

LONDON 2015



10th IOHA International  
Scientific Conference



# Differences in Control Banding health hazard categorization

And how to find the best performing  
scheme

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Geert Wieling

*The most comprehensive database of OEL's and measurement methods*

# Agenda



- About DOHSBase
- The control banding jungle
- Best performing hazard categorization
- The CB exposure concentration ranges

# About DOHSBase



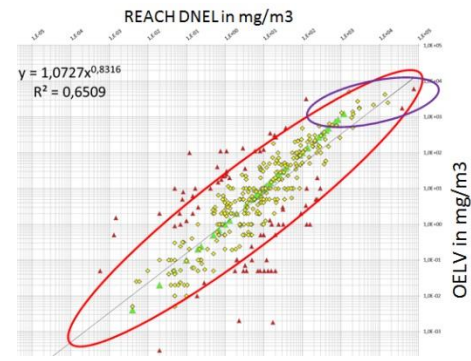
- Dutch Occupational Hygiene Society spinoff
- Started in 1995/ Int. 2010
- Offering extended info on physchem, **health hazard**, OELV and sampling methods
- 170.000 substances
- Hazard categorization is used in the DOHSBase Compare tool and in the Kick-off levels

# OH tools / Research / myth bursting



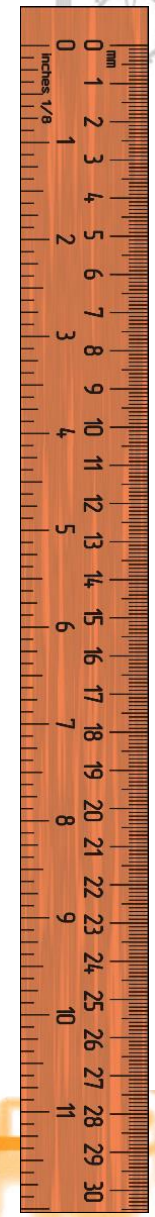
## Research and publications:

- DNEL vs OELV (BOHS/AIHCE 2014)
- Kick-off levels (next presentation)
- Performance of GHS /CLP hazard categorizations (this presentation)



# Control banding fundament: Categorical measuring-rod for health hazard

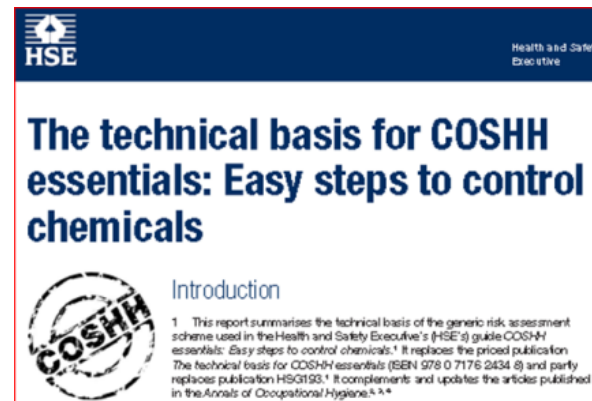
- 90ties: Bruce Naumann (Pharma)
- 1998: COSHH essentials
  - R-phrase 5 category health hazard grouping
- 2005 (Kick-off): 5 R-phrase CBs
- 2015: >>13 R-phases and H-statements CB's



