A Systems Approach to Preventing Musculoskeletal Injuries (MSI's)

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Dec 12, 2019

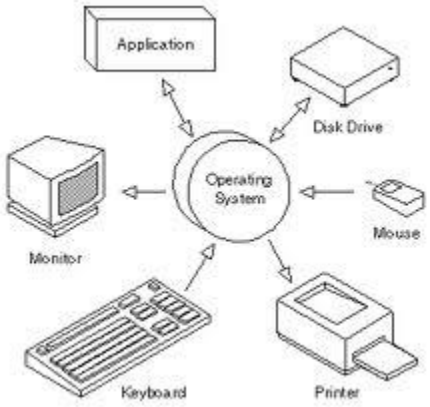
Session Overview

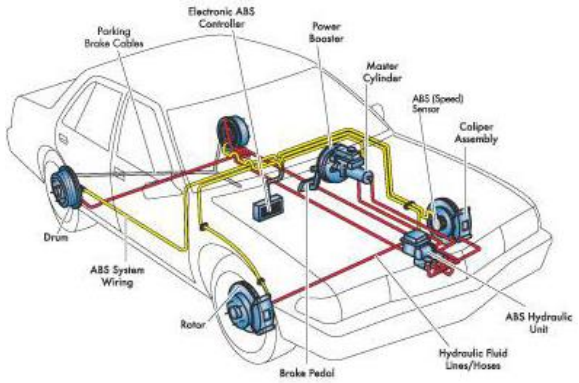
- Brief overview of the Systems Approach to Safety
- Injury Profile
- Risk Management Process / Ergonomic Regulations
  - MSI Risk Factors
  - Risk Identification
  - Risk Assessment
  - Risk Control
  - Evaluation
- Hierarchy of Controls and Effective Recommendations

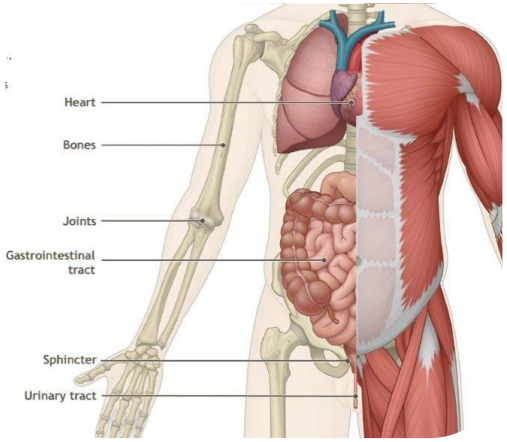
Systems Approach to Safety

What is a System?

A group of interacting, interrelated, or interdependent elements forming a complex whole

