



# Exposure Control Efficacy Library (ECEL)

Development and Evaluation

Henk Goede





## Wat is ECEL?

- › MS Access database
  - brede scala van RMMs
  - kwantitatieve effectiviteitswaarden
  - inhalatoire blootstelling aan stoffen
  
- › Oorspronkelijk ontwikkeld voor modeleren
  - Stoffenmanager
  - Advanced REACH Tool (ART)
  
- › Data uit peer reviewed publications (2000-2007)
  - Occupational Hygiene journals
  - Literature search in PubMed



## Waarom ECEL?

- › Risk management Measures (RMM) belangrijk in REACH exposure scenarios
- › REACH geeft een impuls om effectiviteit van RMMs te evalueren
- › Weinig bronnen beschikbaar met een samenvatting van RMM effectiviteit
  - o.a. arbeidshygiënische interventiestudies



## Data input

- › 'Efficacy value' afgeleid als een multiplier (0,1 = 90% reductie)
  - voor- & na-meting
  - zonder RMM en met RMM
  - RMM versus verbeterde RMM... maar ook statistische analyse van observationele studies
  
- › Criteria ontwikkeld om data consequent in te voeren, bijv.
  - afleiding efficacy value (bijv. voorkeur prioriteit regressie coefficient, GM, ...)
  - invoer van 'single' of 'multiple' RMMs mogelijk per studie (bijv. per stof, per RMM, etc)
  - adequate contextual informatie beschikbaar (study design, measurement strategy, number of measurements, etc.)



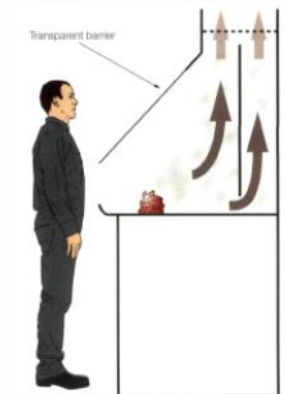
# Classificatie systeem van RMMs

- › Link met Advanced REACH Tool (ART)

Bijvoorbeeld....

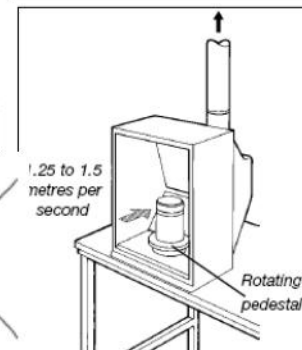
## › Local ventilation systems

- › Receiving hoods
  - › Canopy hoods
  - › Other receiving hoods
- › Capturing hoods
  - › Fixed
  - › Movable
  - › On-tool extraction
- › Enclosing hoods
  - › Horizontal / downward laminar flow booth
  - › Fume cupboard
  - › Other enclosing hoods
- › Other LEV systems
  - › Glove bags & glove boxes



## Suppression techniques

- › Wetting at the point of release
- › Knockdown suppression (post generation suppression)





# Overzicht van data

- Fransman et al, 2008 -

RMM	Studies	Efficacy values per study type			Total
		Cross-sectional studies	Experimental studies	Intervention studies	
Enclosure	5	14	0	0	14
LEV	50	75	88	117	280
Specialized ventilation	7	1	1	12	14
General ventilation	7	27	0	15	42
Suppression techniques	19	12	27	30	69
Separation of worker	2	11	0	3	14
<b>Total</b>	<b>90</b>	<b>140</b>	<b>116</b>	<b>177</b>	<b>433</b>