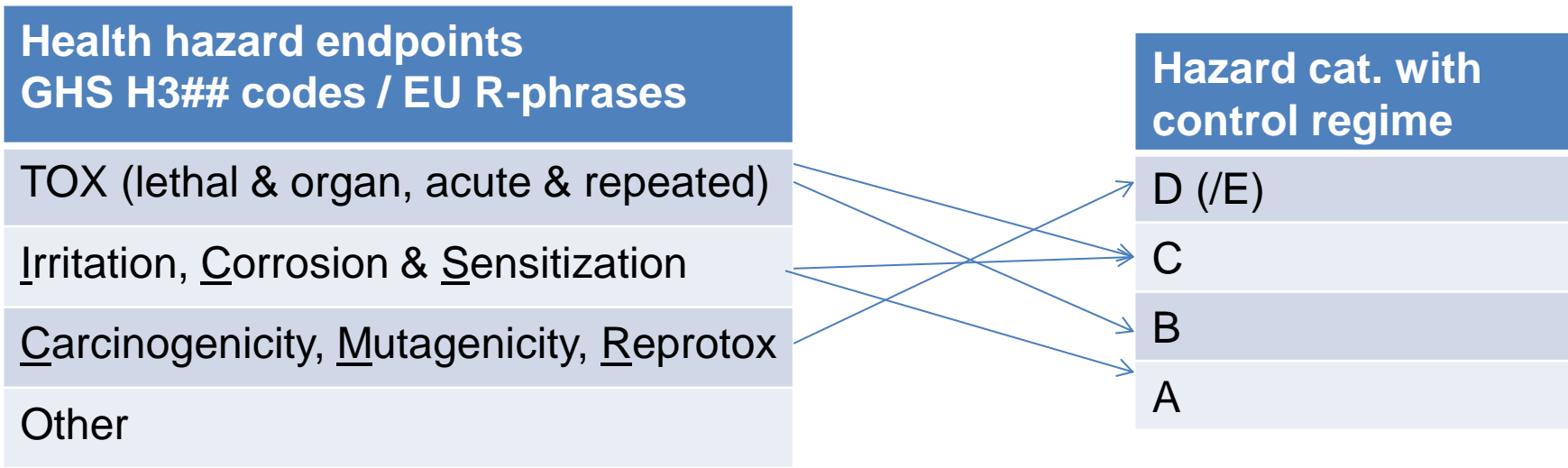



# Much discussed CB tools

- Einfaches Maßnahmenkonzept Gefahrstoffe (GE, Federal BAuA)
- COSHH essentials (UK, HSE)
- IFA GHS Spaltenmodell (GE, Assurance companies)