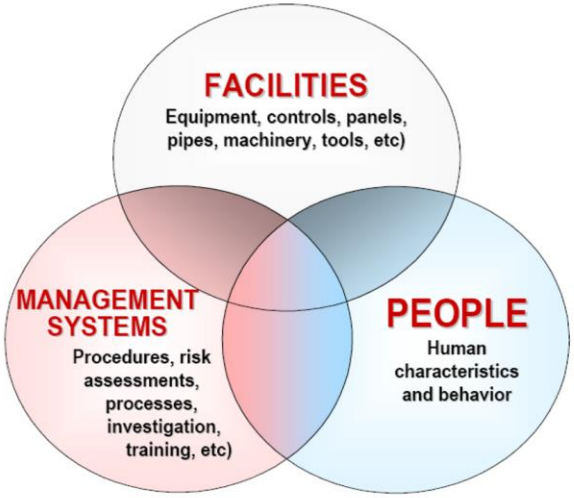




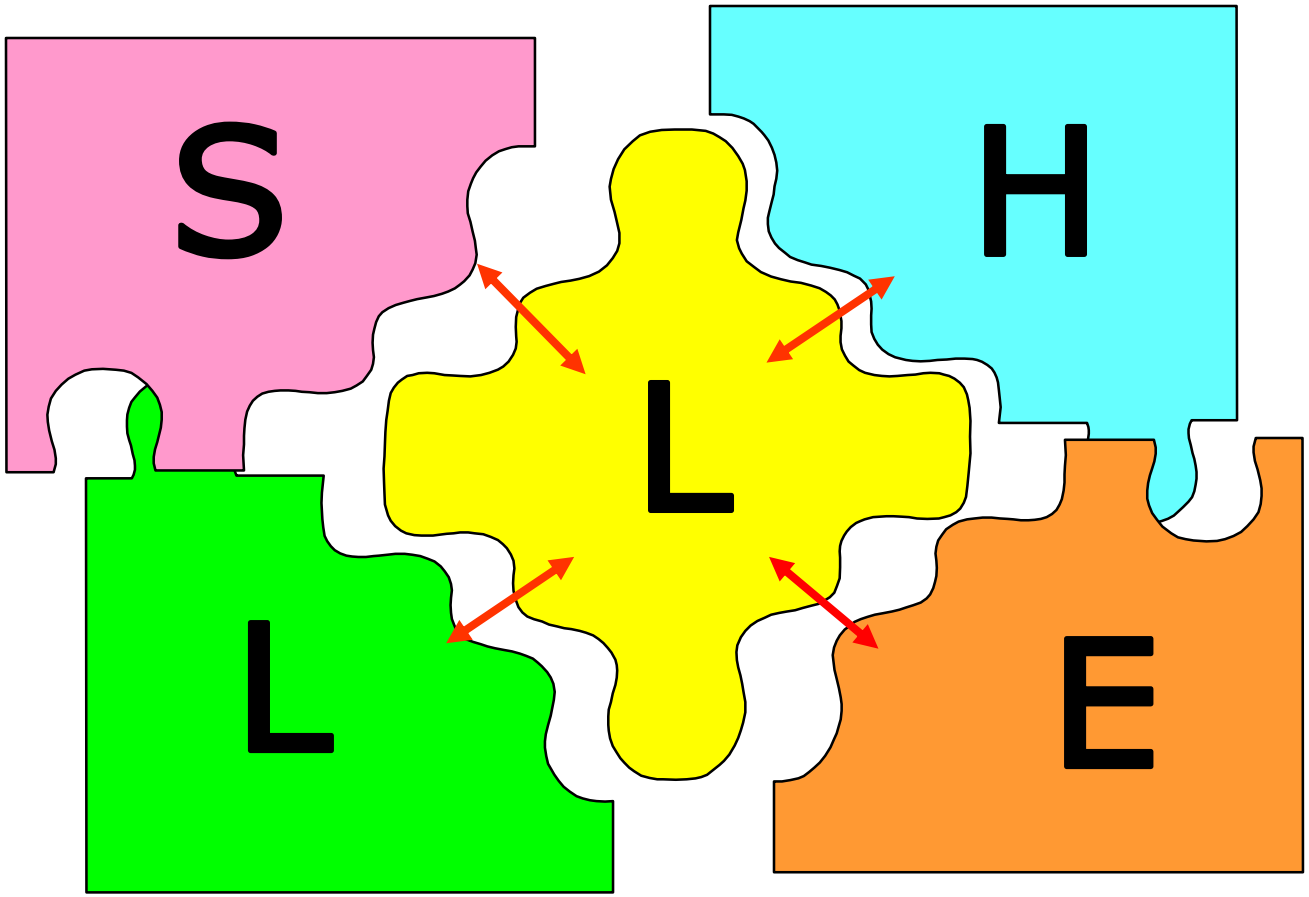


Systems Safety Approach

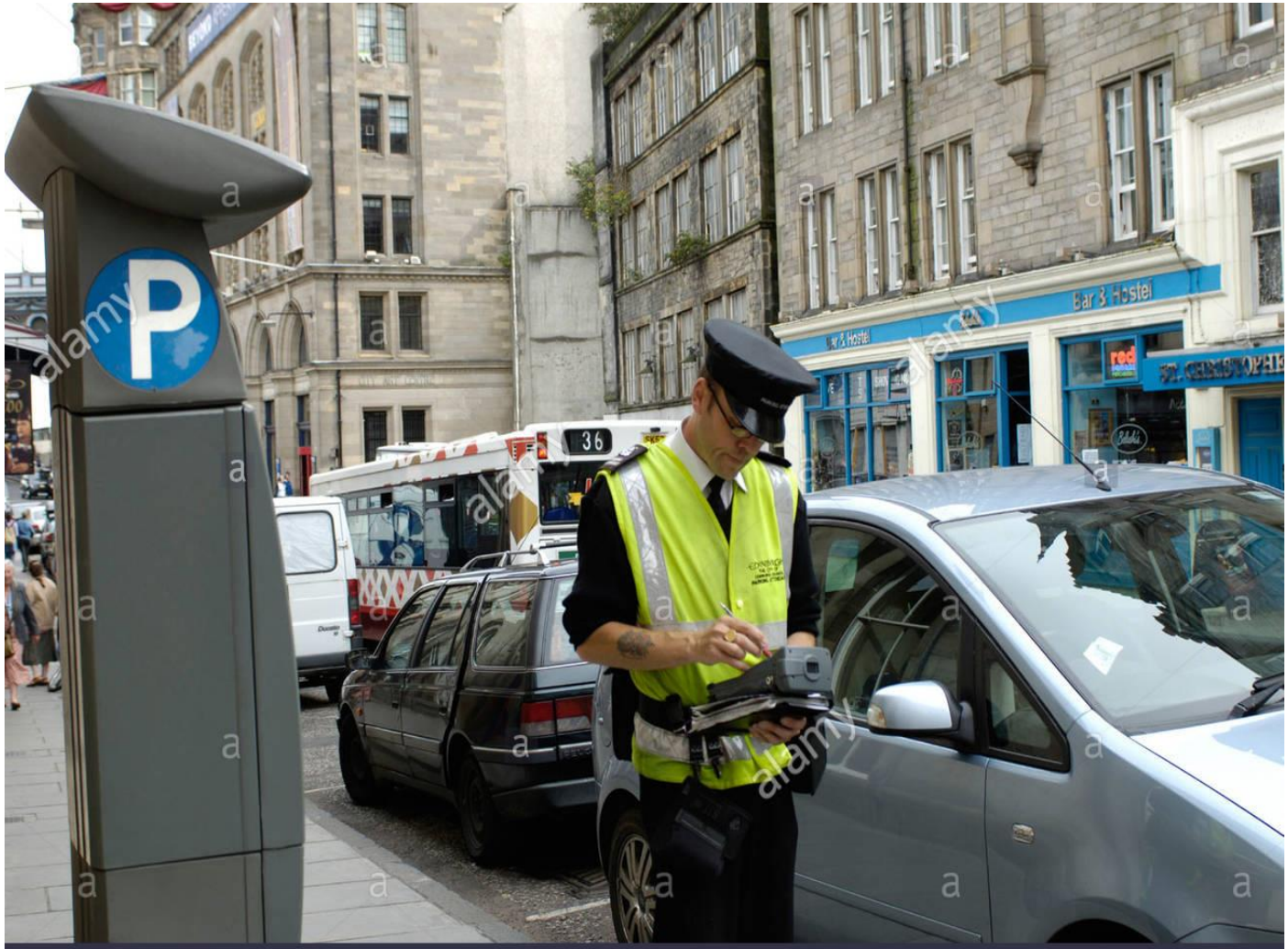
- Understands **performance in workplace context**
- Recognizes **connections** between equipment , tools, procedures and worker actions and decisions
- Determines how work features **influenced decisions and actions**



SHELL



SHEL (Hawkins, 1987)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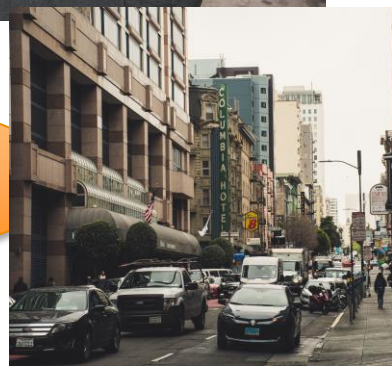
Interdependent

Inteacrtive

Dynamic



Central goal

Organized

Traditional View of Safety

- The workplace system would be fine if not for a few unreliable people in it

- Unreliable people introduce failures

The new view

- Humans are not the cause of failure. Errors are the symptom of deeper trouble

- Errors are not random. Errors are systematically connected to the tools, environment and work process

- Human error is not the conclusion of an investigation, it is the starting point.

Importance of context

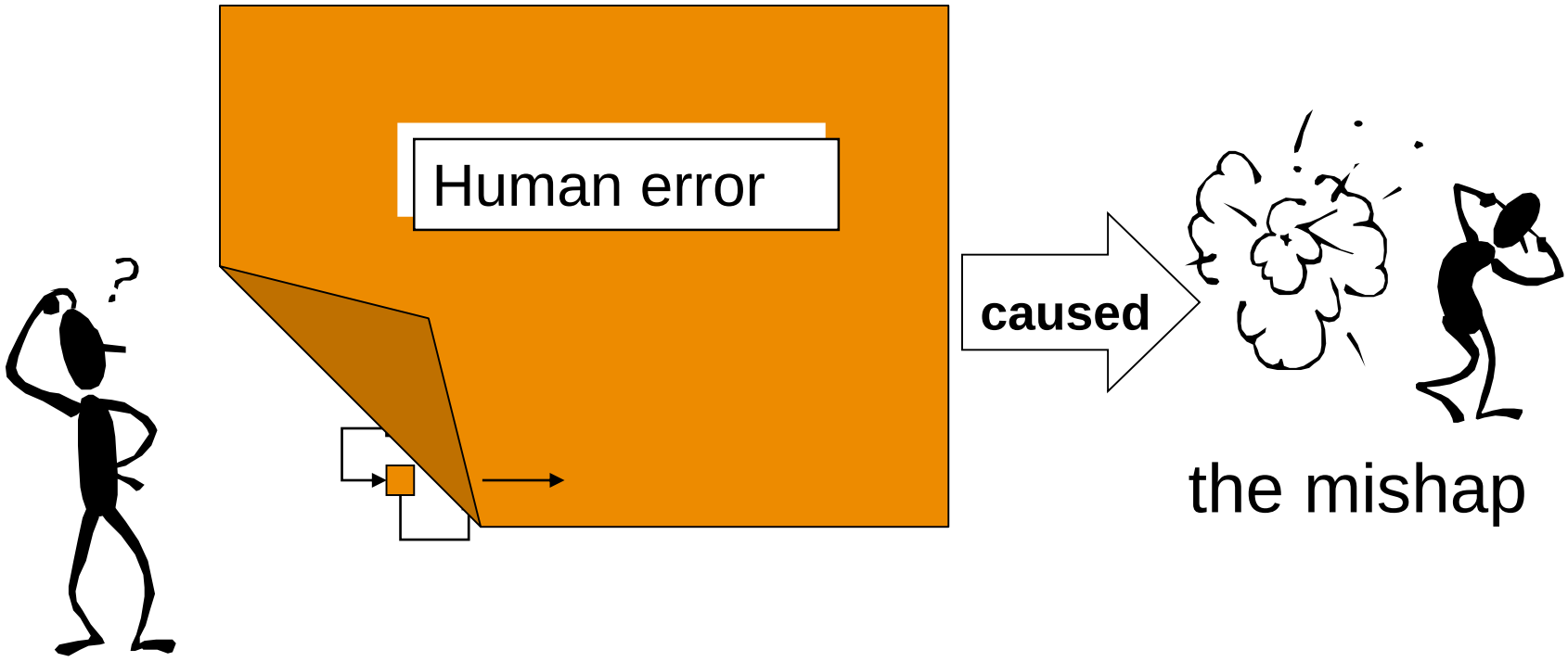
Human performance is fundamentally embedded in, and systematically connected to, the situation in which action takes place.

