

Strategy for management of the risk due to noise

J.Malchaire

Catholic University of Louvain

Belgium



Principles

1. Complementarity of the competences available
2. Limited OH resources
3. The worker is the ACTOR not the assisted
4. All OH problems are linked
5. Prevention > Compliance
6. Prevention > Evaluation or quantification
7. Methods designed for the SMEs

B. Goelzer (1996),

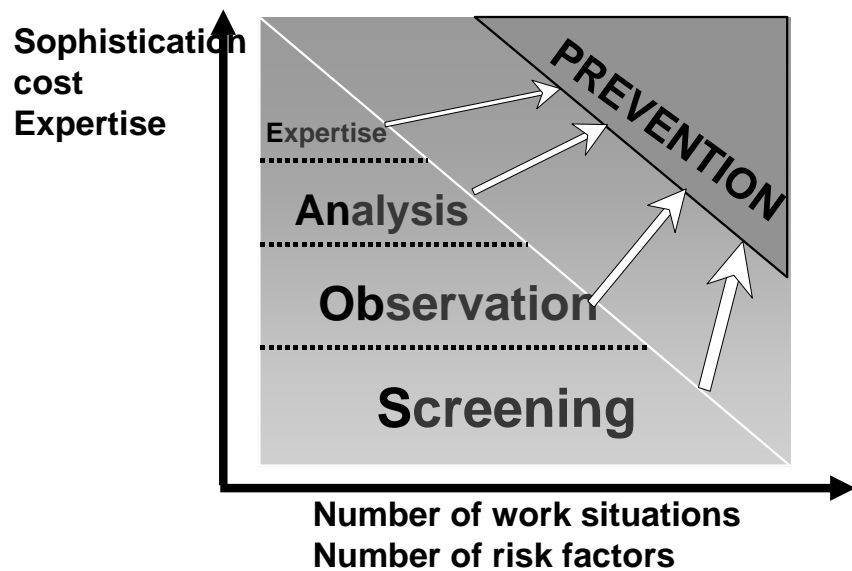
“It is not unusual to see more attention given to exposure assessment and monitoring than to risk prevention and control.

The *fascination* exerted by sophisticated equipment and by numbers is, for some reason, greater than the interest in designing pragmatic solutions to prevent exposure”

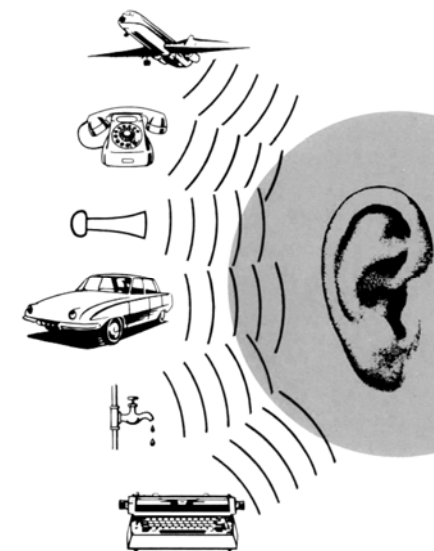
Therefore

- PARTICIPATION of the workers
- Start from a comprehensive approach
- Progressive approach
- Based on the people in the field
- Objective: the best possible conditions
- Measurements after, not before

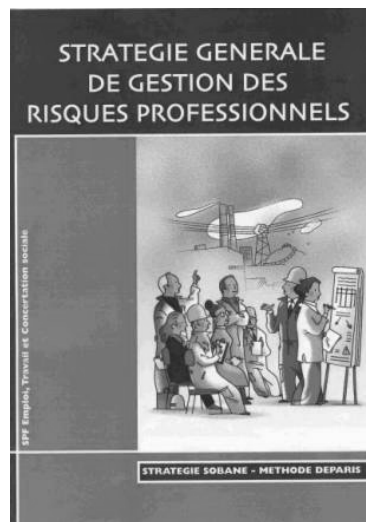
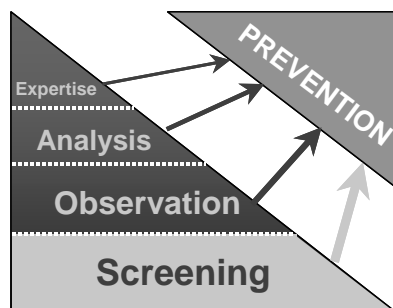
Prevention Strategy SOBANE



SOBANE Noise



Level 1, Screening: Déparis



Meeting of a working group near the work stations



- 3 key-operators
 - at least 1 man and 1 woman if mixed
- immediate technical management
- OHS committee representative

Guided discussion for determining

- what can be done immediately to improve the situation
- what needs the *assistance* of a specialist