# health hazard categorization

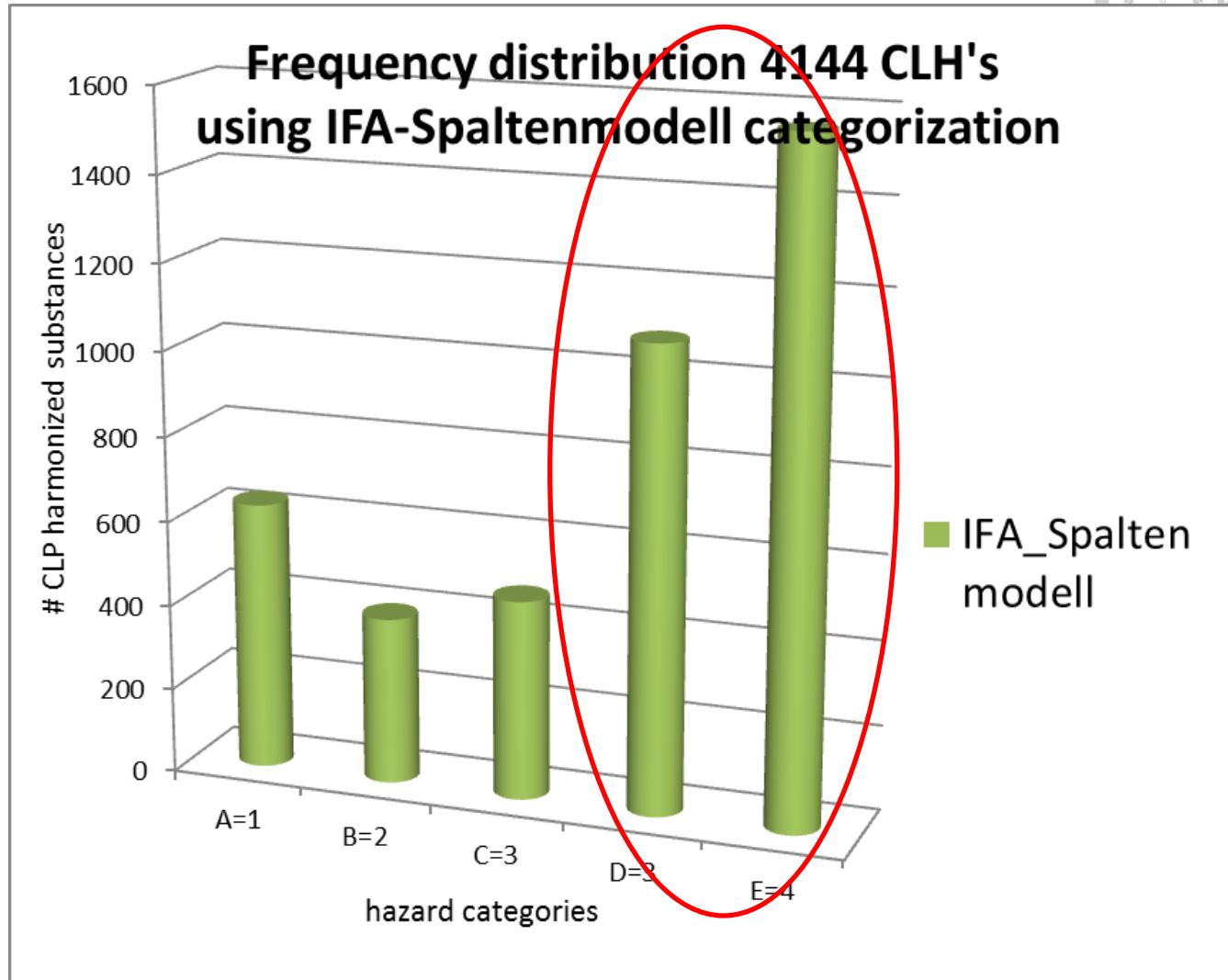


# differences in allocating H-statements

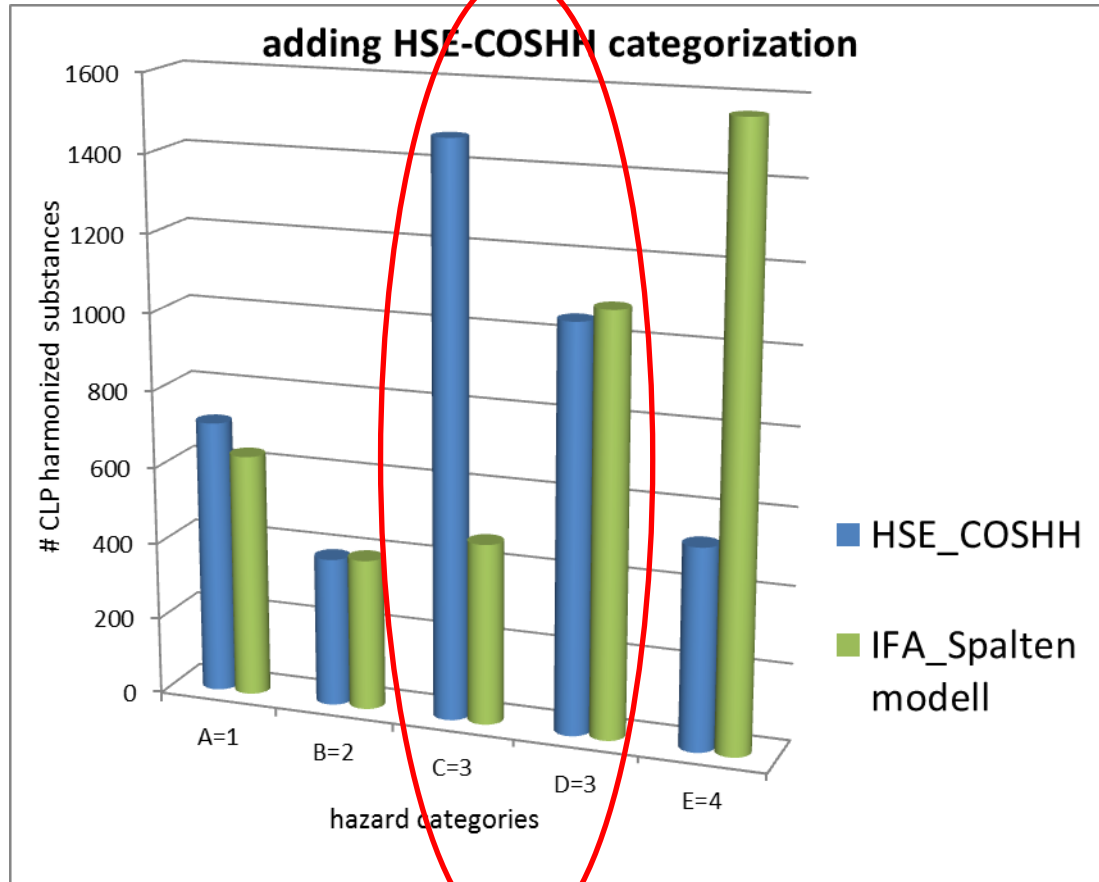
Hazard category	DGUV IFA Spaltenmodell	HSE COSHH Essentials	BAUA EMKG (Einfaches Maßnahmenkonzept) (inhalation)
5/E	H300, H310, H330, EU032 H340 (AGS Mut 1AB) H350, H350i (AGS K1/2 & TRGS 906)	H334, H340, H341, H350, H350i	H340, H350, H350i, H360F (TRGS 905 & 906)
4/D	H301, H311, H331 EUH070, EUH029, EUH031 H370, H317 (Sh), H334 (Sa), H318 H360 <sub>xy</sub> (AGS R <sub>EF</sub> 1/2) H351 (AGS K3), H341 (AGS M3), H372	H300, H310, H330 H351, H360 <sub>xy</sub> , H361, H362, H372	H300, H330, H360D, H372, EUH032
3/C	H302, H312, H332 H314 (pH ≥ 11,5, pH ≤ 2), H371, EUH071 H361 <sub>f/d</sub> , H373, H362 non-toxic gases which may cause asphyxiation	H301, H311, H331, H314, H317, H318, H335, H370, H373, EUH071	H301, H331, H314, H334, H341, H351, H361f/d, H370, H371, H373, EUH031 (TRGS 907)
2/B	H315, H319 damage to the skin during wet work H304, EUH066, H335, H336 Substances chronically harmful in other ways (no H-statement, but still hazardous)	H302, H312, H332 H371	H302, H332, H318
1/A	substances which experience shows to be harmless (e.g. water, sugar, paraffin etc.)	H303, H304, H305, H313, H315, H316, H319, H320, H333, H336, EUH066 and all H-numbers not otherwise listed	H319, H335, H336, H304 No health hazard H-statements



