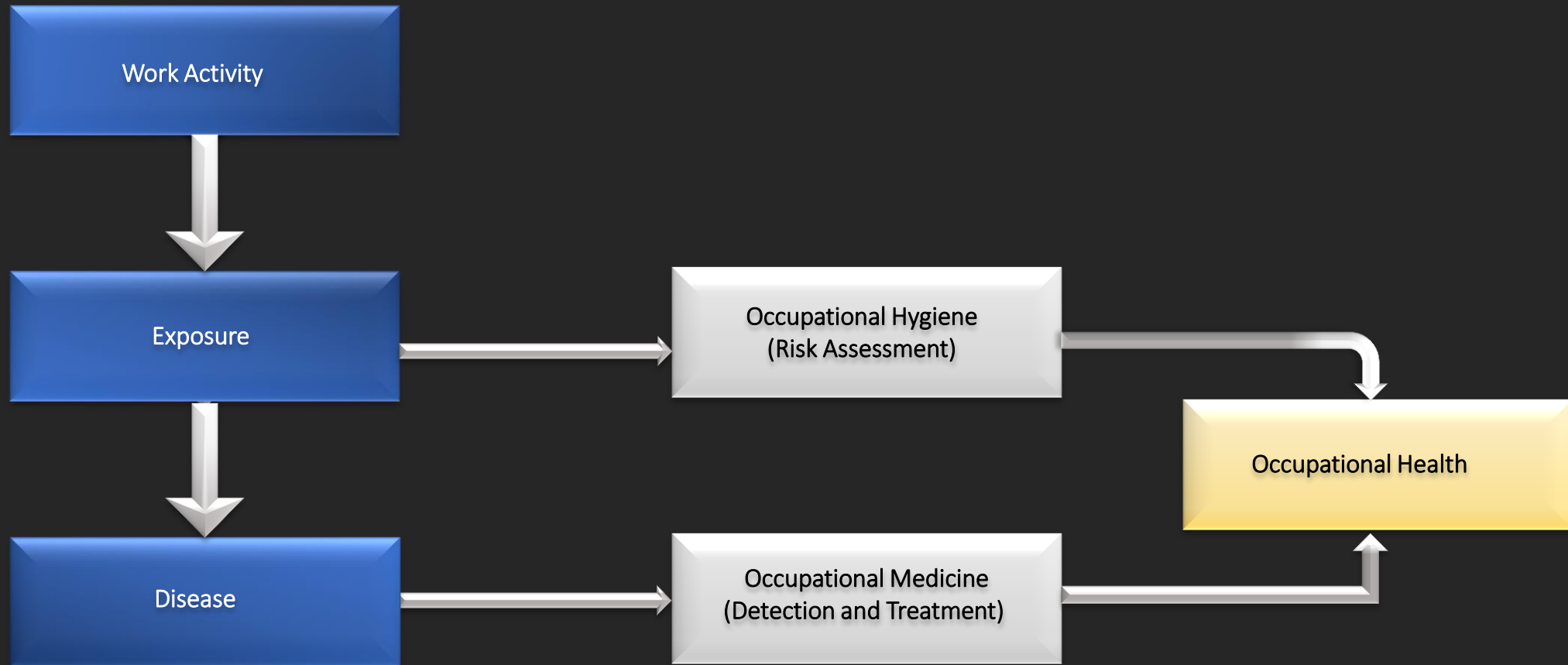


New Zealand Occupational Hygiene
Society Conference 6-7th May 2019

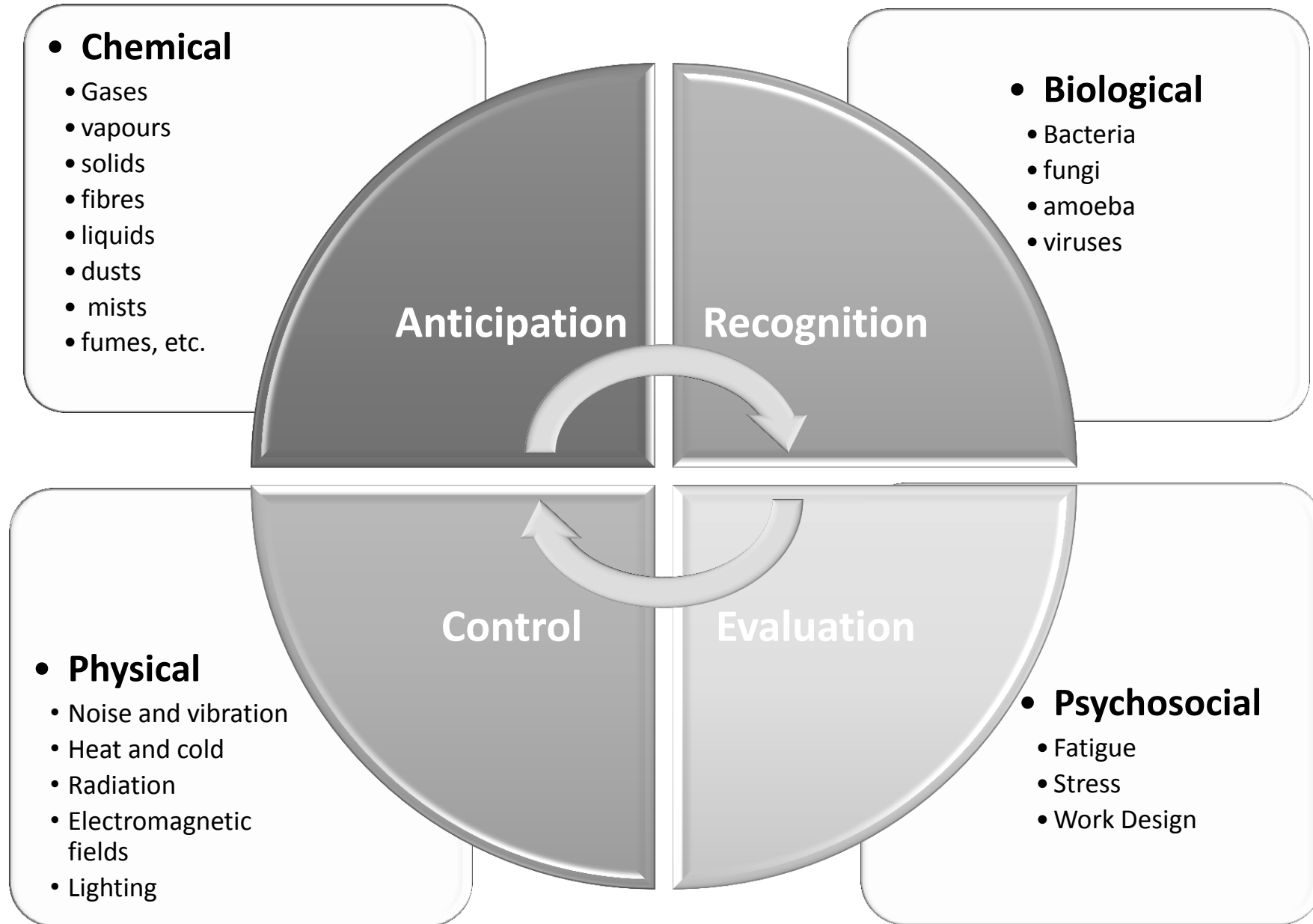
Continuing Education Session: Health Risk Assessment

Occupational Health and Occupational Hygiene



The focus of Occupational Hygiene is the risk assessment of exposure to harmful agents

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D-Keine



Health Risk Assessment allows us to:

- Identify potential harm
- Identify unacceptable exposure
- Prioritise controls
- Justify/prioritise spending
- Predict legacy issues



Health Risk Assessment

Like any risk assessment, a health risk assessment is the calculation of:

Likelihood x Consequence

	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain					
Likely					
Possible					
Unlikely					
Rare					



Likelihood

- The chance that exposure will occur in a harmful dose considering:
 - The concentration of the exposure compared to the Workplace Exposure Standard (WES)
 - The length of exposure
 - The frequency of the exposure
 - The amount of people exposed

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Bloomberg

Workplace Exposure Standards

- In New Zealand we apply WES to determine what:
 - Nearly all workers
 - Working 8 hours per day
 - 5 days per week (40 hour work week)
 - Can be exposed to **without causing harm**

**It is a quantification of likelihood
not a determination of harm**





Consequence

- The impact of occupational illness or disease
 - Is it acute or chronic?
 - Is it treatable or incurable?
 - Are the effects reversible?
 - Is the outcome potentially fatal?

