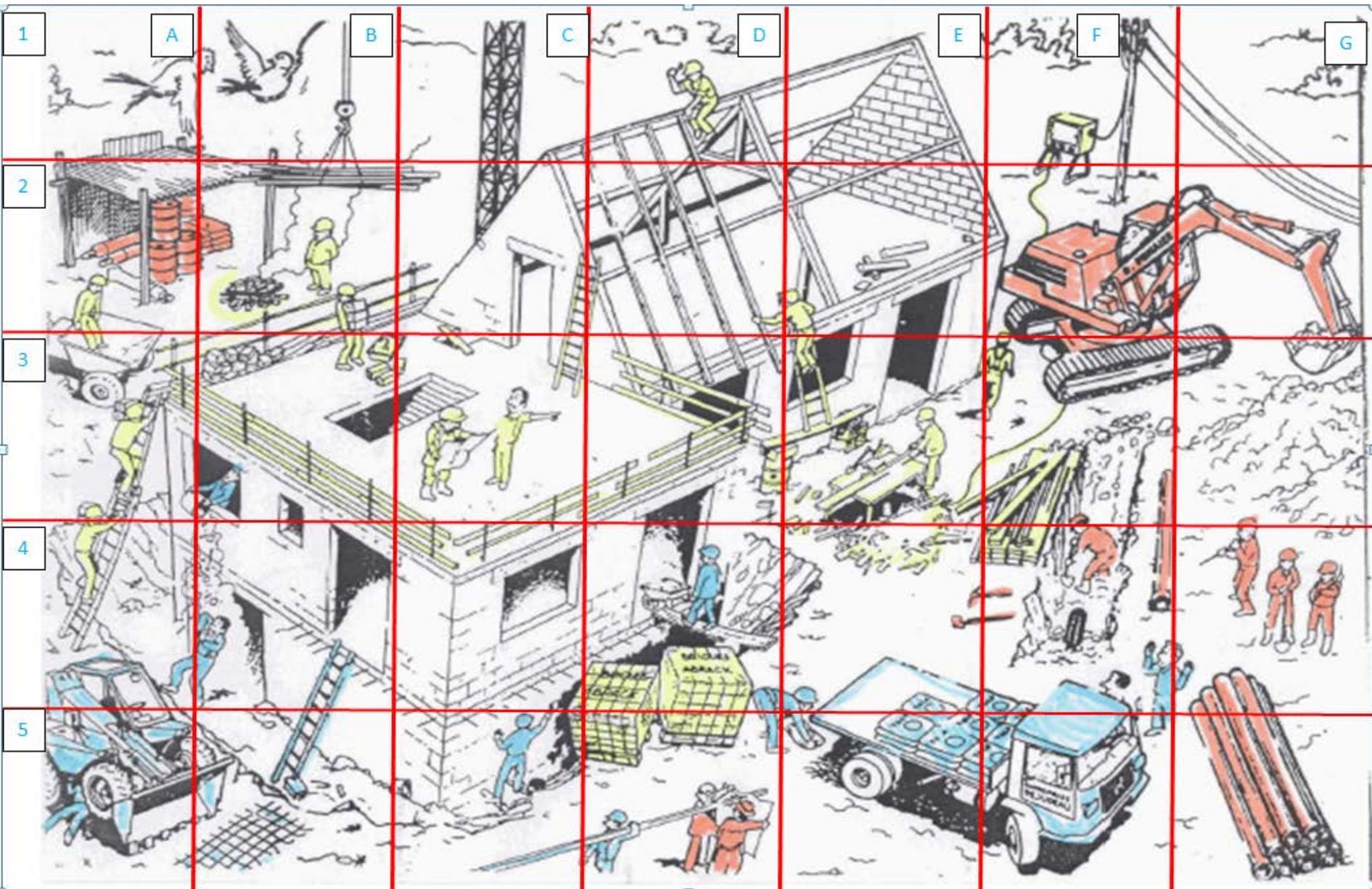
Identify persons responsible for complete actions

Set a review date to ensure actions have been completed

5. Review assessment and update it

Group work

- The task identify and record the location (using the grid) of the hazards presented on the image.
- Having identified the hazards determine what are the current national control measures used to prevent access to the hazards
- Choose a spokesperson to report back with your group's views
- 30 minutes for discussion 15 minutes for report back