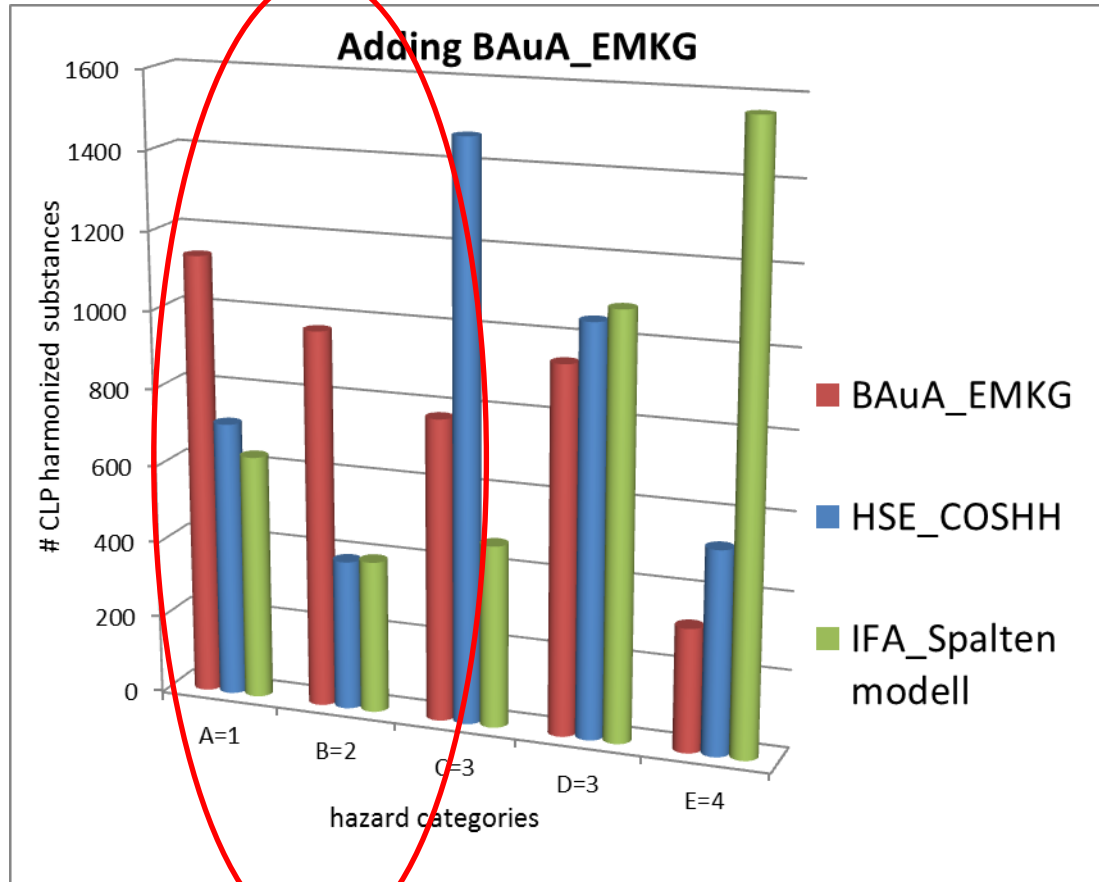
# IFA: 60% H3## in D & E



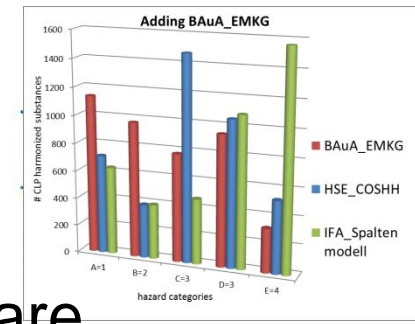
# COSHH 60% H3## in C & D



# EMKG: 70% H3## in A, B & C



# Explanation and consequences



Health hazard categorization in Control banding are

- subjective
- inconsistent

It may lead to (1) differences in hazard/risk level & control regimes (2) confusion in SME's (3) OH reputation damage

Damage control needed :