# Analyse van data (1)

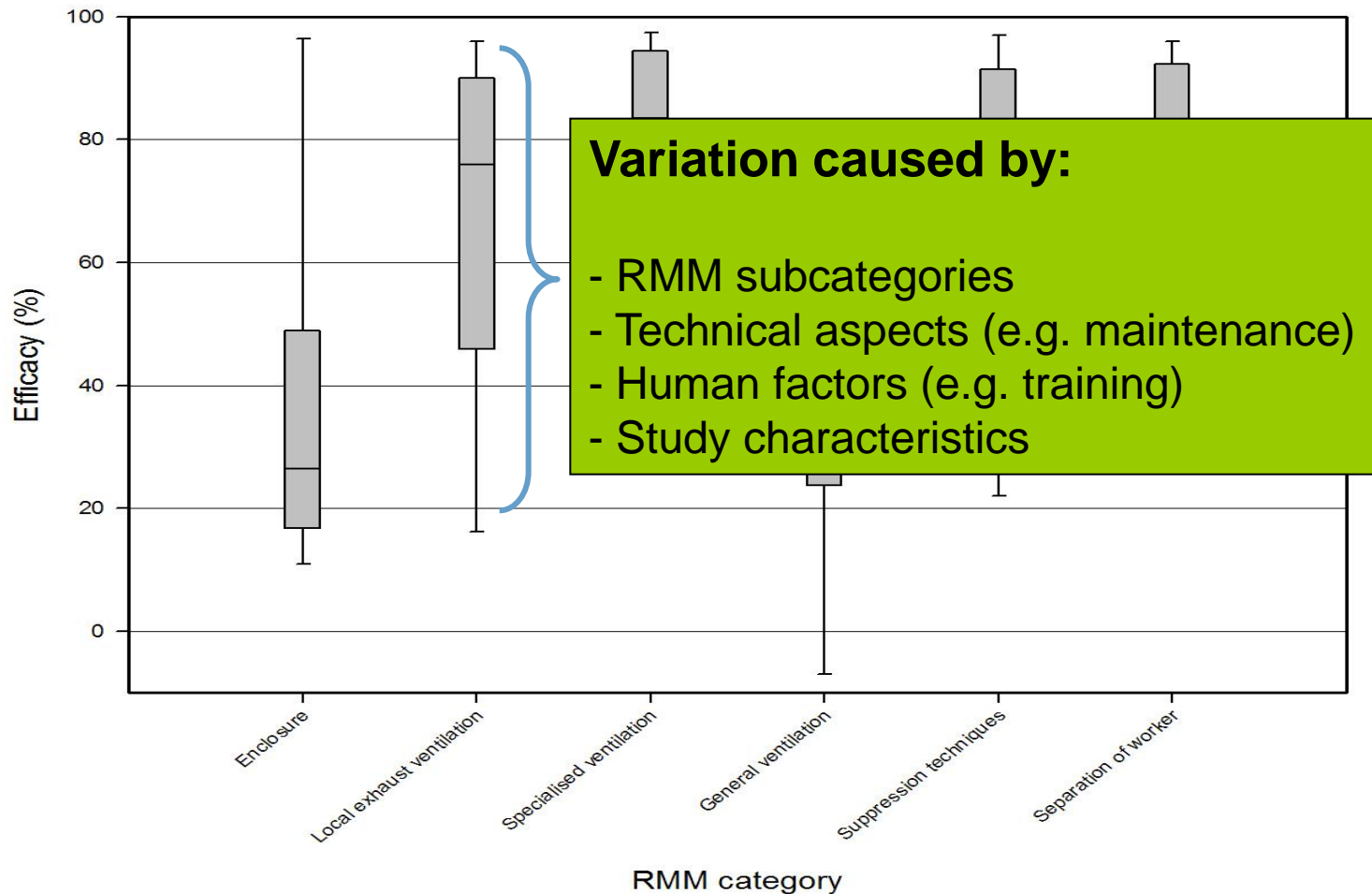
## - Fransman et al, 2008 -

	N	Estimated effectiveness	95% confidence interval
<b>Overall</b>	433	79%	76% - 82%
<i>Study design</i>			
‣ Cross-sectional	140	63%	53% - 70%
‣ Experimental	116	88%	85% - 90%
‣ Intervention	177	80%	76% - 84%
<i>Sampling strategy</i>			
‣ Shift-based	160	65%	57% - 71%
‣ Task-based / short term	273	84%	82% - 87%
<i>Measurement type</i>			
‣ Personal	301	78%	74% - 82%
‣ Stationary	132	80%	75% - 85%