" Human actions and assessments can be described meaningfully only in reference to the world in which they are made; they cannot be understood without intimately linking them to details of the context that produced and accompanied them".

Orasanu and Connolly, Woods et al, Hutchins and Klein

"Rather than being the main instigators of an accident, operators tend to be the inheritors of system defects created by poor design, incorrect installation, faulty maintenance and bad management decisions. Their part is usually that of adding the final garnish to a lethal brew whose ingredients have already been long in the cooking"

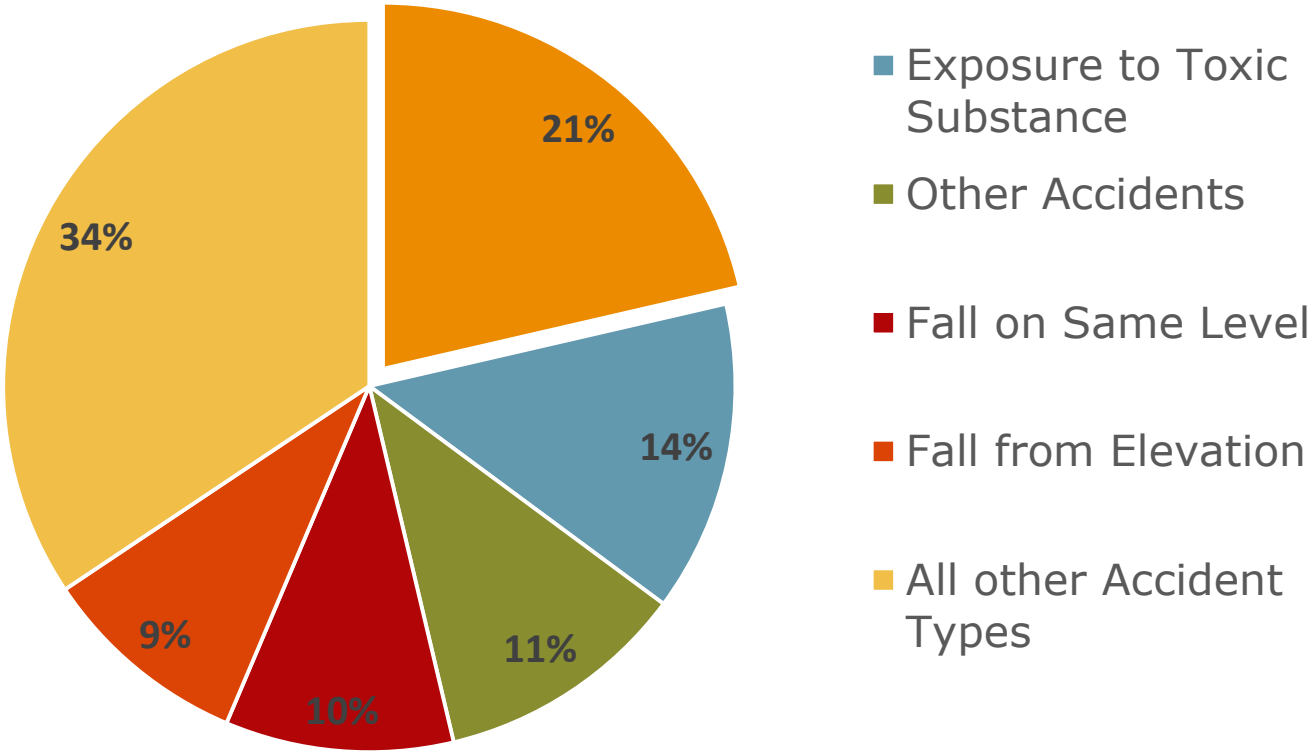
(James Reason, Human Error, 1990)



Dekker 2006

Injury Profile

Time Loss Claim costs from 2014 - 2018 by Accident Type



Hidden costs of Musculoskeletal Injuries (MSI's) in the Workplace

Training replacement employee/employees

Loss of administrative time (filing paper work, return to w
programs, etc)

Higher insurance premiums

Lower morale among employees

Reduced efficiency/productivity

Risk Management Process

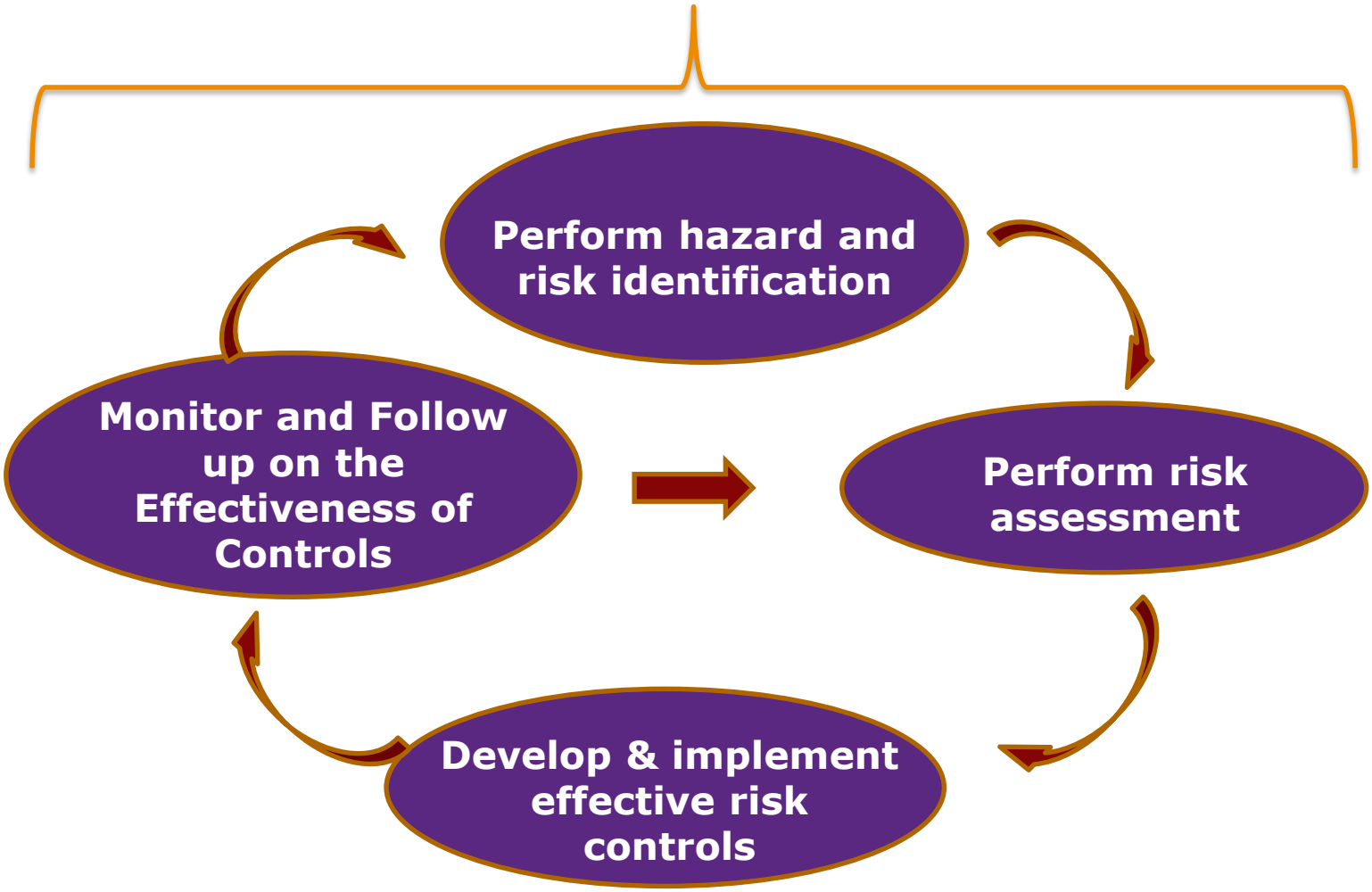
What is the Risk Management process?

