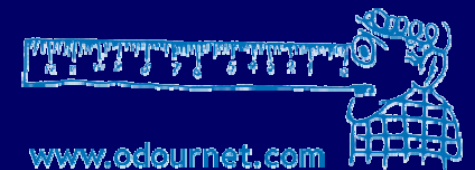


# European perspective on developments in odour

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# Subjects

- Practical considerations on application of e-nose technology
- Standardisation of field assessment methods on the European CEN level
- Reflections on the issue of detection and recognition threshold in field conditions

# Applications of e-nose

- Very little technical development, let alone breakthroughs, on the technical level: sensors, sensor sensitivity

# E-nose economic considerations

- Cost remains high. 30-40k€ for equipment, same again for training the software (40-50 olfactometry tests required). Some maintenance, calibration, data interpretation.  
Total for 3 years monitoring: 100 - 120 k€
- That puts the statement that it would be an economical alternative for olfactometry into perspective
- Equates approx 200-300 odour samples equivalent, including sampling etc.

# E-nose for emissions estimates in composting

- Fugitive emissions not very well characterised with fenceline or close to source e-nose locations (e.g. Odowatch)
- Probably emission rate variations of process are within factor 2-3
- Peaks are easily identified in process status (turning, tunnel loading, sludge discharge, open door)

# E-nose versus investment in better modelling

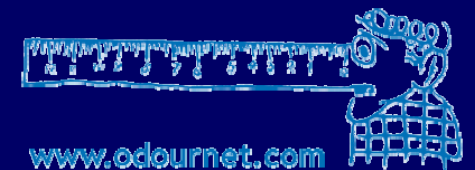
- Variations in exposure due to meteorological conditions >> factor 3!
- Investment in higher quality modelling and an on site high quality met station is probably a better investment, in terms of data improvement/dollar

# E-nose prospects

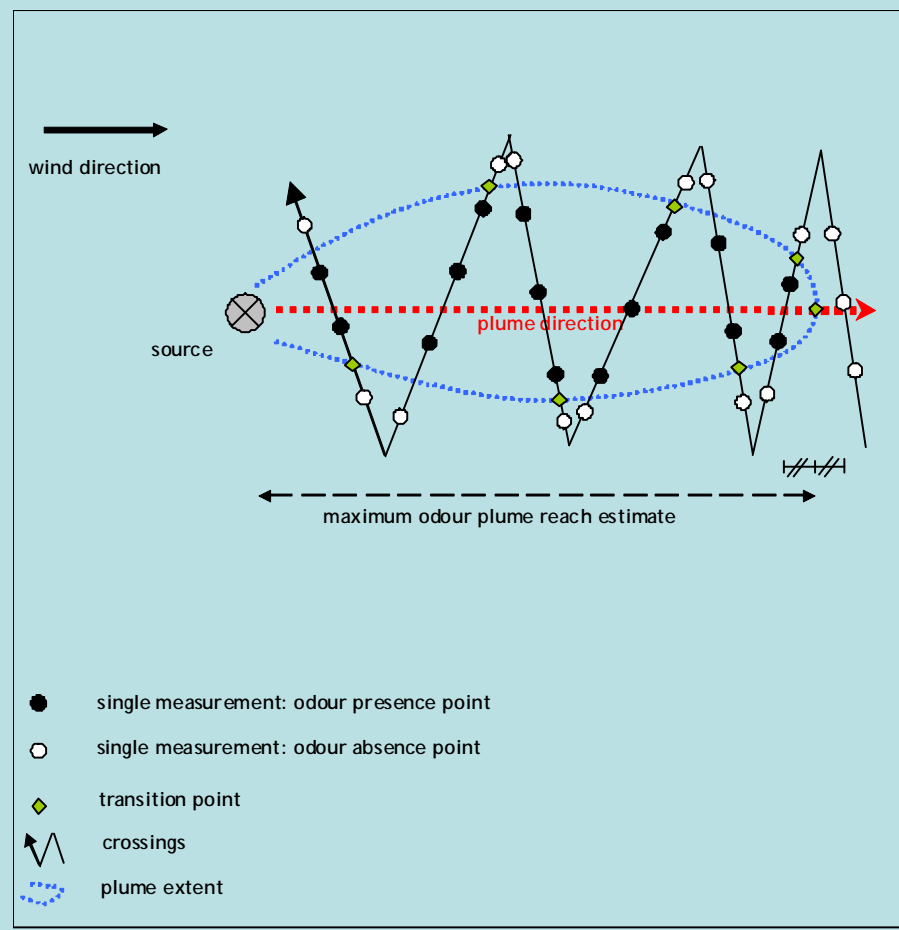
- E-nose remains an interesting technique for process and product control applications
- E-nose for ambient odour measurement or odour control monitoring still not viable for technical AND economical reasons. R&D breakthrough required!
- Application for environmental odours will remain relatively low level, and mainly as public relations tool

