

(activity based) design in retrofit buildings



Sara Vellenga-Persoon
Senior Consultant
Acoustics and building physics
M+P | Muller-BBM Group



CONTENT

- introduction
- investigation approach
- acoustic design
- project example

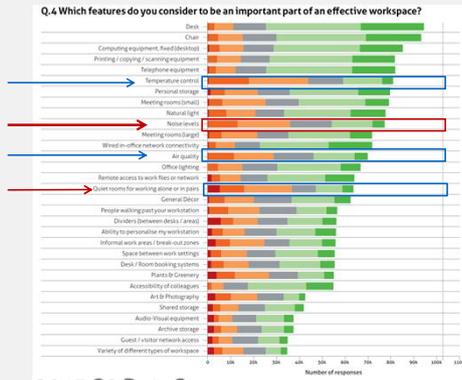


INTRODUCTION

OFFICES

80.000 surveyed out of 100.000

Leesman[®]_review



consider noise levels important:

- **46%: noise levels dissatisfying**

other dissatisfying factors:

- Temperature control
- **Quiet rooms for working alone or in pairs**
- Air quality



Philip Vanhoutte, Sr VP & MD EMEA of Plantronics and chair of Leesman's Advisory Board

2015 Q2 Data Summary

'The workplace world cannot ignore that 46,000+ employees have an issue with noise.'

EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

INVESTIGATION APPROACH

Questions:

1. acoustic comfort in existing building?

2. ideal acoustic comfort?

3. best available acoustic comfort?

4. real acoustic comfort after refurbishment?



QUALITY? RETROFIT OFFICE BUILDINGS

EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

**INVESTIGATION
APPROACH**

BUILDING

**Measurements Acoustical parameters:
Building Acoustics & Room Acoustics**

- sound insulation DnTA in dB
- reverberation time T in s
- spatial decay D2S
- background noise level LpA,B

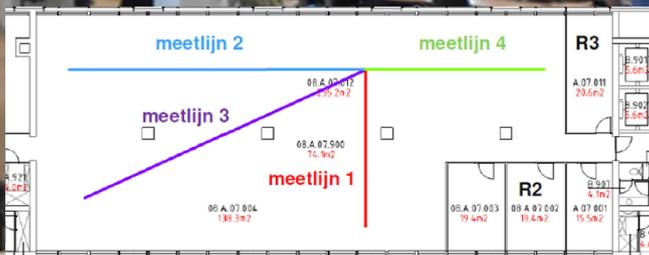
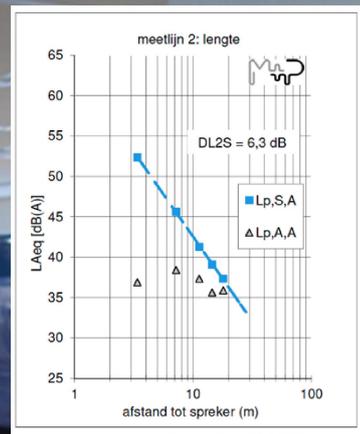


EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

Baseline measurement results

Building and room acoustics

PROJECT EXAMPLE



EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

PROJECT EXAMPLE

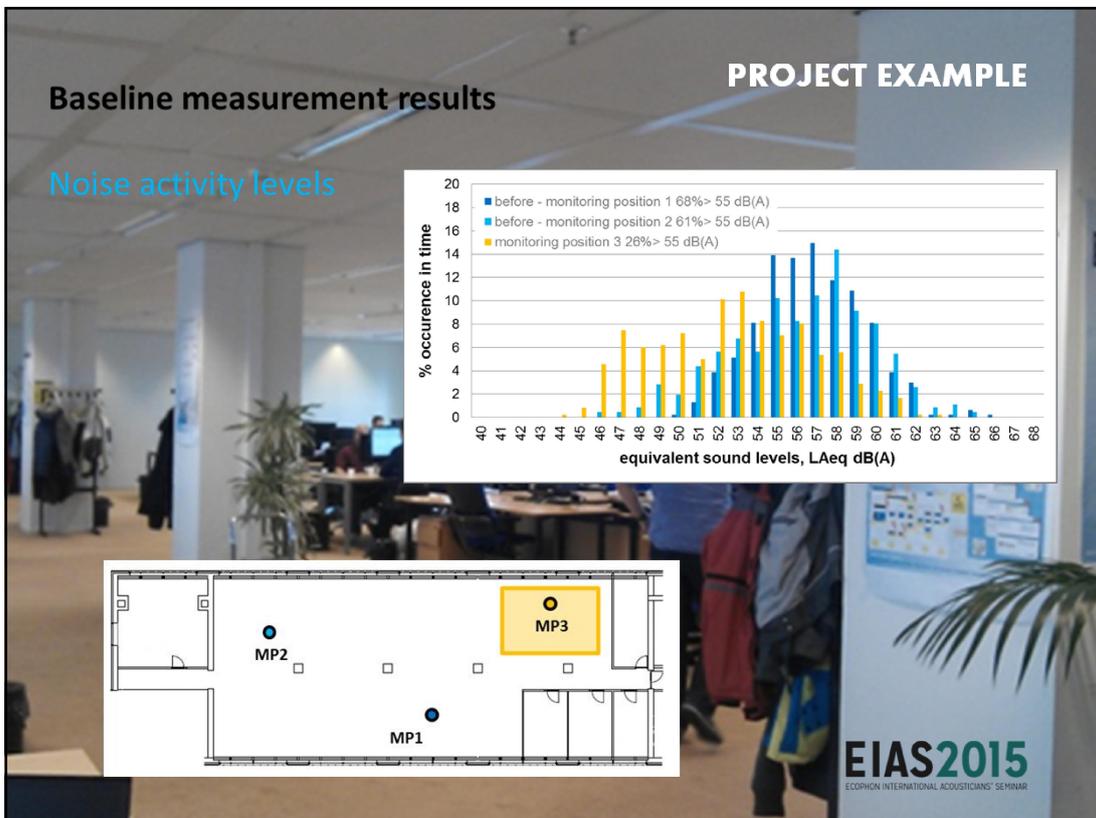
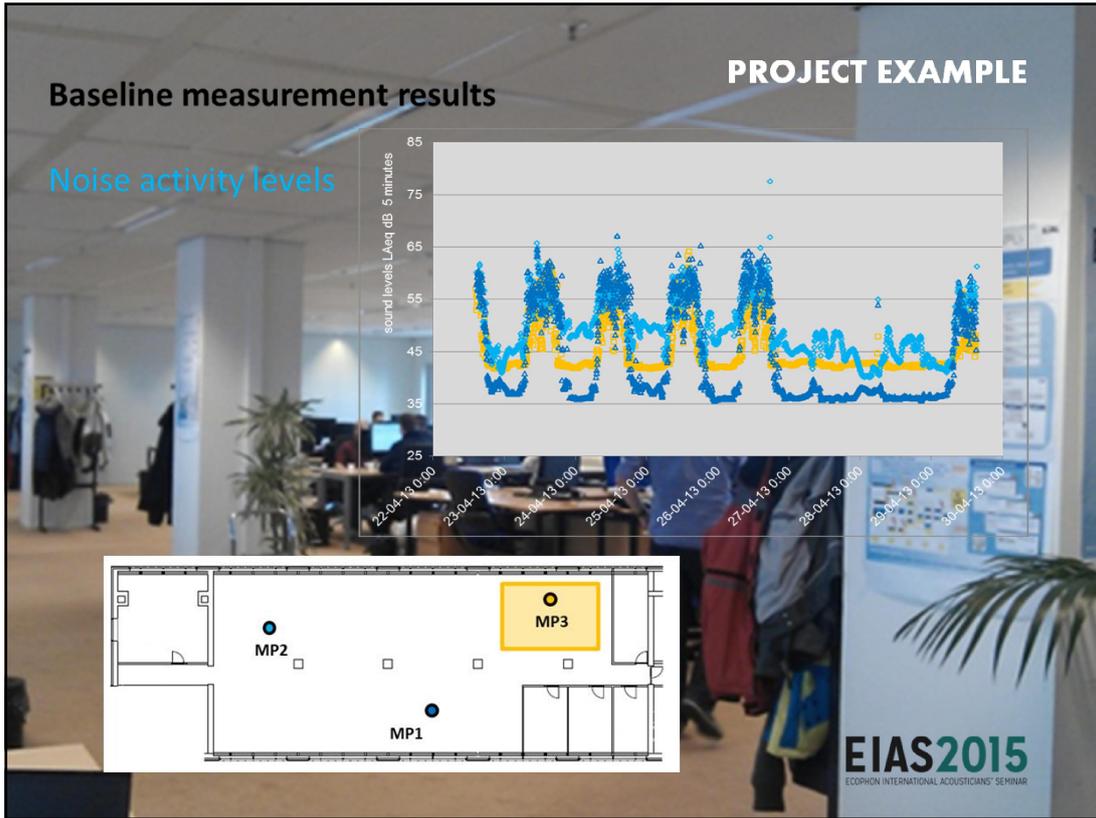
Acoustic parameter	results	
sound insulation $D_{nT,A}$ [dB]	29-36	walls (green notation)
	25-30	walls with doors (red notation)
Reverberation time T_{250-2k} [s]	0,5	open plan office
	0,3	meeting zone
	0,4-0,5	office cells
Spatial decay rate $D_{1,2,3}$ [dB]	5-6	open plan office
Background noise level $L_{n,A,R}$ [dB]	37-44	