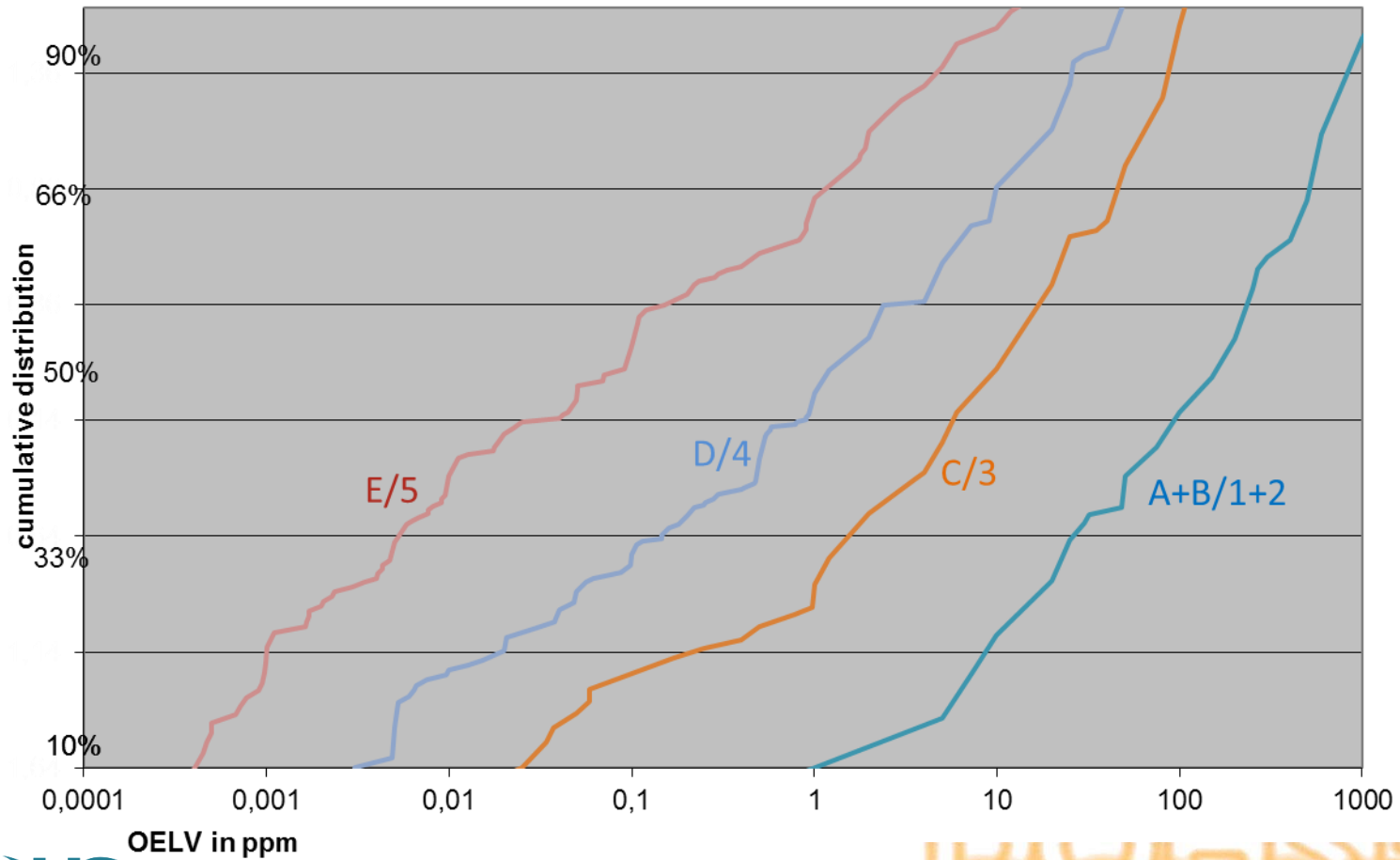
1. Back to traditional OELV compliance control ?
2. Limit to niche/region
3. "Improve" health hazard categorization.
4. Compare with external standard: relation between health hazard categorization and OELV distribution
  - Different schemes
  - health based only OELVs