# CEN/TC264 'Air Quality' /WG7 odour assessment using field panels

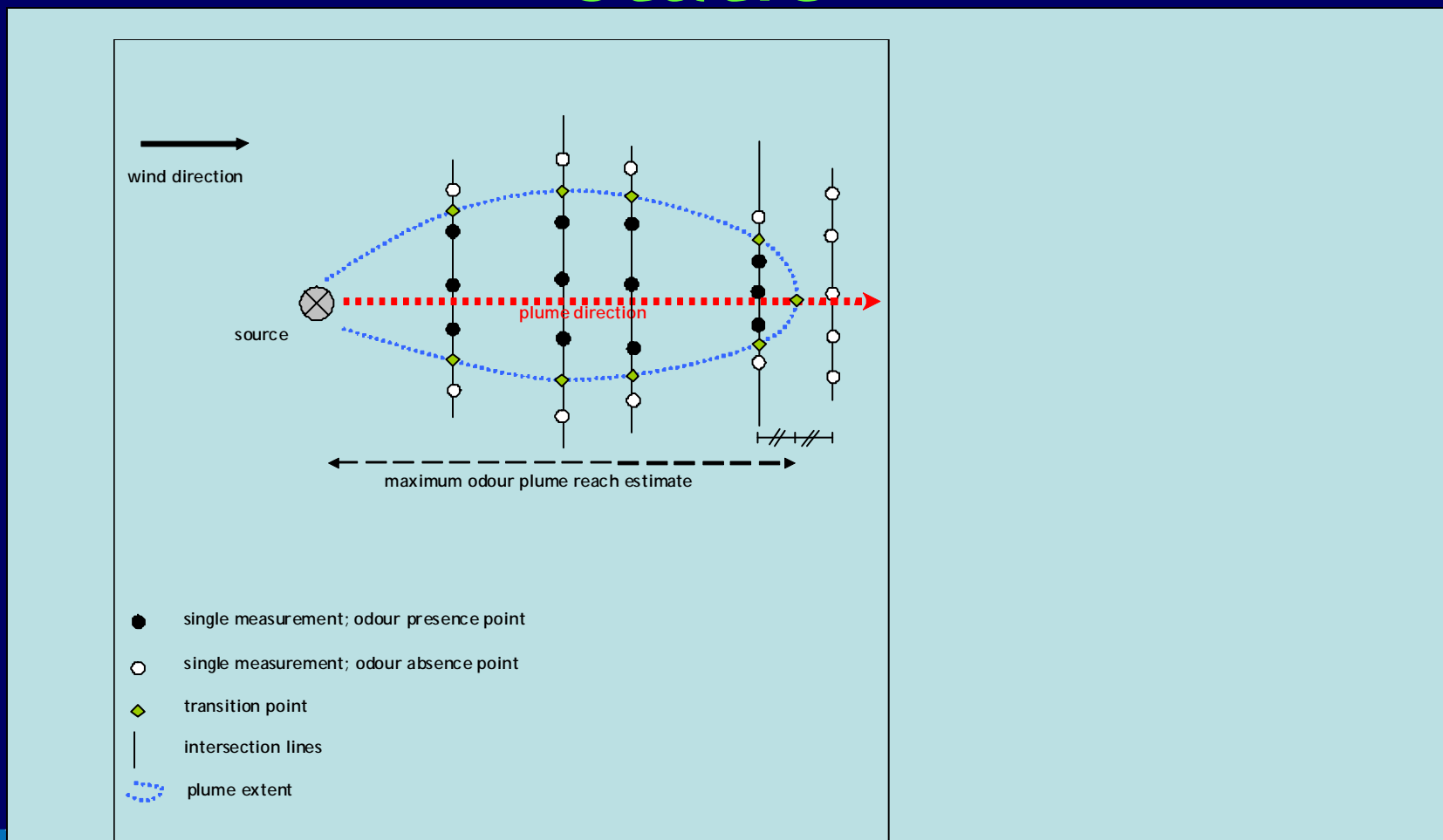
- Working group active since 2006
- Dr Werner Kost is the convenor
- 10+ Members from EU countries
- Scope: include both
  - Grid measurement similar to VDI3940
  - Plume extent measurement, as practiced in Belgium and the Netherlands and also in VDI3940 (Germany)