## Analyse van data (2)

- Fransman et al, 2008 -

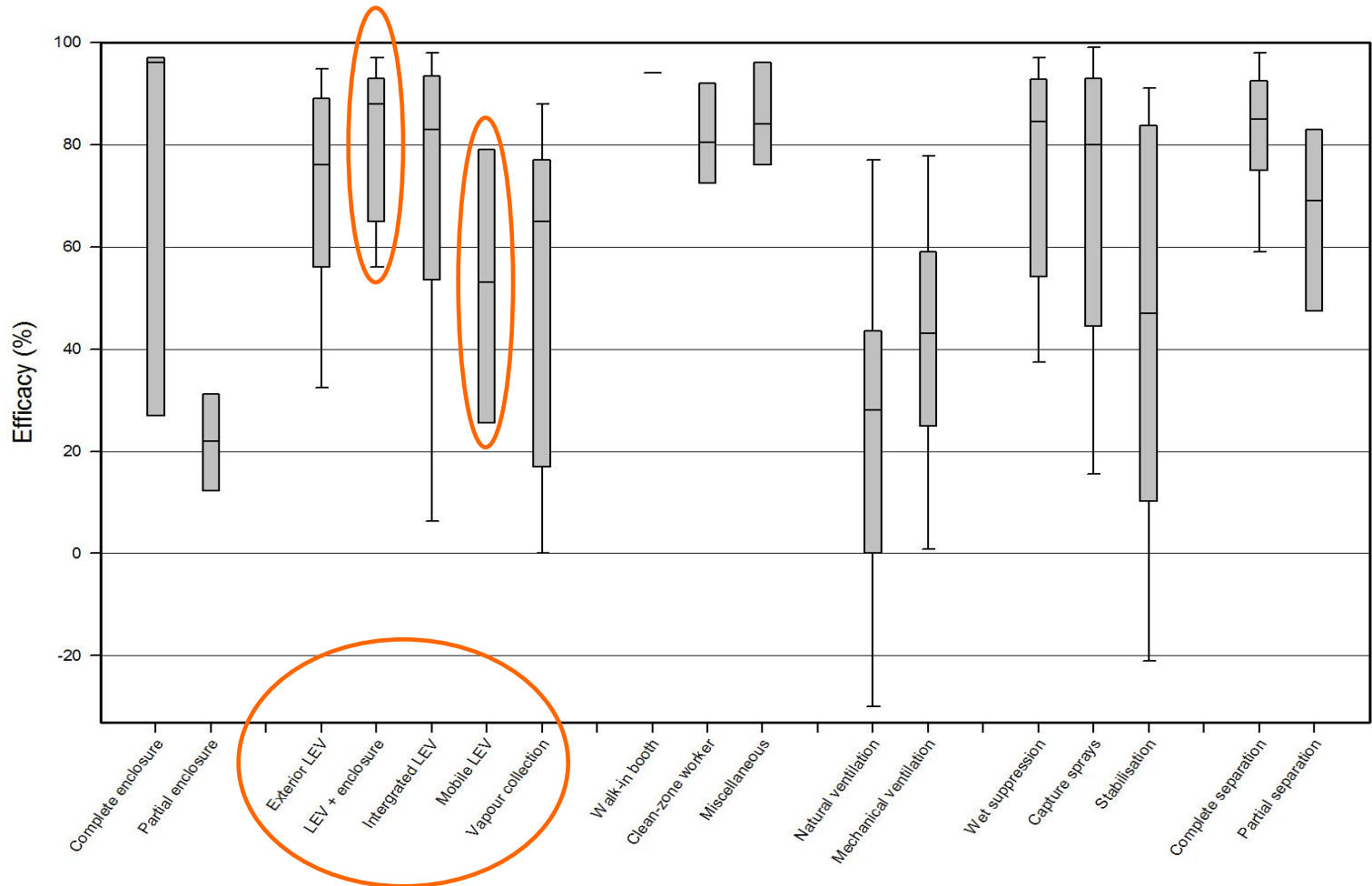






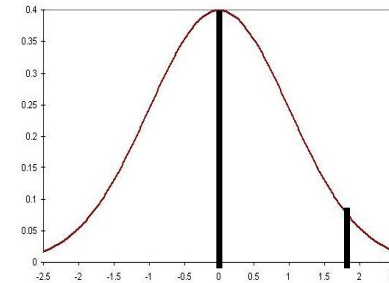
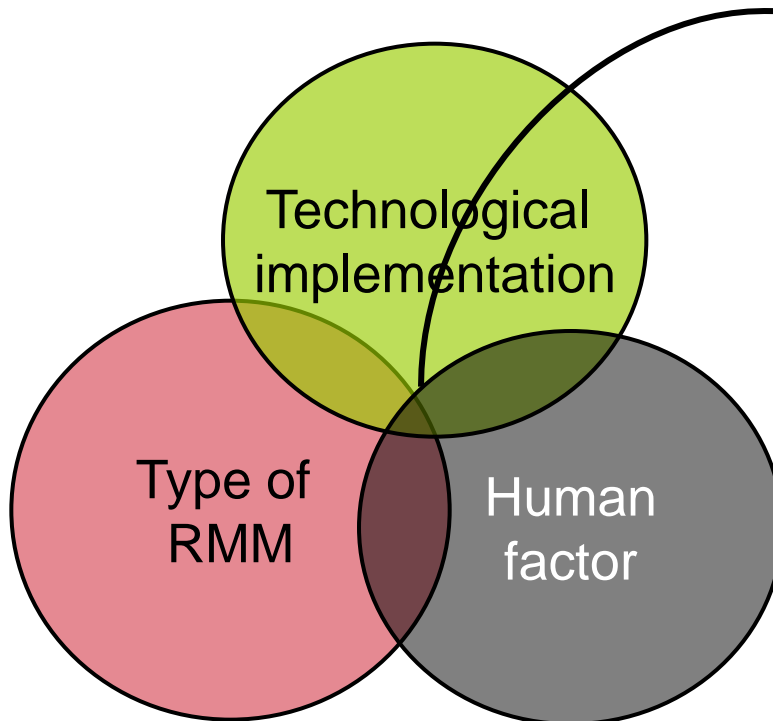
# Analyse van data (3)