# 4. relation between health hazard categorization and OELV

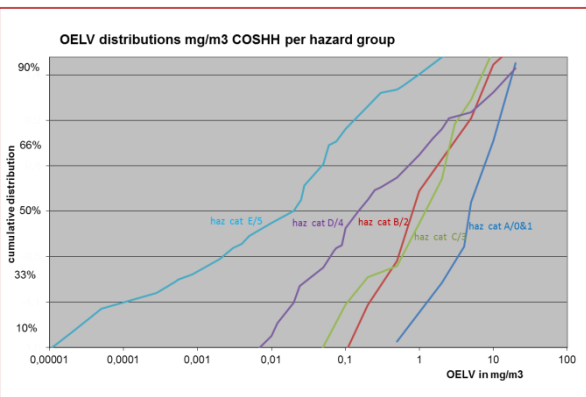
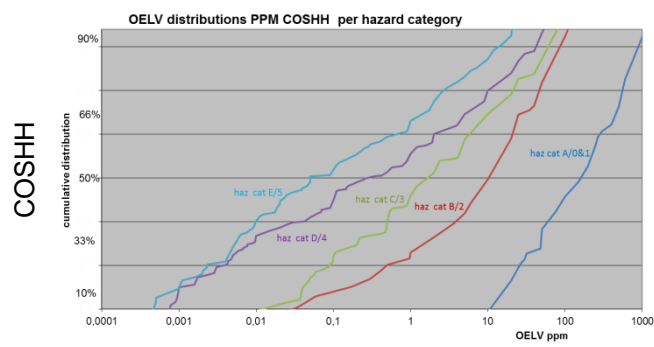
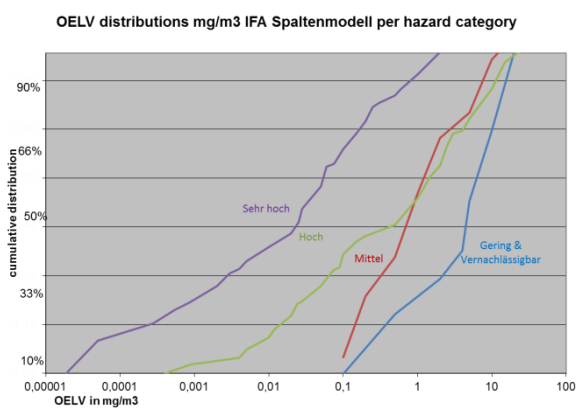
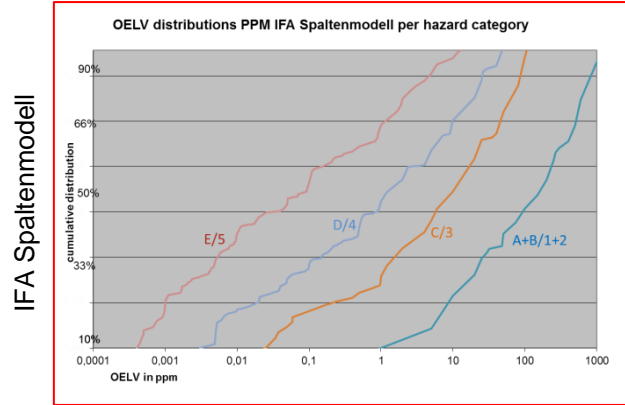
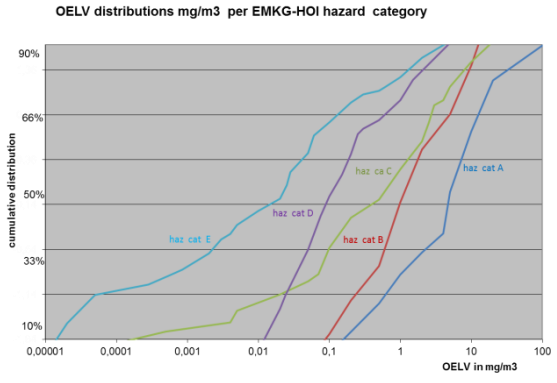
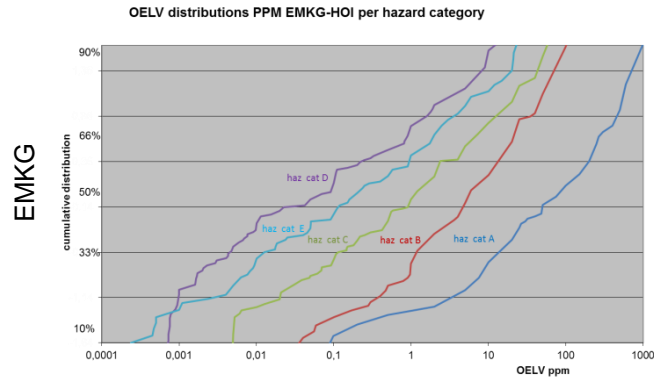