Work situation:			
1. Operating areas	😊	😐	😞
2. Technical organization	😊	😐	😞
3. Work sites	😊	😐	😞
4. Risks of accident	😊	😐	😞
5. Controls and signals	😊	😐	😞
6. Tools and work material	😊	😐	😞
7. Repetitive work	😊	😐	😞
8. Handling operations	😊	😐	😞
9. Mental load	😊	😐	😞
10. Lighting	😊	😐	😞
11. Noise	😊	😐	😞
12. Thermal environment	😊	😐	😞
13. Chemical and biological agents	😊	😐	😞
14. Vibration	😊	😐	😞
15. Work relationships between workers	😊	😐	😞
16. Local and social environment	😊	😐	😞
17. Work content	😊	😐	😞
18. Psychosocial environment	😊	😐	😞

10. Noise

Discuss:

In the workshops:

- **The ease to speak:** at a distance of about 1 m
- **The PHP:** earmuffs, earplugs available and used

In the office:

- **No discomfort or disturbance** (traffic, air conditioning, copiers, phones, talks)

The localization of the workplaces

- As far as possible from the noise sources

The noisy machines:

- The maintenance, hoods

The holes, openings

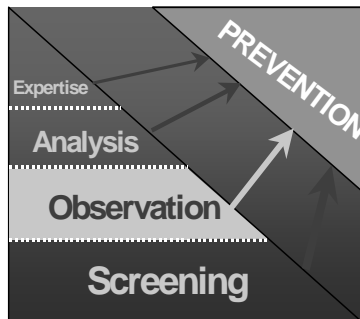
- In the walls, slits under the doors

What can be done in practical terms to improve the situation?

Aspects to study more in details:



Stage 2: Observation



Stage 2, Observation: Objectives

- **Collect general information on**
 - *Noise sources*
 - *Noise exposure conditions.*
- **Determine additional technical measures**
- **Determine if a detailed Analysis is necessary**

Stage 2, Observation: Who?

- **People inside the company**

- *Ideally, the workers + technical staff*

- **Characteristics**

- *Simple vocabulary and words*
 - *Work situation characterized in all circumstances (not at a given time)*
 - *No measurement.*



Stage 2, Observation: Procedure

1. Characterization of the noise sources

- **Identification of the main noise sources**
- **Location of the work places and the workers**

- ✓ *With respect to the sources*

- ✓ *On a map of the area.*



Stage 2, Observation: Procedure

2. Noise control

- **Look for straightforward solutions**

Items to consider	Possible solutions
Vibrations of parts or panels:	Tighten parts or panels Cover them with a rubbery material
Vibrating ground:	Install silent blocks
Impacts of parts on a hard surface:	Tilt the plate on which the parts are falling Cover it directly or in sandwich with a rubbery material
Mechanical noise:	Use helicoidal gears Use plastic materials Equilibrate rotating parts
Aerodynamic noise:	Avoid discontinuities (elbows,...) Or sharp edges in the air stream Use silencers in ducts

Stage 2, Observation: Procedure

2. Noise control

Air jets:	Use exhaust mufflers for decompression air jet Use special air guns Reduce the air velocity of the jet Avoid the impact of the air jet on a sharp edge or perpendicular to a surface
Acoustical enclosure on the machine:	Use hermetic enclosure covered with rubbery materials Install absorbing materials inside
Pure tones:	Equilibrate rotating parts Dampen the blade on power saws Use rubbery materials on resonating parts
Relocation of the source:	Move the source away from the workers Install a screen between sources and workers.
Acoustical treatment of the room:	Add some absorbing materials near the source if the room is highly reverberant Check noise transmission from adjacent rooms or from the outside

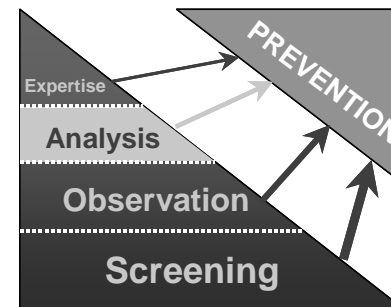
Stage 2, Observation: Procedure

3. Conclusions:

- **Need for a detailed Analysis (stage 3)**
 - *For what sources?*
 - *To reach what level of risk?*
- **Short-term measures**
 - *What personal protection*
 - *Carried by whom*
 - *When and how long.*



Stage 3, Analysis



Stage 3, Analysis: Objectives

For the problems not solved satisfactorily at Observation

- Deepen the research for prevention measures
- Ordinary measurements (N_{EX})
- Estimation of the workers exposure
- Search for more sophisticated prevention measures.
- Organisation of the HCP.
- Estimation whether an Expert is needed

Stage 3, Analysis:

- **Who?**
 - The people who performed the stage 1, Observation
 - Assistance of an OH specialist trained in HCP
- **Characteristics**
 - Concepts used more rigorously.
 - Measurements of the noise exposure levels
 - Simple instruments.

