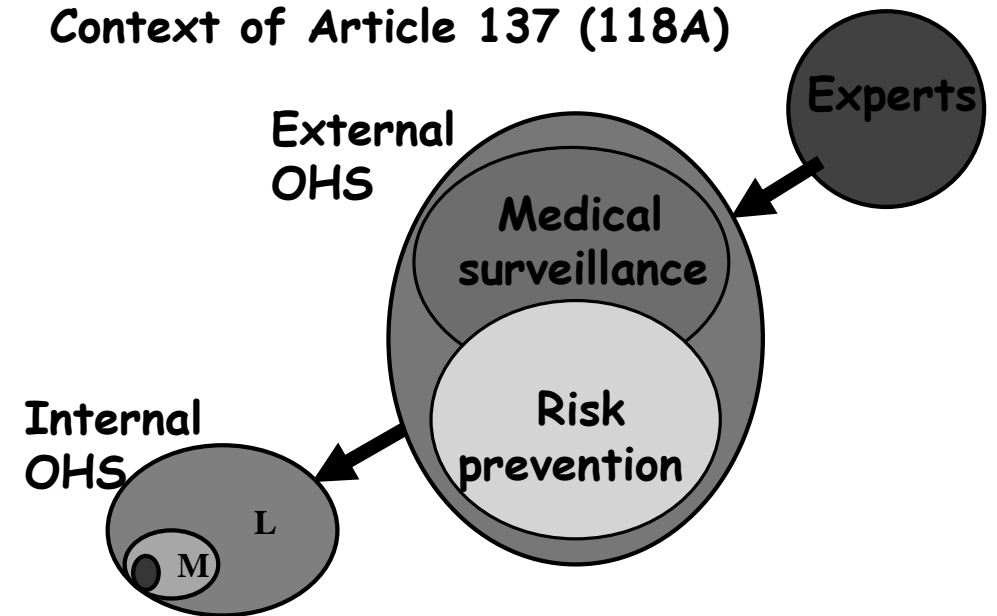


Practical use of standards for workplace risk PREVENTION

Jacques Malchaire
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Context of Article 137 (118A)

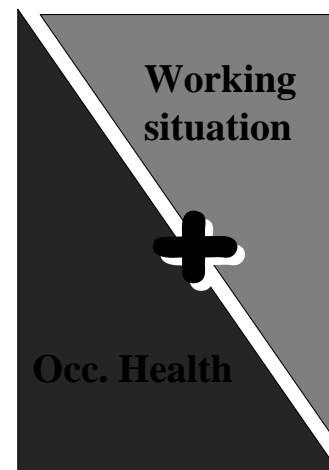


Occupational Health Services structure



OH partners

- Employees
- Management
- Safety officers
- Occ. physicians
- Occ. hygienists
- Ergonomists
- Experts