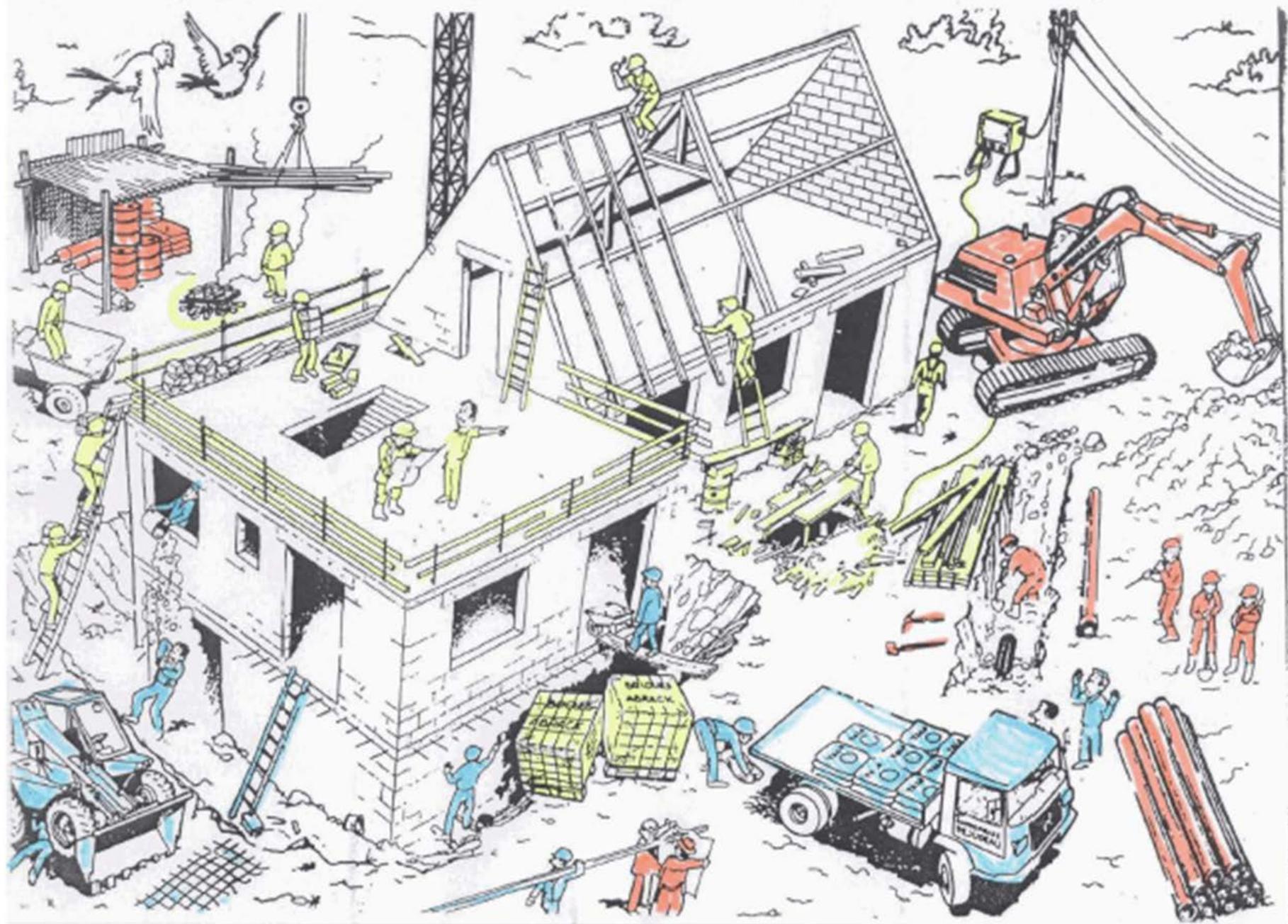
HAZARD IDENTIFICATION CHECKSHEET



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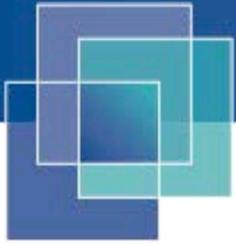
Risk Assessment & Improvement Planning

Hazardous Agents	Severity	Probability	Priority	Remedial Measure Required	Whom	By When	Action Completed	Review Date

4. Conclusions

- It is a mean, not a goal itself.
- They are examinations of what at the workplace can cause harm
- They enable management to identify whether enough has been done to prevent harm i.e. reducing risk to an acceptable level

Thereby assisting to implement an effective OSH management system



- A risk assessment is a continual on-going process – like a film
- Not a snap shot of a workplace - a photograph this can be likened to a workplace inspection
- They are living documents. Are not just a paper exercise.
- Results should generate action

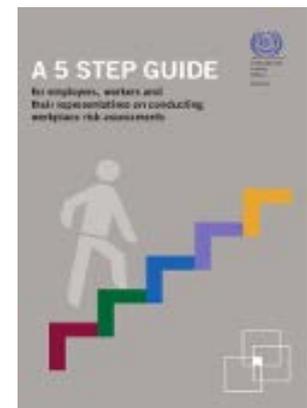
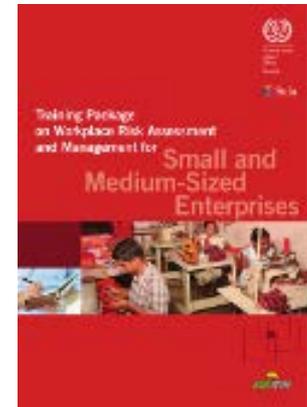
Risk Assessments ≠ Workplace Inspections