# Two modes of plume extent measurement: dynamic & static



# Plume extent measurement: static



# Field panels

- Reverse modelling not included in scope
- Good progress on plume extent method
- Format for the standard is not yet finalized: two parts or one standard

# Field panels: issues to resolve

- Panel selection and training needs
- Panel size. Probably 2 or more for plume method, dynamic variant
- Validation and quality requirements
- How to deal with non-uniform distribution of wind speed and direction (Mediterranean conditions)

# Reflections on the issue of detection and recognition threshold in field conditions

- A method for determining recognition in the field for a substance provides a good starting point (Dutch Institute for Public Health publication 2008, for accidental release response purposes)

# Recognition ambient odour

- BUT this approach is perhaps too rigid a methodologically to describe the phenomenon of odour recognition in the field
- Test conditions for intensity curve and recognition do not take into account modulation of perception and appraisal by the sensory context and cognitive status of the observer

# Example: hearing test

- [video\hearingloss.html](http://video\hearingloss.html)
- Single, discreet constant stimulus strength levels
- Full attention of the assessor: sensory context minimised
- Cognitive conditioning geared to maximum focus on detection

# Mind experiment: visual odour



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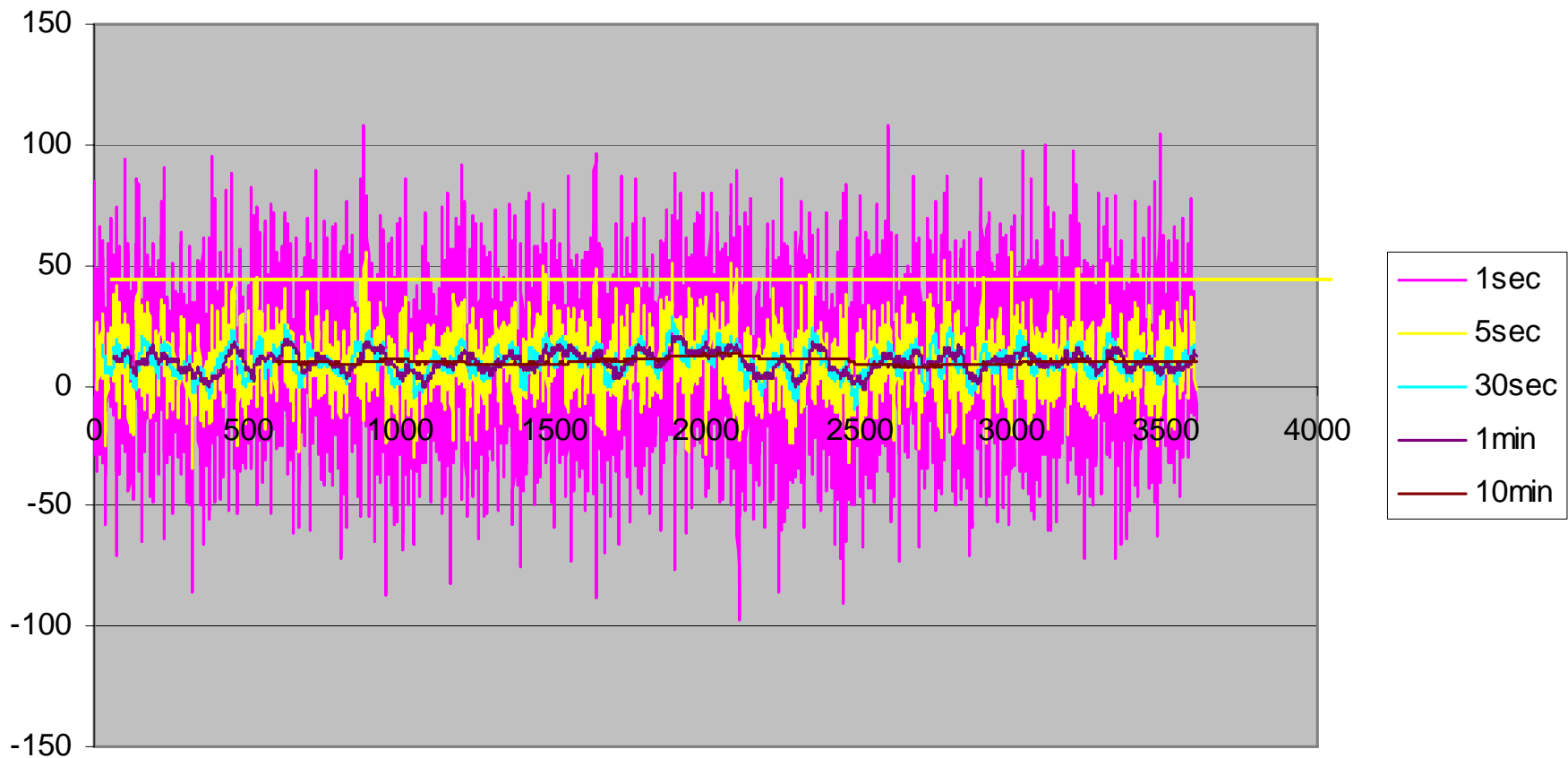