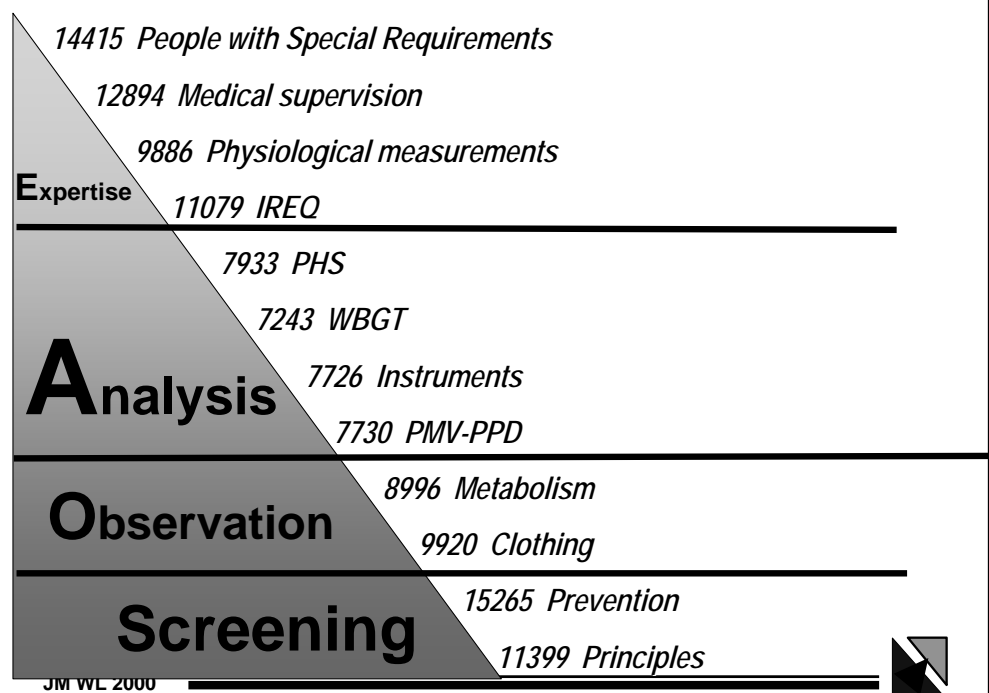
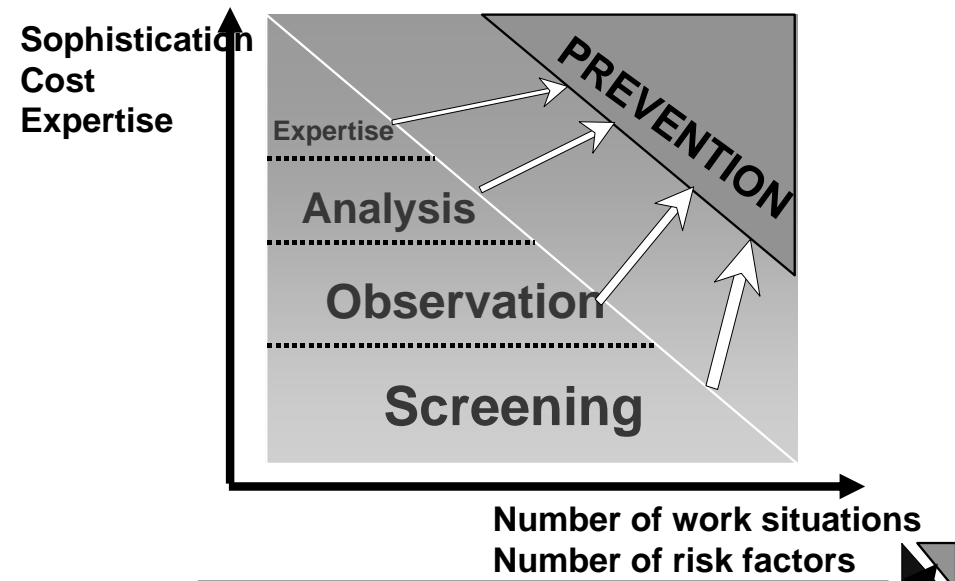
Objectives

- Coordination of all actors
- « We need valid and useable standards with sufficient scope for practical application »
- « Evaluation » vs « Measurements »
- Cost-effectiveness
- Prevention vs assessment
- Qualitative vs quantitative
- Methods applicable by SMEs



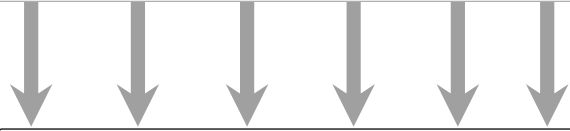
| | Stage 1 "Screening" | Stage 2 "Observation" | Stage 3 "Analysis" | Stage 4 "Expertise" |
|---|------------------------------|------------------------------|------------------------|------------------------------|
| • When? | Systematically | When a "problem" is detected | More complicated Cases | Very complex cases |
| • How? | Opinions | Qualitative observations | Ordinary measurements | Specialised measurements |
| • Cost? | Very low | Low | Average | High |
| • Duration (order of magnitude) | 10 min | 2 hours | 1 day | A few days |
| • By whom? | Workers + company management | Workers + company management | Same + specialists | Same + specialists + experts |
| • Knowledge - working conditions - ergonomics | Very high Low | High Average | Average High | Low Specialised |