The Risk Management Process consists of

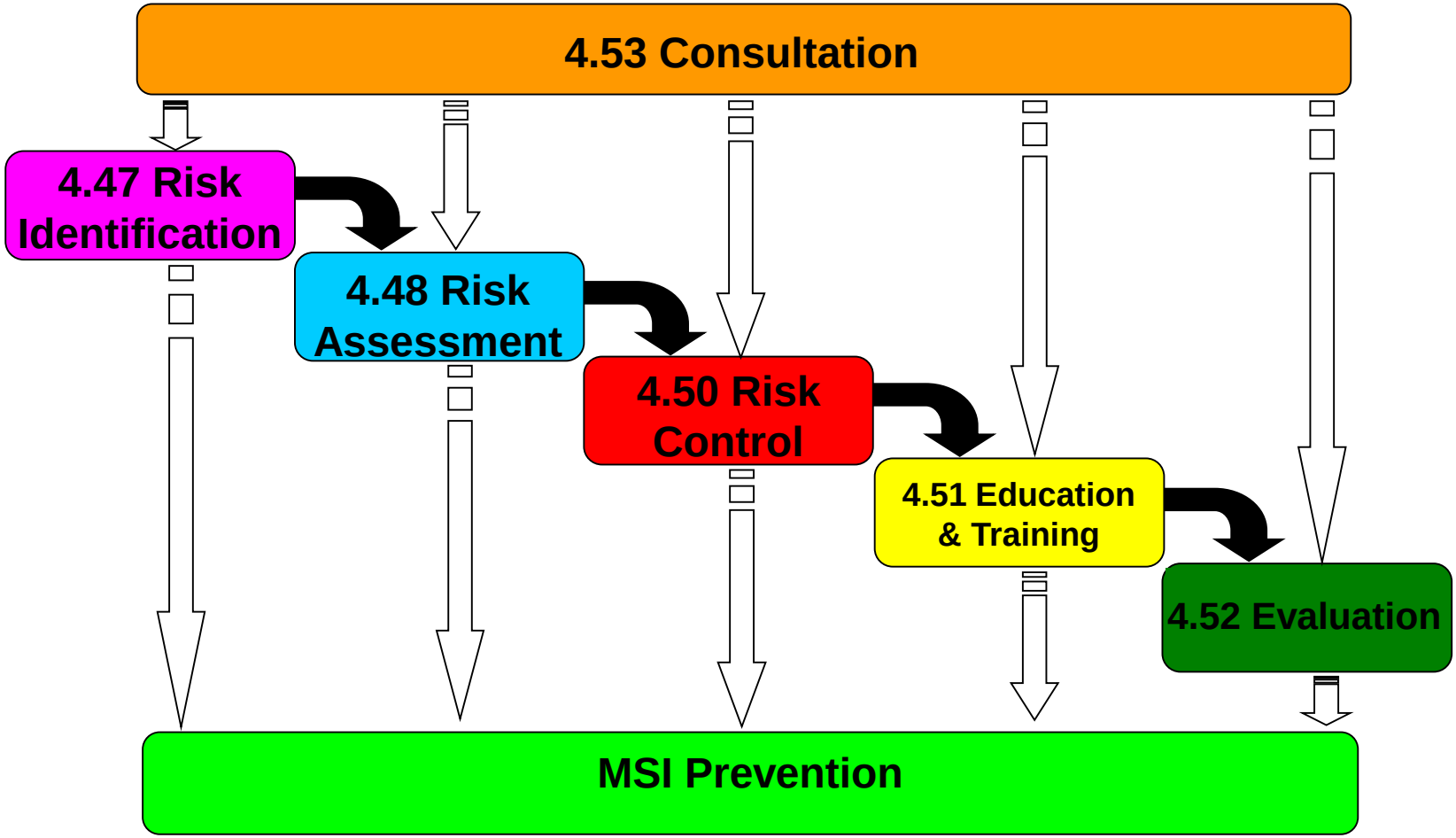
a series of steps that, when undertaken in sequence, enable continual safety improvement.

Risk Management Process

Consult with/involve workers



Ergonomics (MSI) Requirements



Consultation (4.53)

Employer must consult with JH/S committee, if any, or the WH/S representative, as applicable, with respect to the following when they are required by the Ergonomic (MSI) Requirements:

a) Risk identification, assessment and control

b) The content and provision of worker education and training

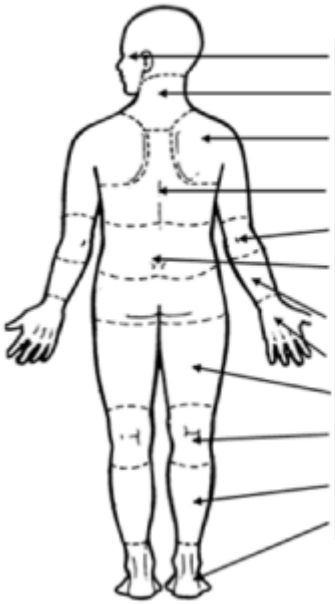
The employer must, when performing a risk assessment, consult with

a) Workers with signs and symptoms of MSI, and

b) Representative same of workers who are required to carry out the work being assessed.