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Peter Dazeley

Stages of Health Risk Assessment

EN689:2018 Workplace Exposure –
Measurement of exposure by inhalation to chemical agents –
Strategy for testing compliance with occupational exposure limit values

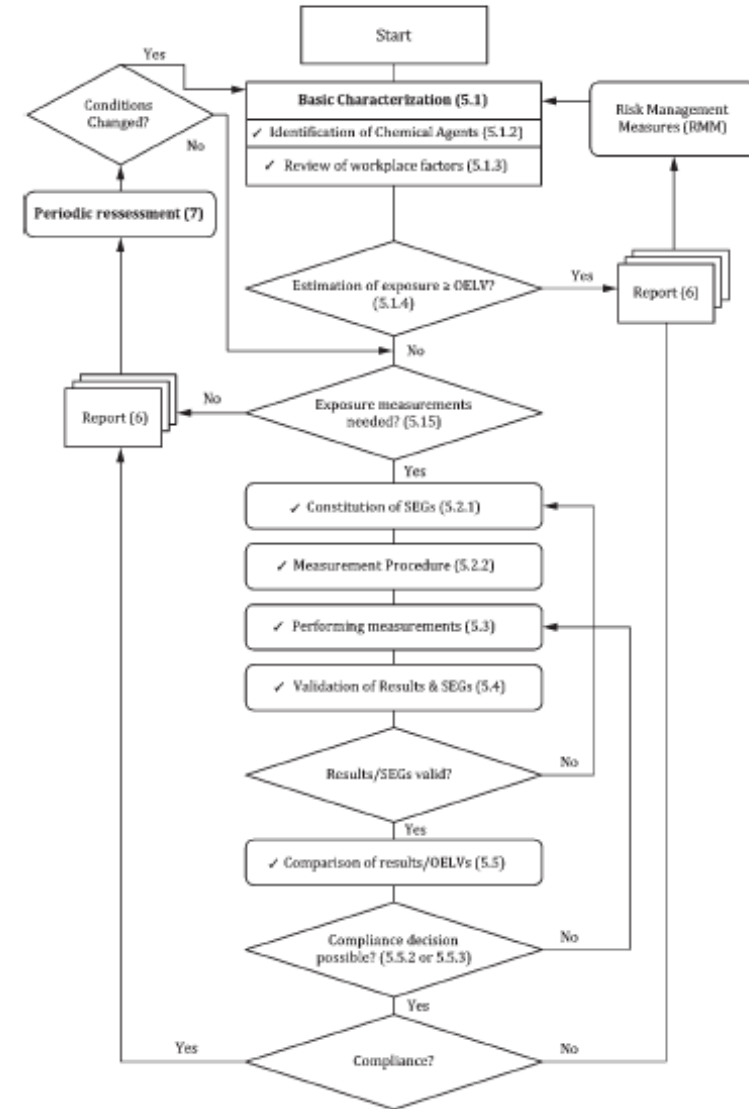


Figure 1 — Schematic overview of the strategy

Stages of Health Risk Assessment (EN628)