Prevention Strategy



Strategy for the management of the thermal working conditions

Climatic factors, M, clo



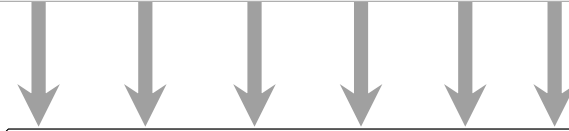
Predicted Heat Strain



Prediction SW, Tco, DLE



Climatic factors, M, clo



Black box



Prediction SW, Tco, DLE



Philosophy

- First stage: SCREENING
- Second stage: OBSERVATION
- Third stage: ANALYSIS
- Fourth stage: EXPERTISE



First stage: SCREENING

- To get an overview of the working conditions
 - ❖ for the main factors related to safety, health and well being
- Conclusions:
 - ❖ Are there complaints related to the climatic conditions?



Second stage: OBSERVATION

Objectives

- Look more closely to the climatic and working conditions
- Search for straightforward solutions.



OBSERVATION designed to:

- Identify particular circumstances, specific tasks, unusual working conditions where a “problem” exists
- Determine what to do to reduce or eliminate these problems.
- By or with the help of the workers themselves.

Conclusion:

- ❖ Is the “problem” satisfactorily controlled or not?
- ❖ If not, the assistance of specialists is needed.



Third stage: ANALYSIS

- Deal with specific conditions
- Usually involve measurements
- Conducted with the help of OH services with adequate training
 - ❖ To find technical solutions
 - ❖ To define organisational solutions and short-term protection measures

Conclusions

- ❖ Is the assistance of an expert required?



Fourth stage: EXPERTISE

- To study unusual circumstances,
 - ❖ Using very specific investigation techniques
- To identify sophisticated solutions



Criteria for OBSERVATION

Designed for the workers and their management

- ❖ Simple to understand by untrained people
- ❖ Avoid concepts or terms not readily understood
- ❖ Easy to use, maximum 1 hour for a specific circumstance of work
- ❖ Based on simple *OBSERVATIONS* (no measurement)
- ❖ Oriented towards prevention



Discussion of

- The working conditions
- The technical process
- The characteristics of the heat or cold sources
- The possibilities of control measures.



Criteria for ANALYSIS

Designed for OH specialists

- ❖ Use common concepts and techniques
- ❖ If necessary simple, measurements
 - To identify the causes of the problems
 - And the means to solve them
- ❖ Useable in less than one day
- ❖ Oriented towards prevention



Characteristics of the strategy

- Participative
 - ❖ Workers play the essential role in the dynamics of improvement
 - ❖ Occupational health specialists and experts are helping
- Structured in 4 complementary stages
 - ❖ Requiring complementary knowledge and competencies



Methodology



Stage 2: OBSERVATION

- Describe the working condition known to or likely to raise a thermal problem
- Evaluate the situation for each of the six parameters separately:



Stage 2: OBSERVATION

| AIR TEMPERATURE | |
|-----------------|---------------------------------|
| -3 | • Generally freezing |
| -2 | • Generally between 0 and 10°C. |
| -1 | • Generally between 10 and 18°C |
| 0 | • Generally between 18 and 25°C |
| 1 | • Generally between 25 and 32°C |
| 2 | • Generally between 32 and 40°C |
| 3 | • Generally greater than 40°C |



OBSERVATION: Synthesis

Summary of the results

| | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|-----------------|----|----|----|---|---|---|---|
| Air temperature | | | | | | | 0 |
| Humidity | | | | | | 0 | |
| Radiation | | | | | 0 | | |
| Air movements | | | | 0 | | | |
| Work Load | | | | | | 0 | |
| Clothing | | | | | | | 0 |



OBSERVATION: Solutions

AIR TEMPERATURE

- Locate the sources of heat or cold in the periphery
- Eliminate the sources of hot or cold air
- Insulate the hot surfaces
- Exhaust hot or cold air locally
- Ventilate without draughts
- Use clothes with lower or higher insulation
- ...