OELV distributions PPM IFA Spaltenmodell per hazard category



PPM

mg/m<sup>3</sup>





# OELV variance explained by health hazard categorization

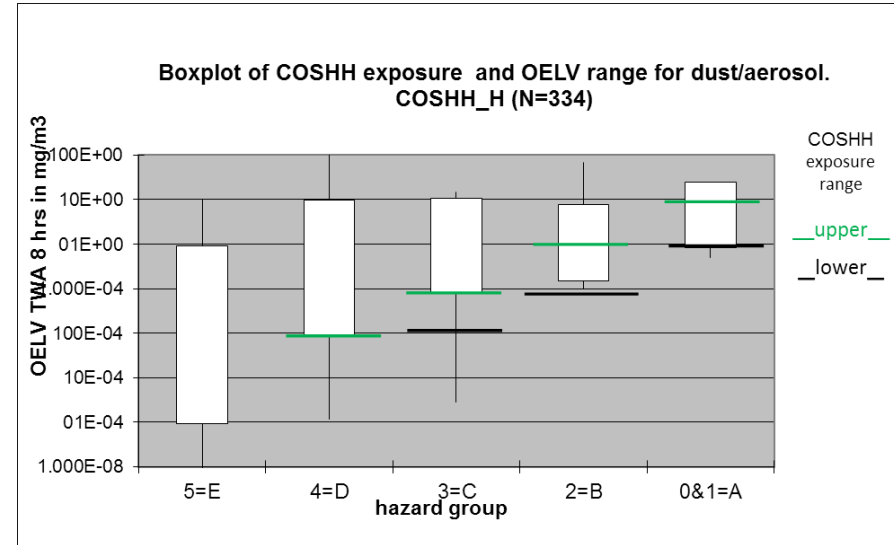
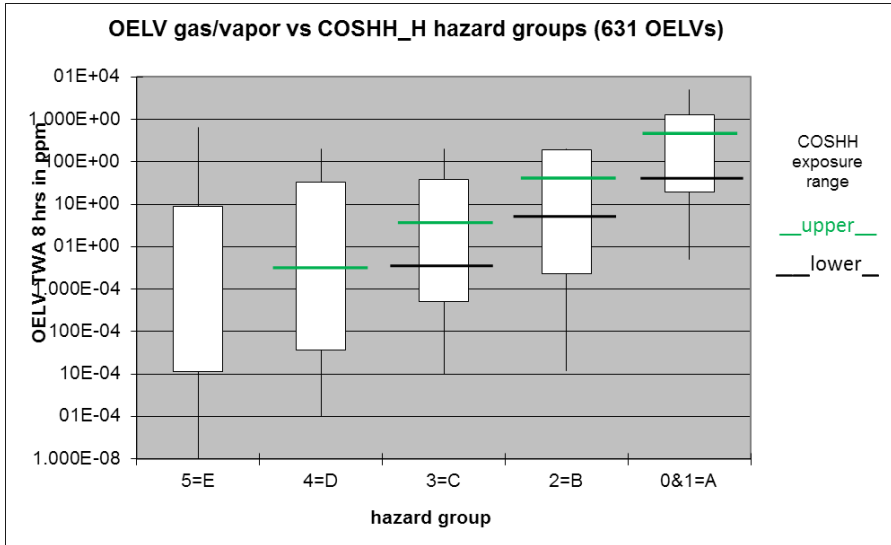


Physical state ->	VAPOUR/GAS N=631			DUST/AEROSOL N=338		
	EMKG	IFA	COSHH	EMKG	IFA	COSHH
distribution free ANOVA P(Kruskal-Wallis)	8E-45	4E-56	8E-47	6E-19	2E-22	3E-27
Var[log(OELV)] explained by categorization	0,29	0,40	0,33	0,27	0,25	0,35

The best health hazard categorization:

- IFA-spaltenmodell for vapour/gas
- COSHH for dust/aerosol

# Validity of Control band Concentration range



Current OELV concentration ranges are:

- Much broader than in the 90<sup>ties</sup>
- too optimistic for the vapour categories (combine B & C)
- Inadequate for dust categories C (should be combined with B)

# Recommendations and prophecy



- OH should enroll **ONE** UNIVERSAL health hazard categorization scheme (local/niche schemes allowed)
- Adjust current used CB concentration ranges
- Use ANOVA/goodness-of-fit, to select the “best performing” health hazard categorization from all existing schemes and experts suggested improvements
- Finding best performing health hazard categorization will improve CB, its concentration ranges and the derived Kick-off levels (presentation Geert)

*Align health hazard categorization !!  
Visit following presentations on Kick-off  
levels & Harmonization of OH tools*

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April 25th-30th 2015  
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