Basic Characterisation of Hazards

Constitution of Similar Exposure Groups

Selection of suitable measuring procedure

Performing exposure measurements

Validation of exposure measurement results and SEGs

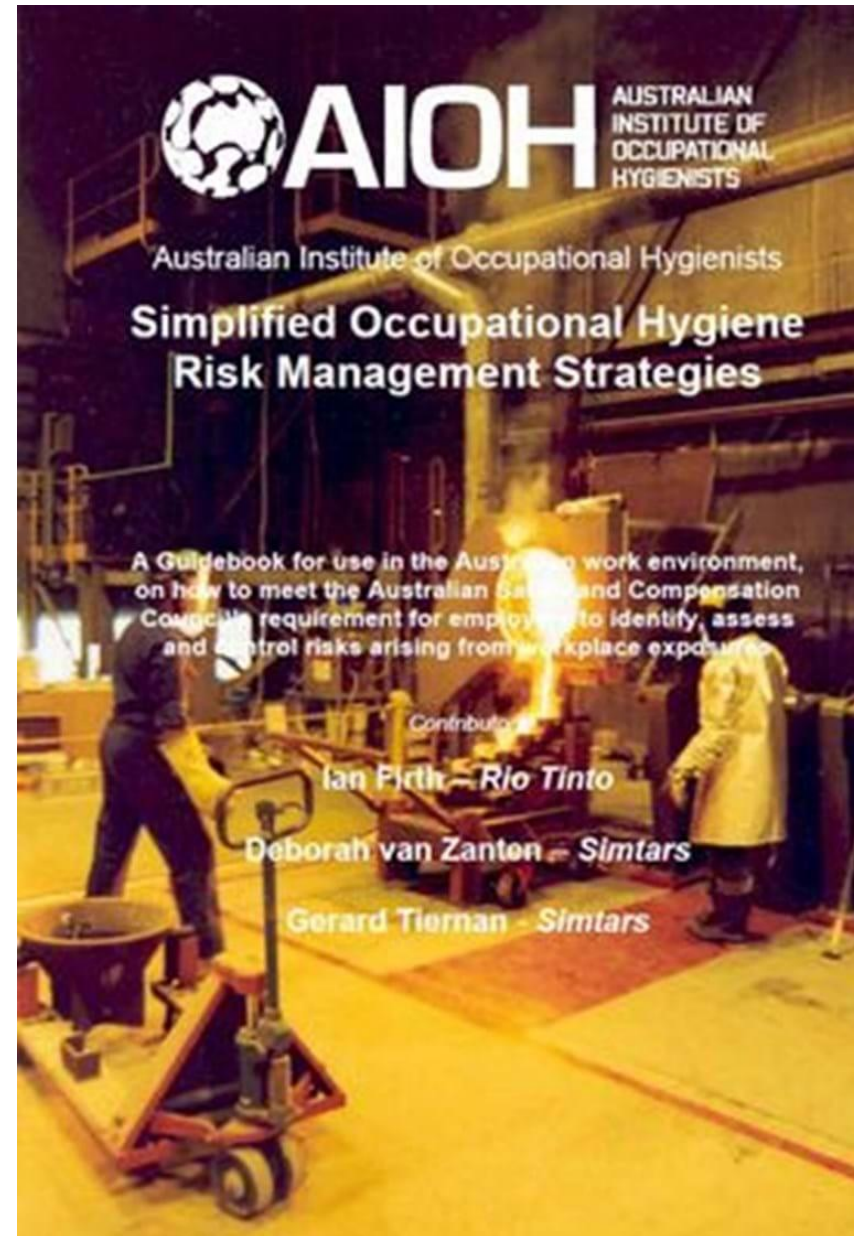
Comparison of results with OELV's (WES)

Report of Results

Confirmation of control effectiveness????