OBSERVATION: Synthesis

Estimate what the situation will be after improvement

| | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
|-----------------|----|----|----|---|---|---|---|
| Air temperature | | | | | | X | 0 |
| Humidity | | | | | X | 0 | |
| Radiation | | | | | = | | |
| Air movements | | | | = | | | |
| Work Load | | | | | X | 0 | |
| Clothing | | | | | X | | 0 |



OBSERVATION: Conclusions

- Decide whether a more detailed *ANALYSIS* is needed to quantify and to solve the problem.
- Determine the measures to be taken in the short-term if needed:
 - ❖ Drinks, Recovery periods, Work organisation
 - ❖ Clothing....



ANALYSIS: Objectives

For the conditions selected during stage 2:
OBSERVATION

- To quantify the risk of thermal discomfort or
- To Identify more elaborated solutions
- To determine the optimum work organisation.
- To determine whether an *EXPERTISE* (stage 4) is needed.



ANALYSIS: Procedure

Analyse the sequence of activities:

- ❖ Description of the activities.
- ❖ Mean and maximum durations.
- ❖ Period concerned by the working situation.
- ❖ Exposed workers



ANALYSIS: Procedure

ANALYSIS of the working situation during representative period(s) of time

- Measurement or estimation of the mean and maximum values
- Computation of the indices (PMV/PPD, PHS)



ANALYSIS: Synthesis

| | Activity ... | | Activity ... | |
|-----------|--------------|-----|--------------|-----|
| | mean | Max | mean | max |
| t_a | | | | |
| RH | | | | |
| t_g | | | | |
| v_a | | | | |
| M | | | | |
| Clo | | | | |
| PMV | | | | |
| PPD | | | | |
| WBGT | | | | |
| PHS / DLE | | | | |



ANALYSIS: interpretation

Risk in the present situation

| | |
|------------------------------|-------------------------|
| cold constraint | $PMV < -2$ |
| cold discomfort | $-2 < PMV < -0,5$ |
| comfort | $-0,5 < PMV < 0,5$ |
| warm discomfort | $0,5 < PMV < 2$ |
| constraint in the long term | $DLE < 480 \text{ min}$ |
| constraint in the short term | $DLE < 120 \text{ min}$ |
| immediate constraint | $DLE < 30 \text{ min}$ |



ANALYSIS: synthesis

| | Activity | Activity |
|---|----------|----------|
| | ... | |
| 3. RISK | | |
| <ul style="list-style-type: none"> • Class of risk • If heat stress <ul style="list-style-type: none"> • Sweating rate • Water loss per day • DLE | | |
| 4. ACCEPTABILITY | | |
| 5. PREVENTION/CONTROL MEASURES | | |
| 6. RESIDUAL RISK | | |
| 7. NEED FOR AN EXPERTISE | | |
| 8. SHORT TERM MEASURES | | |
| 9. MEDICAL SURVEILLANCE | | |

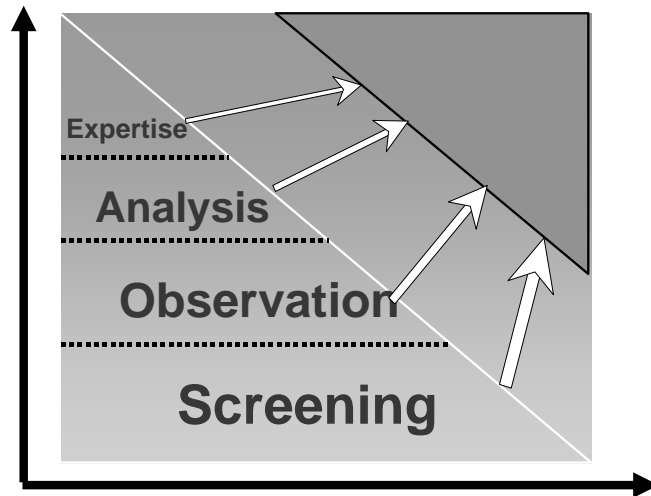


EXPERTISE

- Better characterise some heat or cold sources and/or some thermal phenomena
 - ❖ Specific measurements
- Characterise the overall exposure of the workers
- Look for special prevention/control measures
- **Method appropriate, more sophisticated**
 - ❖ Personal protection
 - ❖ Medical surveillance



Prevention Strategy



Thank you