- Fransman et al, 2008 -





## Typical versus optimal effectiveness RMM



**Typical default value (50<sup>th</sup> perc.)**

**Maximum achievable value**



# Web-based versie 2011/2012

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HOME BACKGROUND

## Exposure Control Efficacy Library

Industry: - Substance: inhalable dust | 2 |  
Group: Local ventilation systems -Capturing hoods Control: On-tool extraction  
Task: - Exposure Route: -  
Study: - Optimisation: -

industry	risk management strategy	task	study	exp. route	substance	efficacy
Aircraft surface industry	Local ventilation systems -Capturing hoods On-tool extraction	Handheld sanding	Experimental study	Inhalation	inhalable dust	0.9
Aircraft surface industry	Local ventilation systems -Capturing hoods On-tool extraction	Handheld sanding	Experimental study	Inhalation	inhalable dust	0.07
Aircraft surface industry	Local ventilation systems -Capturing hoods On-tool extraction	Handheld sanding	Experimental study	Inhalation	inhalable dust	0.02
Brick and cement masonries	Local ventilation systems -Capturing hoods On-tool extraction	Block cutting	Intervention	Inhalation	inhalable dust	1.04
Brick and cement masonries	Local ventilation systems -Capturing hoods On-tool extraction	Surface grinding	Intervention	Inhalation	inhalable dust	0.71
Brick and cement masonries	Local ventilation systems -Capturing hoods On-tool extraction	Tuck point grinding	Intervention	Inhalation	inhalable dust	0.13
Brick and cement masonries	Local ventilation systems -Capturing hoods On-tool extraction	Tuck point grinding	Intervention	Inhalation	inhalable dust	0.28
Brick and cement masonries	Local ventilation systems -Capturing hoods On-tool extraction	Tuck point grinding	Intervention	Inhalation	inhalable dust	0.46
Brick and cement masonries	Local ventilation systems -Capturing hoods On-tool extraction	Surface grinding	Intervention	Inhalation	inhalable dust	0.07
Composite material and fiberglass repair on military aircrafts	Local ventilation systems -Capturing hoods On-tool extraction	Sanding of aircraft parts	Experimental study	Inhalation	inhalable dust	0.16

12 ≥  
Results found: 17

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**EXPOSURE CONTROL EFFICACY LIBRARY CARD**

<b>Reference</b>		Croteau et. al. 2002	
Industry		Brick and cement masonries	Substance
Task description		Block cutting	inhalable dust
Activity Emission Potential			Analytical method
Exposure route		Inhalation	Type of exposure
Measure type		Personal	NF
Exposure form		Dust particulate	Shift or task measurement
			Task
			Intervention
<b>Risk management strategy</b>			
Local ventilation systems -Capturing hoods			On-tool extraction
<b>Situation before</b>			<b>Situation after</b>
Block cutting with high ventilation (75 cfm)			Block cutting without ventilation
N= 1	Exposure 2.35 mg/m3		N= 1
			Exposure 2.44 mg/m3
<b>Efficacy value</b>		1.04	Measure of tendency
Statistical analysis		(Mixed effect) Regression analysis	Statistical significance
			P value > 0,1
<b>Remarks</b>			
A study assessed the effectiveness of commercially available local exhaust ventilation (LEV) systems for controlling respirable dust and crystalline silica exposures during concrete cutting and grinding activities. Exposure levels were compared for no ventilation, low ventilation (30 cfm) and high ventilation (75 cfm). Location is a tent of 6,1m X 9,1m (149,2m3) with one side open and an airflow rate of 12,2 m/min.			



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## Conclusies

- › ECEL is een aanzet om RMM data te bundelen voor
  - onderzoekers
  - praktijk
  
- › Web-based ECEL geeft waardevolle informatie over RMMs en effectiviteiten voor specifieke situaties
  - vinden van juiste informatie ligt bij gebruiker
  
- › Toekomstige 'meta-analysis' van ECEL data kan zinvol zijn en kosten-effectief voor implementatie van RMMs



## Huidige & toekomstige ontwikkelingen

- › Lancering van web-based ECEL begin 2012
  
- › Meer data nodig...
  - update gepubliceerde data (2006-2011)
  - focus ook op 'grey literature' en ongepubliceerde data
  - experimentele data van leveranciers (....?)
  - samenwerking met (externe / internationale) partners
  
- › Future prospects
  - dermal exposure data
  - nano exposure data
  - 'optimisation' data (e.g. improved conditions of use / human factor / worker behaviour)



## Meer informatie.....

[www.ecellibrary.com](http://www.ecellibrary.com)

(lancering pas begin 2012)

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## Development and Evaluation of an Exposure Control Efficacy Library (ECEL)

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