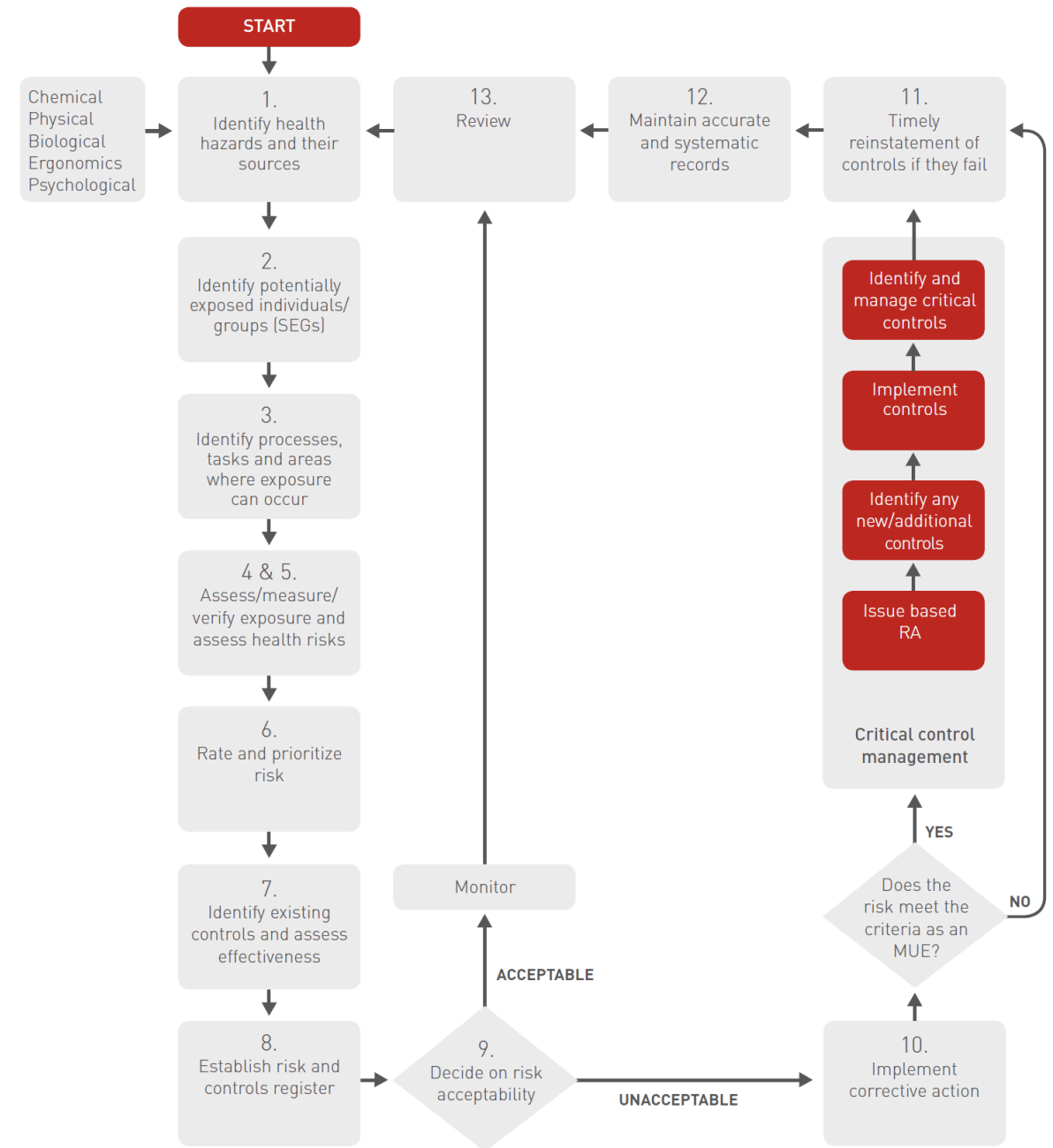
Alternative Health Risk Assessment Methodologies

AIOH Simplified Occupational Hygiene Risk Management Strategies



Alternative Health Risk Assessment Methodologies

International Council
on Mining and
Metals: Good
practice guidance on
occupational health
risk assessment 2016



Basic Characterisation of the Workplace

Workplace Organisation

Organisation
and
headcount

Job Roles and
Job Function

Work Shifts

Workplace Environment

Location of
task

Surrounding
work

Existing
controls

Processes and Tasks

Tools and
Techniques

Ingredients

Products/By-
products

Workplace Organisation

Organisation and headcount

- How many people are allocated to each job task?
- How are the task allocated to workers? Are some workers excluded from certain tasks

Job Roles and Job Function

- What activities are associated with each job title?
- What are the frequencies of the tasks as a part of the job role?

Work Shifts

- Shift length; <8, 8, 10, 12, >12
- Roster Pattern; 5:2, 4:4, 6:1, 7:7, 9:5, 28:7
- Is there a residential component with potential exposure; e.g. fishing boats, oil rigs.

Workplace Environment



Location of task

- Is the work indoor, outdoor?
- Is the work mobile or regularly shifting?
- Confined Spaces?

Surrounding work

- What hazards are produced by surrounding work, e.g. noise, heat, dust?