Identification (4.47)

- Review first aid reports
- Review injuries
- Look at near misses
- Worker reports
- Incident investigations
- Symptom survey
- Workplace inspections (proactive risk id)

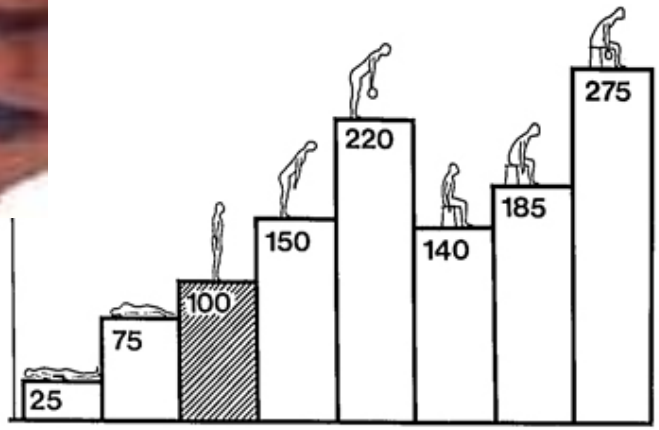


	Extremely Comfortable				Extremely Uncomfortable
Eye	1	2	3	4	5
Neck	1	2	3	4	5
Shoulder	1	2	3	4	5
UpperBack	1	2	3	4	5
Elbow	1	2	3	4	5
LowerBack	1	2	3	4	5
Arm	1	2	3	4	5
Wrist/Hand	1	2	3	4	5
Thigh	1	2	3	4	5
Knee	1	2	3	4	5
Calf of leg	1	2	3	4	5
Feet/Ankle	1	2	3	4	5

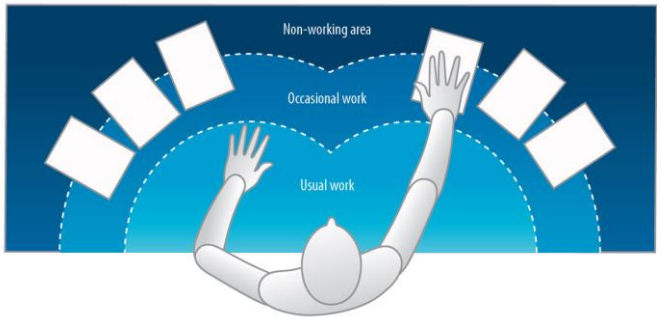
MSI Risk Factors (4.49)

Physical Demands of work

- Force
- Repetition
- Duration
- Work Postures
- Local Contact Stress



Aspects of the layout and condition of the workplace or workstation



- working reaches
- working heights
- seating
- floor surfaces

Characteristics of the objects handled

- Size and shape
- load condition and weight distribution
- container, tool and equipment handles

Environmental conditions, including cold temperature

- work recover cycles
- task variability
- work rate

Risk Assessment (4.48)

- Determine the extent of the impact of the Risk Factors on the Potential for MSI
- Variety of methods can be utilized
- Person performing assessment needs to:
  - Understand work process
  - Understand physical demands of work tasks and factors influencing them
  - Understand methods of performing RA
  - Limitations to RA being utilized.
  - eg/ Worksafe BC Worksheet B, RULA, REBA, HSE Tools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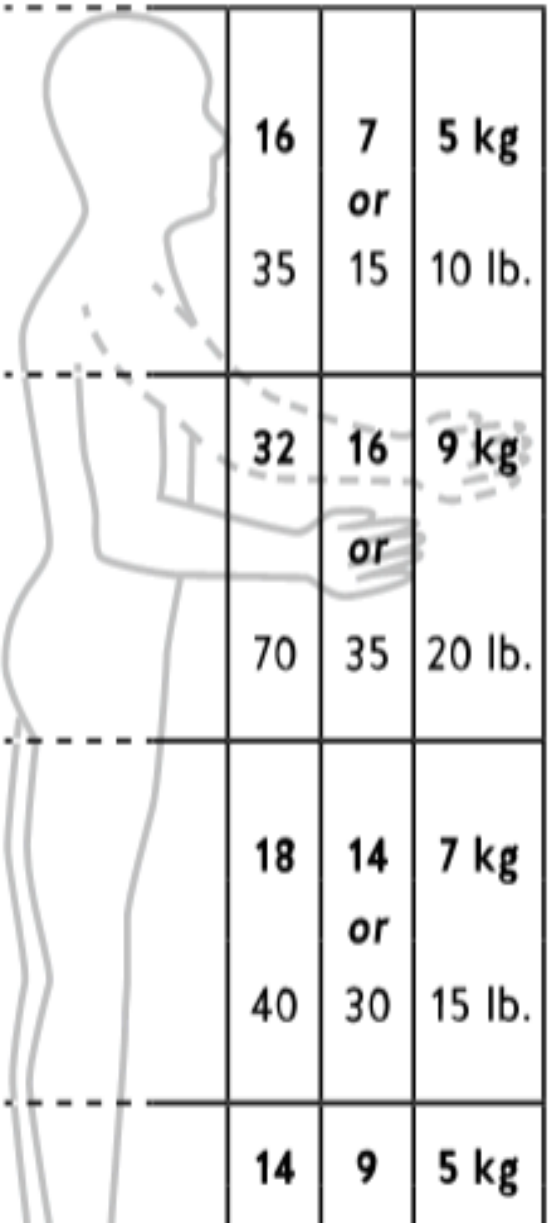
Twisting adjustment



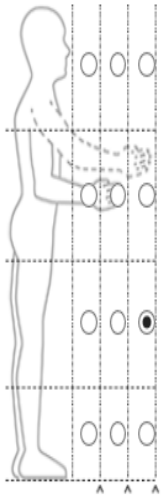
16	7 or 15	5 kg 10 lb.
32	16 or 35	9 kg 20 lb.
18	14 or 30	7 kg 15 lb.
14	9	5 kg

Lift/Lower Calculator

Step 1 › How much is the actual weight you are lifting or lowering?

50 ◉ lb. ○ kg

Step 2 › Where are your hands when they are in the most extreme position (e.g., highest, lowest, and/or furthest away from you) during the lift or lower?



10 41 58 cm

4 16 23 in

Step 3 › Do you twist your body more than 45 degrees during the lift or lower?

◉ Yes ○ No

Step 4 › How many lifts or lowers per minute?

4-5 lifts every min

Step 5 › For how many hours per day?

2 hrs or more

Step 6 › Click "Calculate" to view the results:

Calculate

Calculated results

Actual Weight: 50 lb.

Weight Limit: 6.375 lb.

What does this mean?

The **Actual Weight** is greater than the **Weight Limit.**
This task poses an increased risk of lifting-related low back injury. There are other contributing risk factors that may influence the likelihood that a worker will experience low back and shoulder injury. In this scenario, risk control is required under section 4.50 of the OHS Regulation.

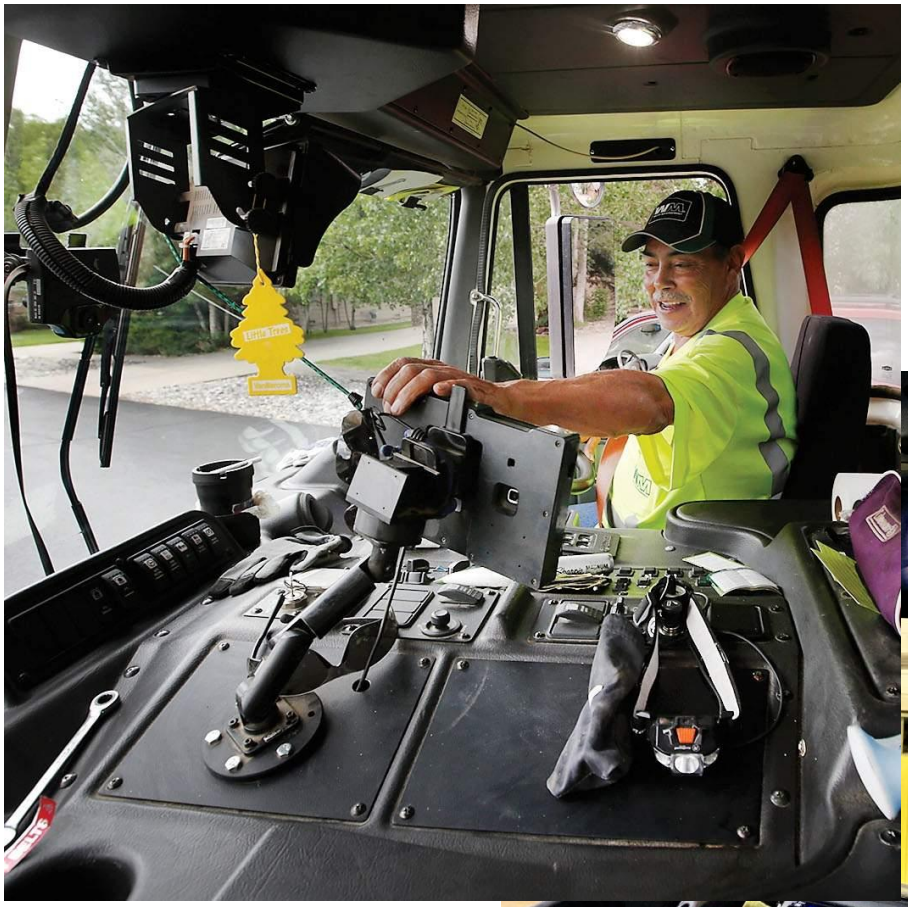
Risk Control (4.50)