Stage 3, Analysis: Procedure

1. Exposure of the workers: present situation

- Groups of workers with same exposure (HEG).
- Stationarity interval
- Times and duration for measurement:
 - Work phases, representative dates and hours.
- Appropriate measuring techniques.
- Personal noise exposure level L_{PE}



Stage 3, Analysis: Procedure

Risk in the present situation:

- Discomfort:

L_{Aeq} (dB(A))	50	60	70	80
Voice level	Normal	Raised	Loud	Very loud
Discomfort	Low	Medium	High	Extreme

Stage 3, Analysis: Procedure

Risk in the present situation:



- Hearing impairment: % subjects 55 years old, 35 years exposure to the present noise, average hearing loss > 25 and 50 dB

L_{PE} dB(A)	85	90	92	94	97	98	99	100
50 dB	4	5	7	9	15	18	21	26
25 dB	29	36	40	46	59	65	70	75

Stage 3, Analysis: Procedure

2. Detailed analysis of the exposure conditions

- Work techniques
 - ✓ *New technology*
 - ✓ *Less noisy machines.*
- Characterization of the noise sources:
 - ✓ *Causes vs sources of noise*
 - ✓ *Noise level at the sources*
 - ✓ *Directions of emission*

Stage 3, Analysis: Procedure

2. Detailed Analysis of the exposure conditions

▪ Noise propagation:

- ✓ *distances sources-workers*
- ✓ *directivity of the sources*
- ✓ *screens between sources and workers.*

Stage 3, Analysis: Procedure

2. Detailed Analysis of the exposure

▪ Acoustic treatment of the room:

- ✓ *reverberation time*
- ✓ *reflecting partitions, ceiling or ground,*
- ✓ *absorptive materials*

▪ Acoustic insulation with the neighbours and outside:

- ✓ *Tightness of doors and windows, cracks, openings,*
- ✓ *Heavy gaskets, noise barriers.*

▪ Work reorganisation

Stage 3, Analysis: Procedure

3. Future situation

▪ Personal noise exposure level L_{pe} expected

▪ Residual risk :

- *Discomfort, or hearing impairment*

▪ Need for a Expertise

- *What priority and objectives?*

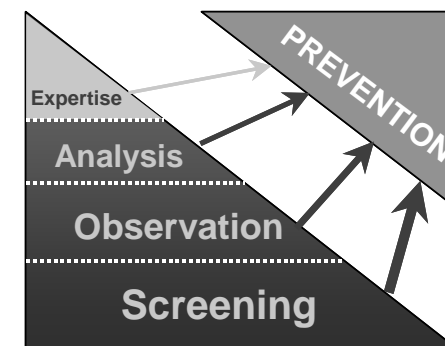
▪ Short-term protective measures

▪ Medical surveillance:

- *Audiometric exams, Hearing conservation program.*



Stage 4, Expertise



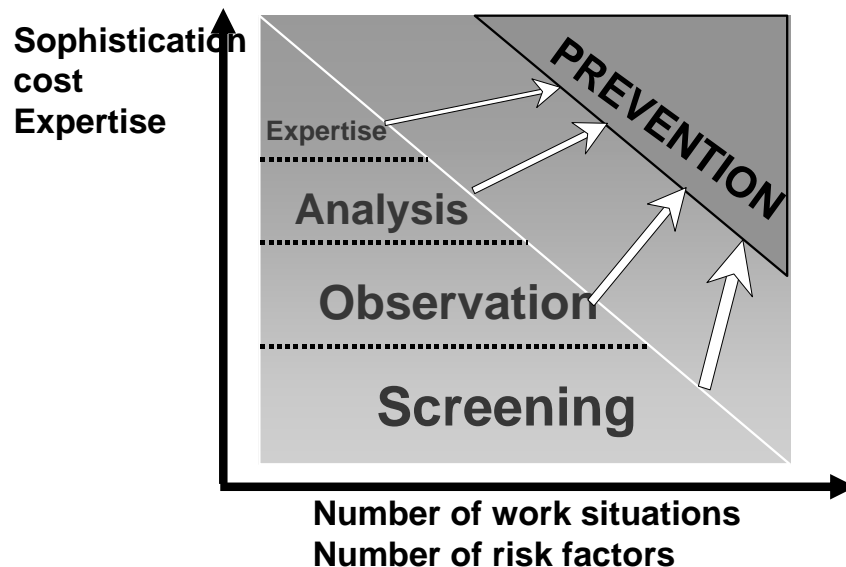
Stage 4, Expertise: Objectives

- Better characterize some noise and/or certain acoustic phenomena
- Finer Analysis of activities and noise conditions
- Ultimate prevention/control modifications.

Stage 4, Expertise: Who?

- People of the company
- Assistance of experts with:
 - Specialised measuring equipment
 - Training to use them and interpret the results.
 - Technical Expertise for particular technical solutions.

Prevention Strategy



www.sobane.be
www.md.ucl.ac.be/hytr/

Thank you