Existing controls

- Is there ventilation systems in place?
- How effective are the controls? Known or unknown?

Processes and Tasks

Tools and Techniques

- Do the tools or techniques create a hazard?
- What are the likely emission points? Where are agents likely to concentrate?
- Are there alternative processes available?

Ingredients

- What products are used as a part of the process?
- What do the SDS's for the products say? Are they a known health hazard?
- Are physical agents such as heat, steam, vibration, radiation or pressure a part of the process?

Products/By-products

- What is produced by the process?
- Are there unwanted by-products? Gases?



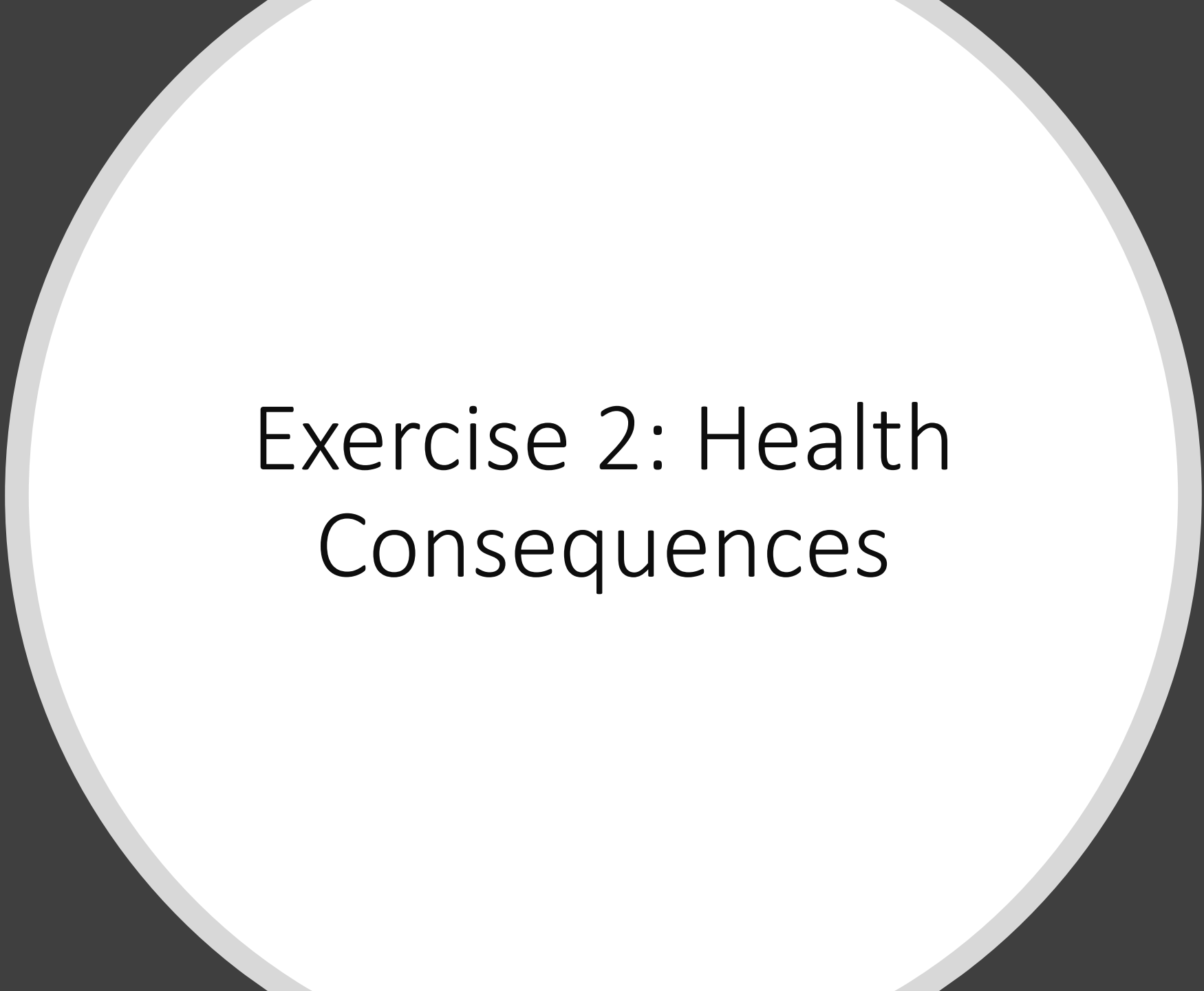
Exercise 1: Basic Characterisation

Hazard Assessment



Determining Consequence

- The impact is dependant on the hazard toxicokinetics.
- The Assessor needs a basic understanding of the health impacts of the hazard.
- Information is available from a range of reliable sources:
 - CDC – NIOSH Pocket Guide to Chemical Hazards
 - PubChem – US National Library of Medicine, National Centre for Biotechnology Information
 - World Health Organisation
 - International Agency for Research on Cancer (IARC)
 - Government Health Department's
 - Worksafe NZ
 - Wikipedia???



Exercise 2: Health Consequences

Determining Likelihood

- Likelihood is a mix:
 - Exposure Levels
 - Frequency of exposure
 - Length of exposure
 - Amount of people exposed.

Estimation of Exposure

A best guess based on personal experience of the risk assessor

A banding method based on the risk matrix is recommended

Almost Certain

- Greater than 150% of the WES

Likely

- Between 100% and 150% of the WES

Possible

- Between 50% and 100% of the WES

Unlikely

- Between 10% and 50% of the WES

Rare

- Less than 10% of the WES

Tools for Estimation: Particulates

Real time particulate monitoring

Tyndall Effect

Smoke Tubes (Extraction efficiency)

Tools for Estimation: Gases and Vapours

Real time monitoring (Gas monitor and PiD)

Colourimetric Tubes

Smoke Tubes (Extraction efficiency)

Tools for Estimation: Noise

1m Rule

Sound Level Meter

IPhones and Apps

Tools for Estimation: Vibration

HSE Ready Reckoner

(<http://www.hse.gov.uk/vibration/hav/readyreckoner.htm>)

iPhone and Apps


Tools for Estimation: Thermal Stress

AIOH Basic Risk Assessment Apps: Thermal Risk