- Employer must eliminate, or, if that is not practicable, minimize the risk of MSI to workers
  - Hierarchy of controls
- Minimization typically means minimizing the duration, magnitude, and/or frequency of the relevant risk factor.
  - Be careful not to increase the risk of another
- Required to consult with the Joint OH/S committee or Worker H/S rep regarding possible controls and their implementation

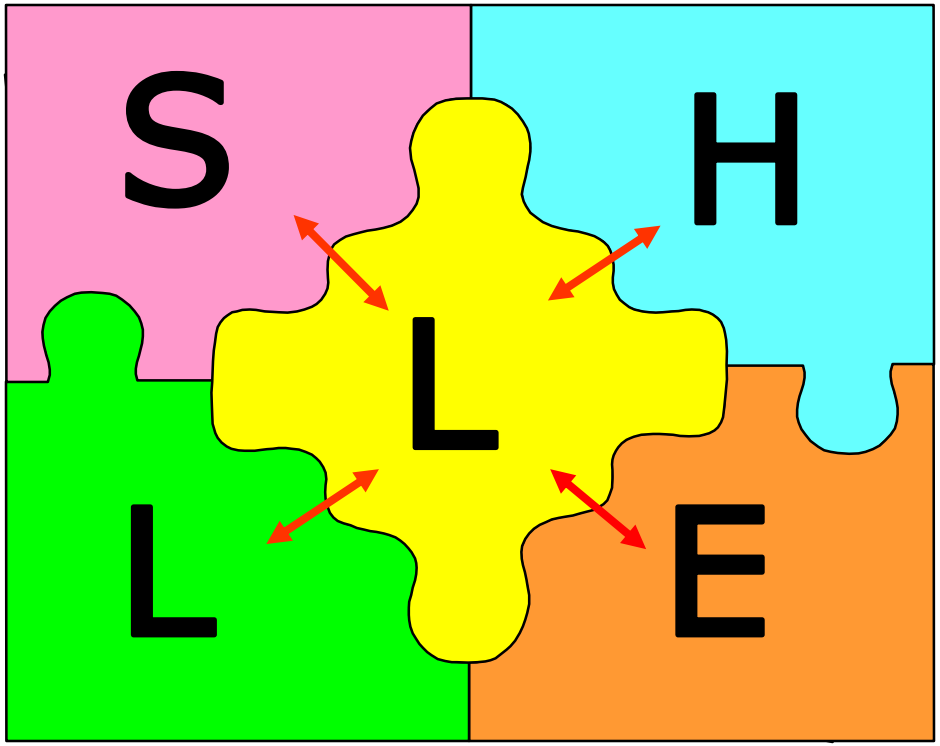

HEIL
HEIL

Evaluation (4.52)

- Must monitor the effectiveness of the measures to control the risks, ensuring they are reviewed at least annually.
- Any deficiencies identified while monitoring, must be corrected without undue delay



SHELL Model



S = Software
Rules, regulations
manuals, work procedures
policy, risk assessment

H = Hardware
Vehicles, tools. machinery,
equipment, Instruments, controls
Example – testing equipment

E = Environment
Climate, vibration, visibility, noise
Management environment,
Org. culture

L = Liveware (Human)
Worker, attention, expectations,
Workload, personal factors

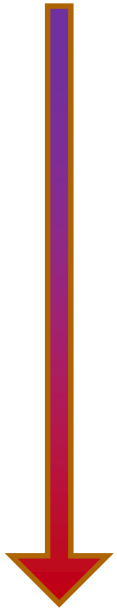
L = Liveware
Co-workers, supervisors,
managers, public, owners,
emergency crews (communication)

Control Hierarchy & Effective Control Options

Utilizing the Hierarchy

Hierarchy of controls

Best Scenario



Worst Scenario

Hierarchy of Controls
Elimination of safety hazard
Substitution of hazard with a hazard that gives a lesser risk
Minimizing the risk of the hazard by engineering means
Minimizing the risk by administrative controls
Minimizing the risk by awareness means
Using personal protective equipment

Elimination or Substitution

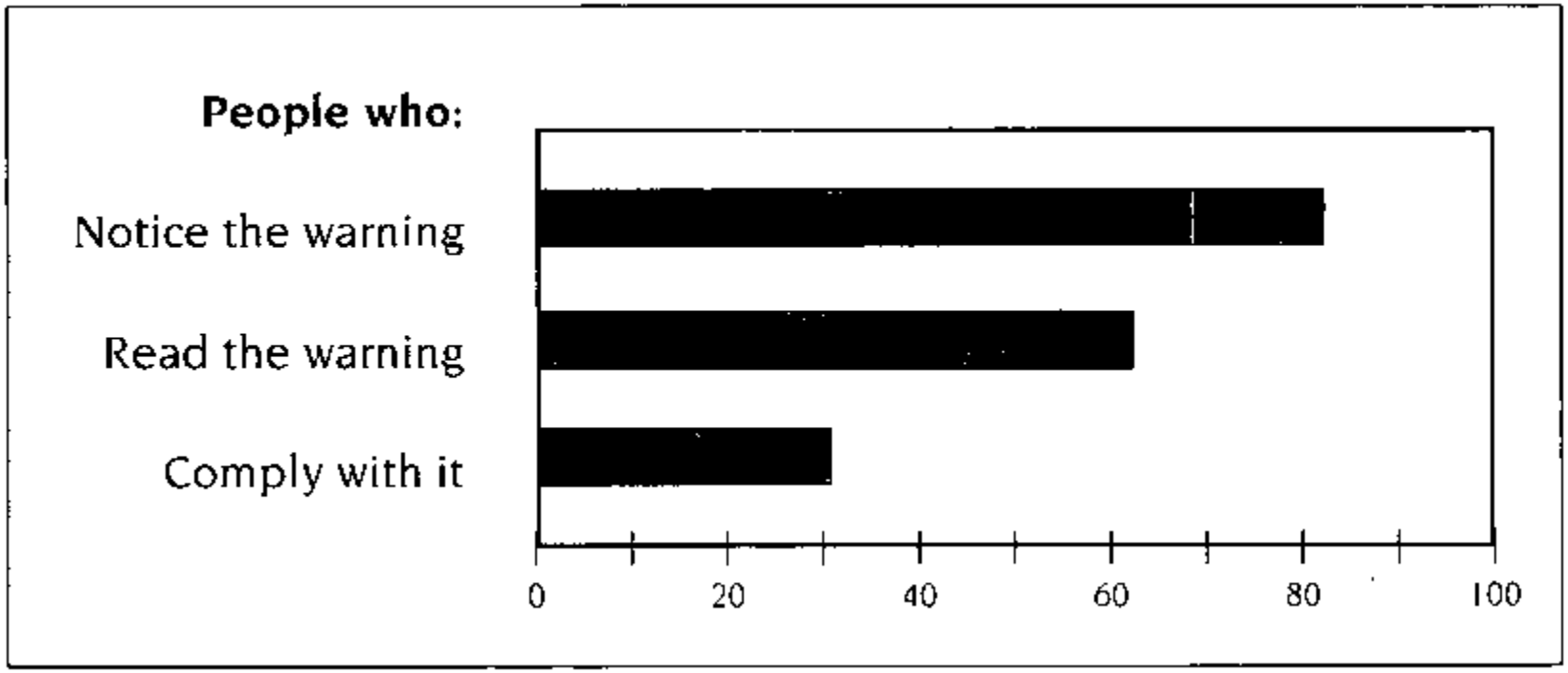
- Control response – eliminate interaction