INVESTIGATION APPROACH

BEHAVIOUR

Measurements Acoustical parameters:
Noise activity levels & interpretation

- $L_{eq,5min}$ in dB
- sound fragments

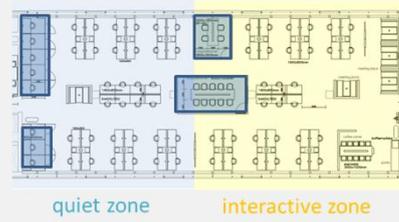


ENGINEERING

Engineering the new design

- activity based design
- zones
- closed rooms with high levels of sound insulation
- screens
- absorption

ACOUSTIC DESIGN



EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

PROJECT EXAMPLE

The image shows two acoustic simulation diagrams overlaid on a photograph of the office interior. The top diagram is titled 'DL2 [61098 rays (adapt), 774 ms]' and the bottom diagram is titled 'DL2 [61098 rays (adapt), 428 ms]'. Both diagrams show a color-coded map of the office space, with a color scale on the right indicating sound level in dB (0 to 15). The diagrams show the distribution of sound energy throughout the office, with a red circle highlighting a specific area in the bottom diagram. The text 'Middle region (d1=4,0m d2=30,0m) r.c. <= -0,7%' is visible in both diagrams. The text '0,00 (total 0,0) %' and 'no data' are also present.

EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

BUILDING

Control measurements

Room and building acoustics

D2S improved from 6 to 9 dB

QUALITY

EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

BEHAVIOUR

Control measurements

Noise activity levels

QUALITY

Measurement Point	Leq,5min in dB(A)	Concentration Qualification [%]
MP1 68% in time > 55 dB(A)	~58	68%
MP2 61% in time > 55 dB(A)	~56	61%
MP1 35% in time > 55 dB(A)	~52	35%
MP2 27% in time > 55 dB(A)	~51	27%
MP3 22% in time > 55 dB(A)	~50	22%

EIAS2015
ECOPHON INTERNATIONAL ACOUSTICIANS' SEMINAR