Malchaire (Dropbox)

<http://www.deparisnet.be/DROPBOX.htm#eng>



Exercise 3: Risk Assessment

Sampling Strategies: Similar Exposure Groups (SEGs)

- SEGs describe a group of people in a workplace with a similar exposure to a range of agents.
- By grouping people together you reduce the sampling required to determine the quantitative risk.
- SEGs are not final, they can and will change as the business or conditions changes.
- They are a tool to allow us to prioritise:
 - Controls
 - Monitoring

Exercise 4: SEGs

What are the top 3 at risk
SEGs?

Deciding what to monitor?

- All hazards that are expected to exceed the WES should have further controls put in place.
- Monitoring should be used to assess the effectiveness of controls
- Those hazards that are expected to be greater than 50% of the WES should be assessed further by monitoring to quantify the actual risk.
- Ideally a Baseline sampling program should be implemented to give the organisation an accurate understanding of the health risks.

Only a personal exposure sample can be used to assess risk against a WES



- A Static sample can be used to:
- Assess for the presence or composition of a contaminant in the atmosphere
- Review the effectiveness of controls

Establishing Sample Plans

- Sample plans should reflect the risk for each SEG.
 - Example;
 - Risk = Moderate or above
 - Likelihood = Possible, Likely, Almost Certain
- A statistical relevant amount of samples should be planned
 - NIOSH Method
 - EN628
- What is feasible?

Health Risk Assessment Review

- A Health Risk Assessment should be regular reviewed including:
 - When operations change.
 - When a new product or process is introduced.
 - Baseline sampling is completed.

Alternatively a periodic review is generally conducted every 12 months

What does the data mean?

- Converting sampling results to risk
 - Statistical Analysis
 - Reapply banding

Lessons to take away

- A health risk assessment is a great place to start for any organisation.
- It is the same process regardless of organisational size, processes or complexity.
- It allows an organisation to prioritise its health hazard controls
- The Qualitative Assessment and Basic Characterisation is subjective. People will not agree with other people's assessment.
- A Quantitative Assessment requires a statistically valid set of samples that determine exposure likelihood.