Engineering controls

Administrative controls

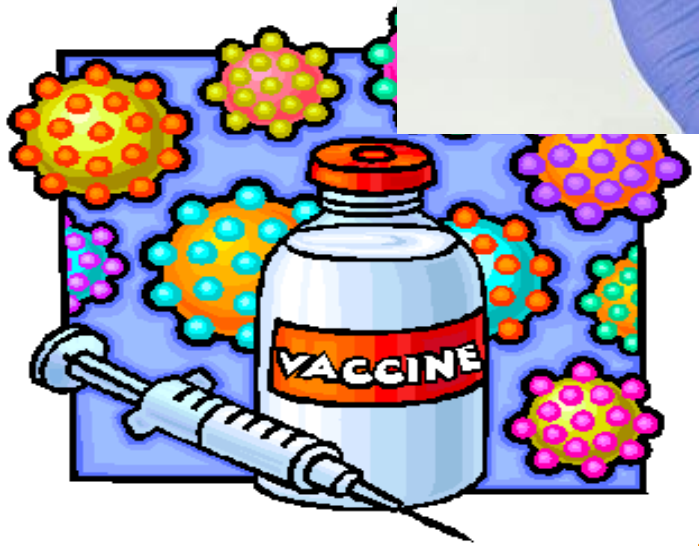
- Training
- Procedures
- Job Rotation

Awareness Means –Warnings




Think Before You Lift
Think Safety
Use Your Legs
NOT Your Back

Personal Protective Equipment (PPE)