But those conducting workplace inspections can conduct risk assessments to assess if safe systems of work are being followed and identify corrective action

Thus risk assessments can be conducted during workplace inspections and a workplace inspection can be used to verify the controls identified in a risk assessment are indeed in place

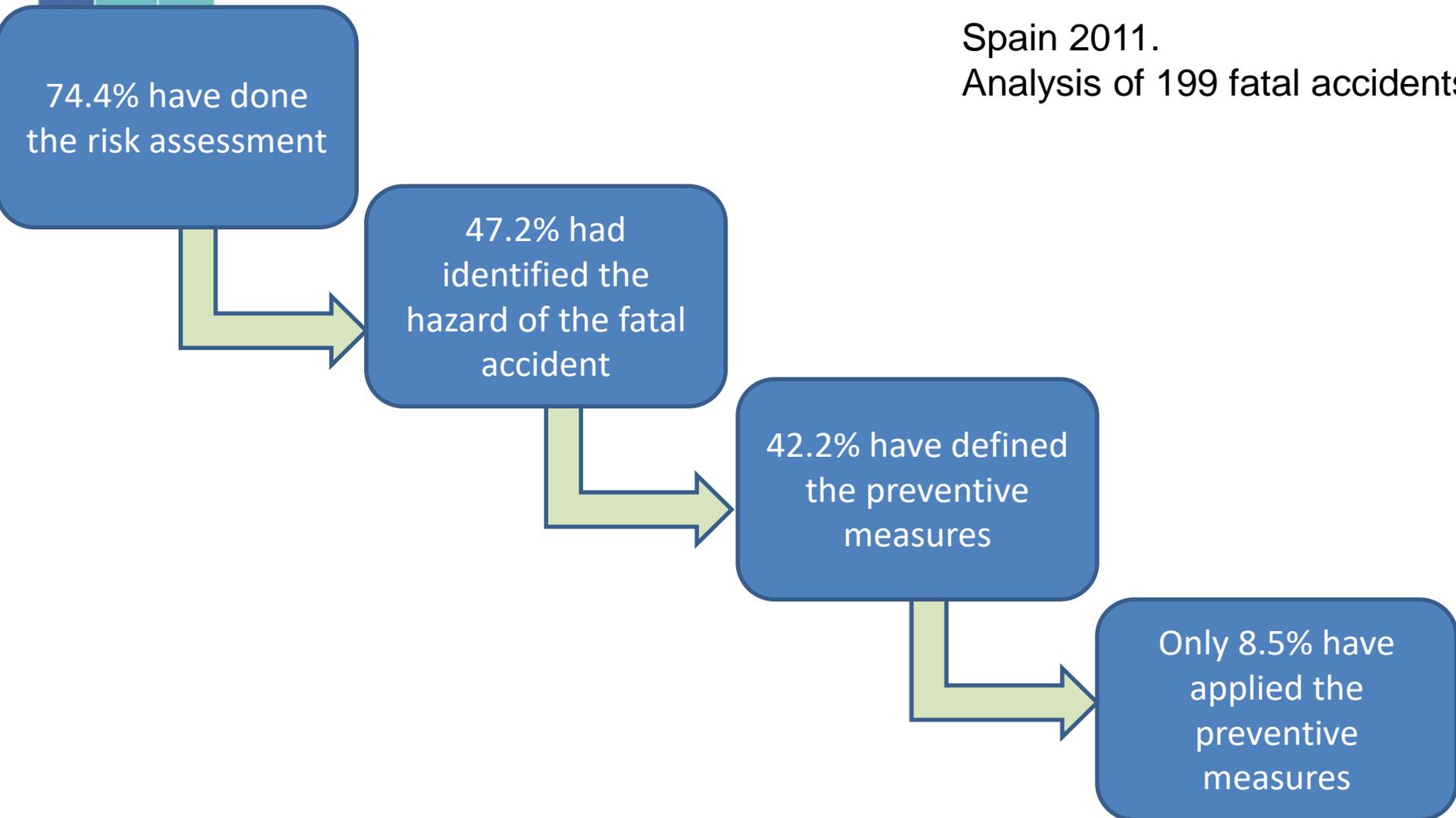
Further Guidance

- ILO Training Package on Workplace risk assessment and management for small and medium enterprises
- http://www.ilo.org/safework/info/instr/WCMS_215344/lang-en/index.htm
- ILO- A 5 Step guide for Employers, workers and their representatives on conducting workplace risk assessments
- http://www.ilo.org/safework/info/publications/WCMS_232886/lang--en/index.htm



% of fatal accidents according their compliance with preventive process

Spain 2011.
Analysis of 199 fatal accidents



```
graph TD; A[74.4% have done the risk assessment] --> B[47.2% had identified the hazard of the fatal accident]; B --> C[42.2% have defined the preventive measures]; C --> D[Only 8.5% have applied the preventive measures];
```

74.4% have done the risk assessment

47.2% had identified the hazard of the fatal accident

42.2% have defined the preventive measures

Only 8.5% have applied the preventive measures