[www.odournet.com](http://www.odournet.com)

# In the field

- Relatively infrequent events are relevant
- 10% positive recognition in VDI3940 yields 'odour hour', or significant cognitive presence of odour
- Panel members are cognitively conditioned to focus on smell, not context
- Texture of data suggests <10% odour hours OK

# Peak to mean simulation: between 1 and 5 sec is relevant!

Peak to mean, simulated from 1s data, mean = 10, std = 30



# My guesstimate

- For panel members, focussed and hence cognitively conditioned: recognition at 5 second peaks of  $5 - 10 \text{ ou}_E/\text{m}^3$
- For not cognitively conditioned subjects in normal sensorial context:  $10 - 100 \text{ ou}_E/\text{m}^3$

# BUT!

- Sensitive individuals who are negatively conditioned to a malodour and suffer nuisance: similar to panel members
- In other words: they are alerted to single out this 'voice' from the 'crowd'
- And will suffer a negative appraisal as soon as they can identify their perception, and hence give it *meaning*

# Implications

- We can allow a fair margin of uncertainty, as we should be considering Decismells instead of odour units
- The variation in the field is such that the observation by panel members is more probablistic (short peaks well above threshold) than a gentle undulation of concentration
- Intensity is less relevant than the ability to identify with a certain frequency, for the 'at risk' population (negative cognitive 'mindset')

# Pink Floyd: Stay



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