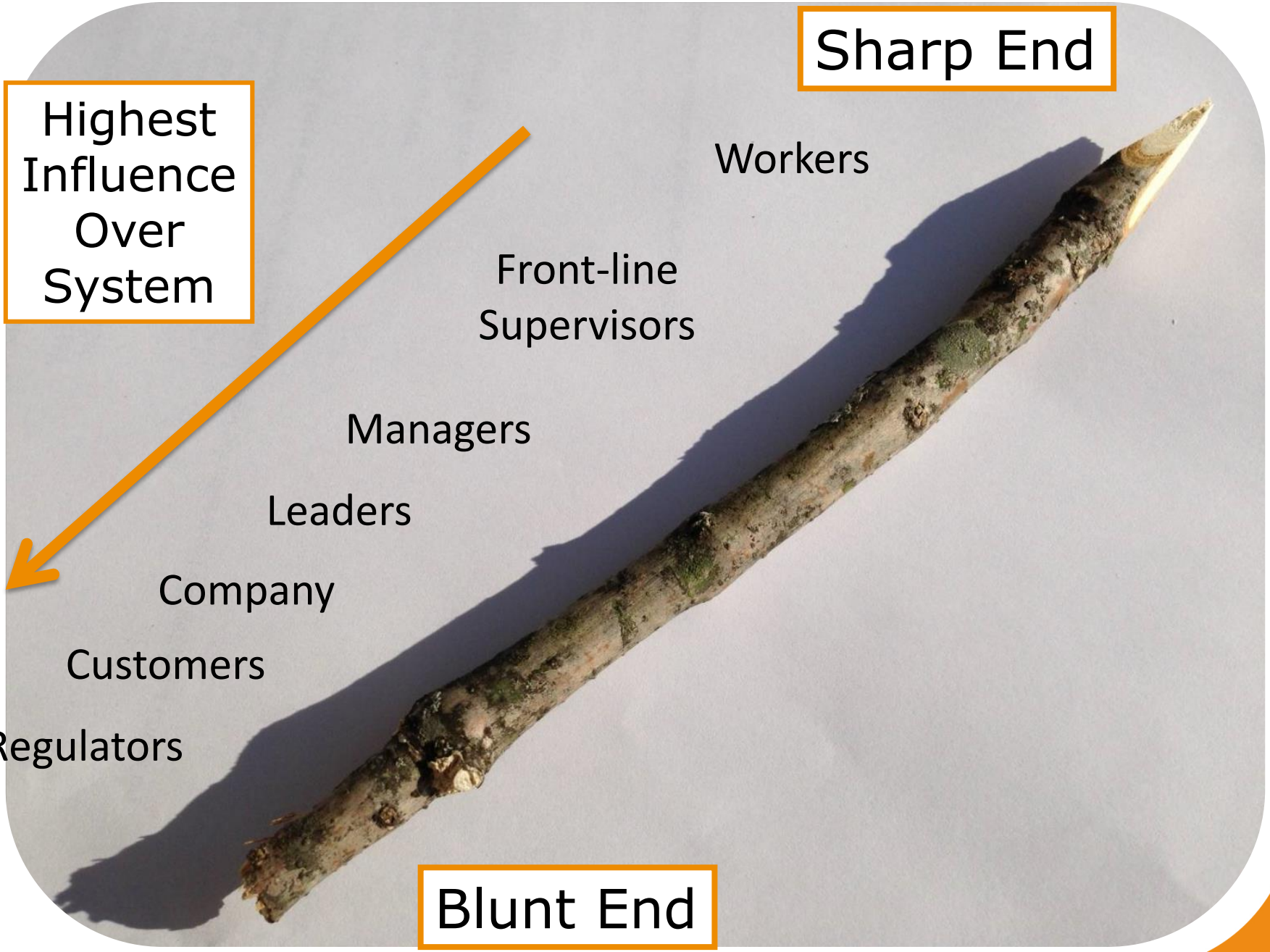


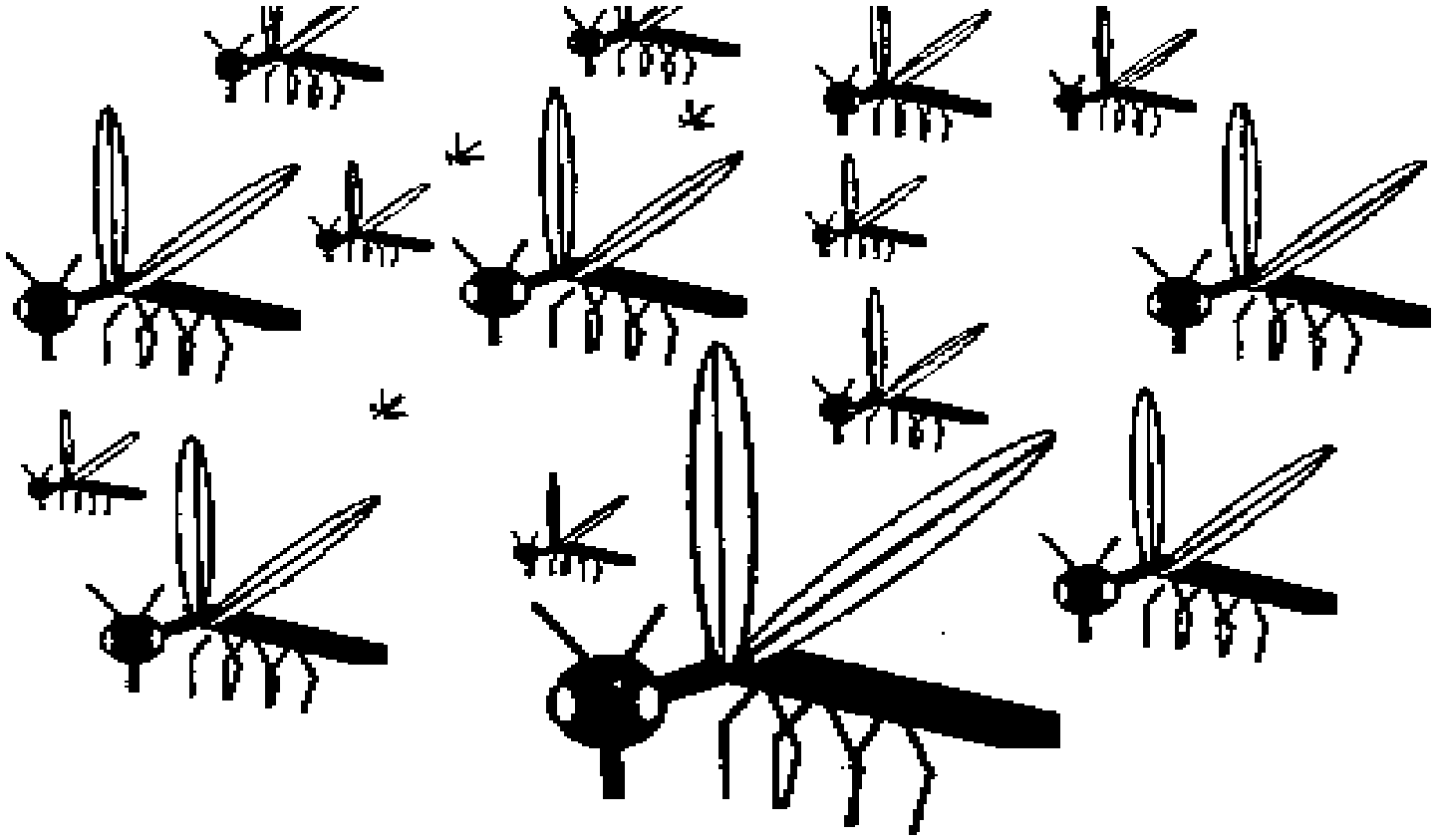
Effective recommendations…

Ideally:

"…your recommendations essentially propose to re-tool or re-shape parts of the operational or organizational environment in the hope of altering the behaviour that goes on within it."

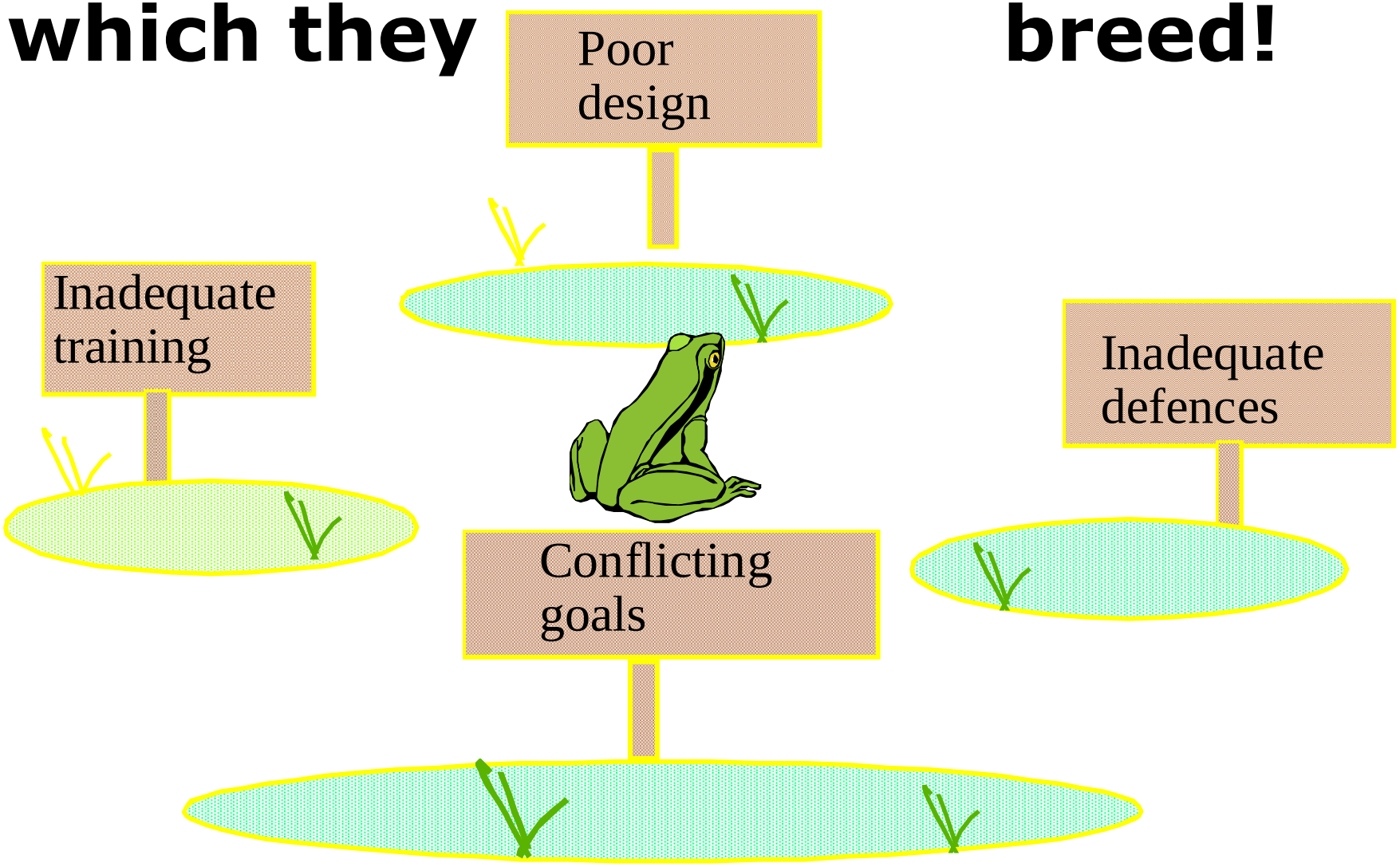
Sidney Dekker, 2002


Sharp End
Highest Influence Over System
Workers
Front-line Supervisors
Managers
Leaders
Company
Customers
Regulators
Blunt End



Compliments of James Reason

It's best to drain the swamps in which they breed!



Offer appropriate level of protection

Worst day

Best day

Human Factors Ergonomists at WorkSafeBC

- Humanfactors@worksafebc.com
- Tami.perkins@worksafebc.com

Resources

- WorkSafe BC Worksheet A and B (Risk Identification and Assessment)
- WorkSafe BC Ergonomic Guidelines
- WorkSafe BC Guidance sheet for Contact Stress
- WorkSafe BC Lifting Calculator
- WorkSafe BC Pushing/Pulling Calculator

- Human Factors Approach to Incident nvestigations Workshop

Thank You!