

trust those

“

SCIENTISTS

”

of you





photo: Io Cooman, Volkskrant

“samen meten” is zweten: burgeronkunde, boerenonwijsheid en bestuursonkunde

together we measure applied citizen wisdom unwisely ignored



- ▶ **examples of ignored air quality results**
- ▶ **situation: agricultural region in Holland**
 - ➔ **local citizens**
 - ➔ **local government**
 - ➔ **local bio-industry**
 - ➔ **local (heavy) traffic**

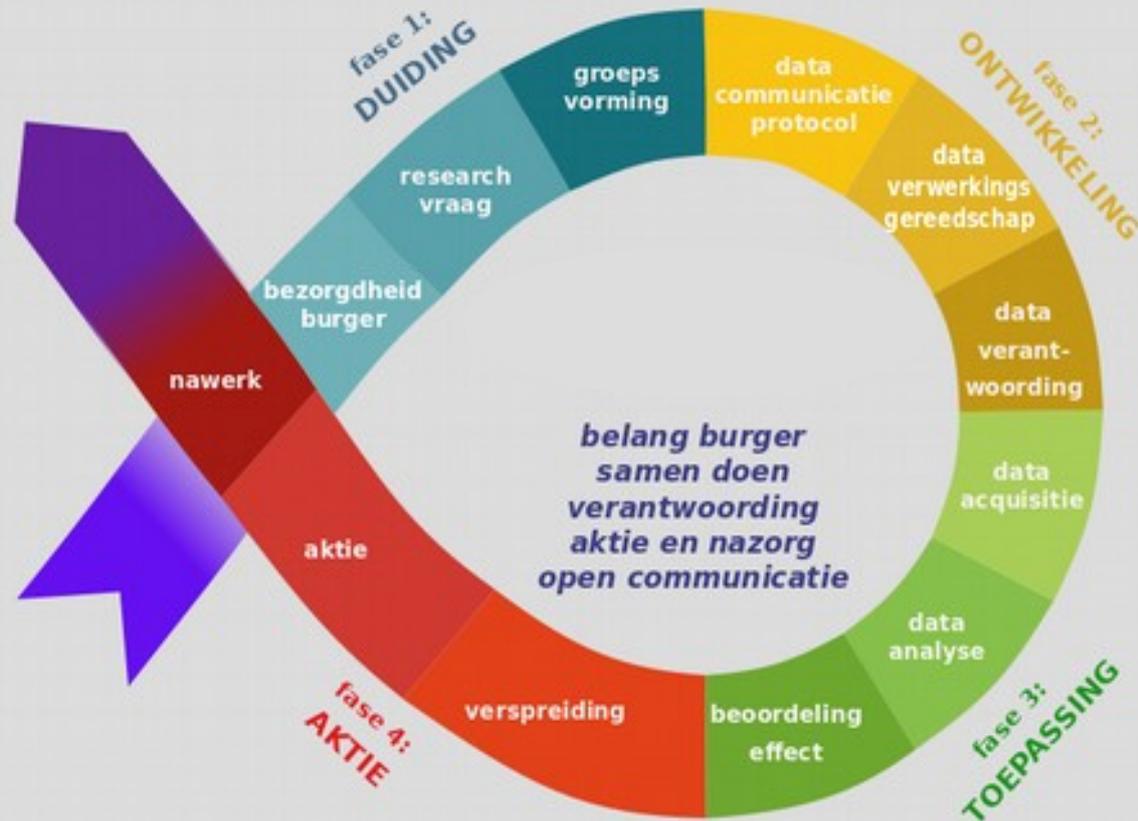
teus hagen

email: mysense@theunis.org

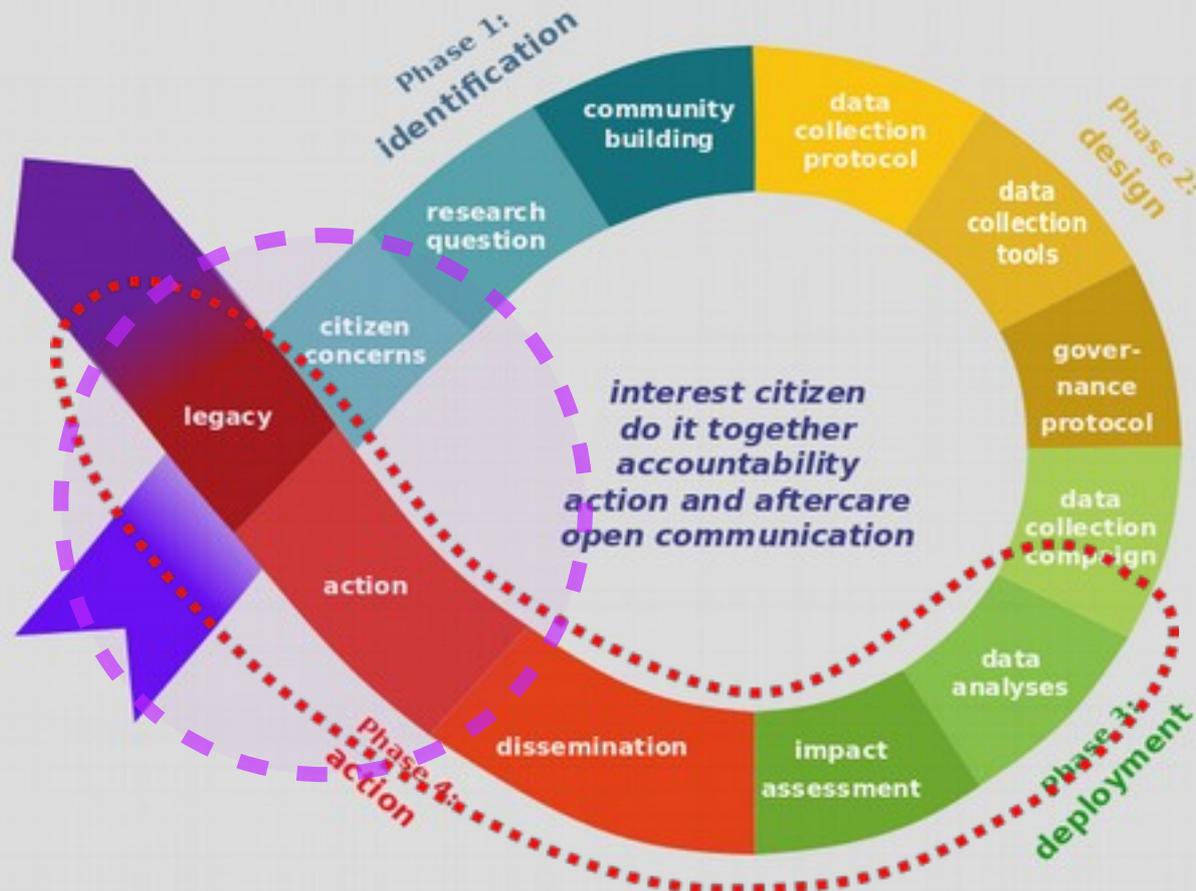


vereniging Behoud de Parel
<http://behouddeparel.nl>

CitieS-Health framework for citizen science



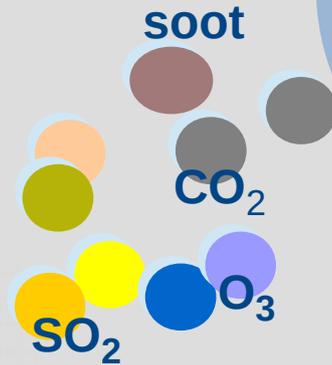
CitieS-Health framework for citizen science



rural region:

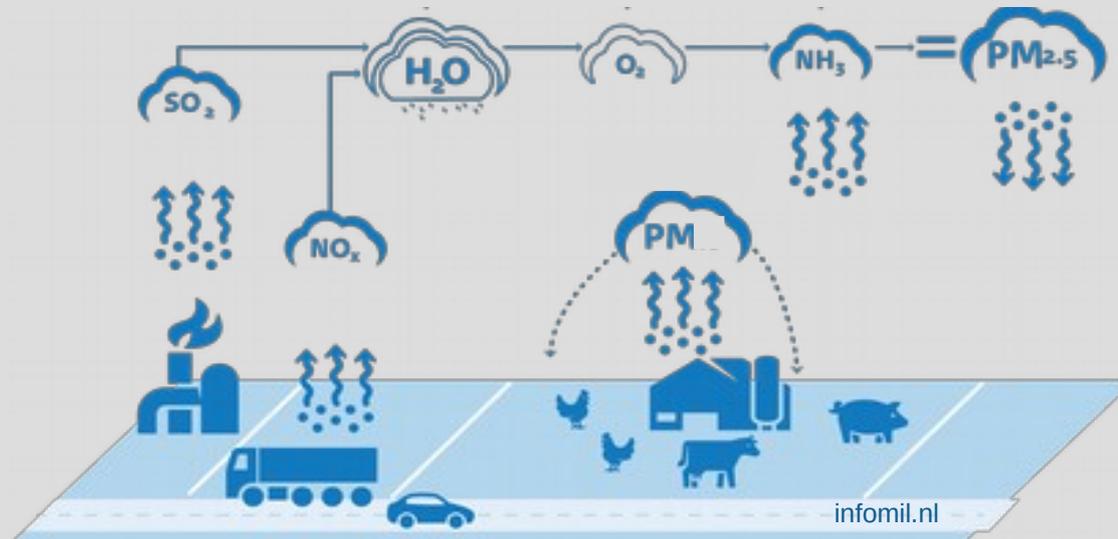
bio-industry, heavy traffic, wood burning

south-east Brabant
north Limburg



the Dutch 'Clean Air Agreement' Schone Lucht Akkoord (SLA)

air quality improved to WHO '2021 limits' in 2030



infomil.nl

- ★ started Januar 2020: 50% better clean air as in 2016, most municipalities signed
- ♦ one should have implementation plan defined by 1st March 2022
- ♦ one should complete executive plans before 1st March 2023
- ★ execution plan should start by 1st July 2023 - Environmental and Planning Act

Hollandse Luchten

e.g. Tata Steel region



- ★ **goal:** technology driven
data handling, measurement system, exchange knowledge
- ◆ **questions to answer:**
air quality measurement network, data analysis
- ◆ **evaluation:** is it usable and is it used?
- ◆ **reasoning:** together improve insight of pollution problem
- ◆ **advice:** define a vision expectation,
use simple language, relates to SLA

from: report Project Hollandse Luchten, August 2020



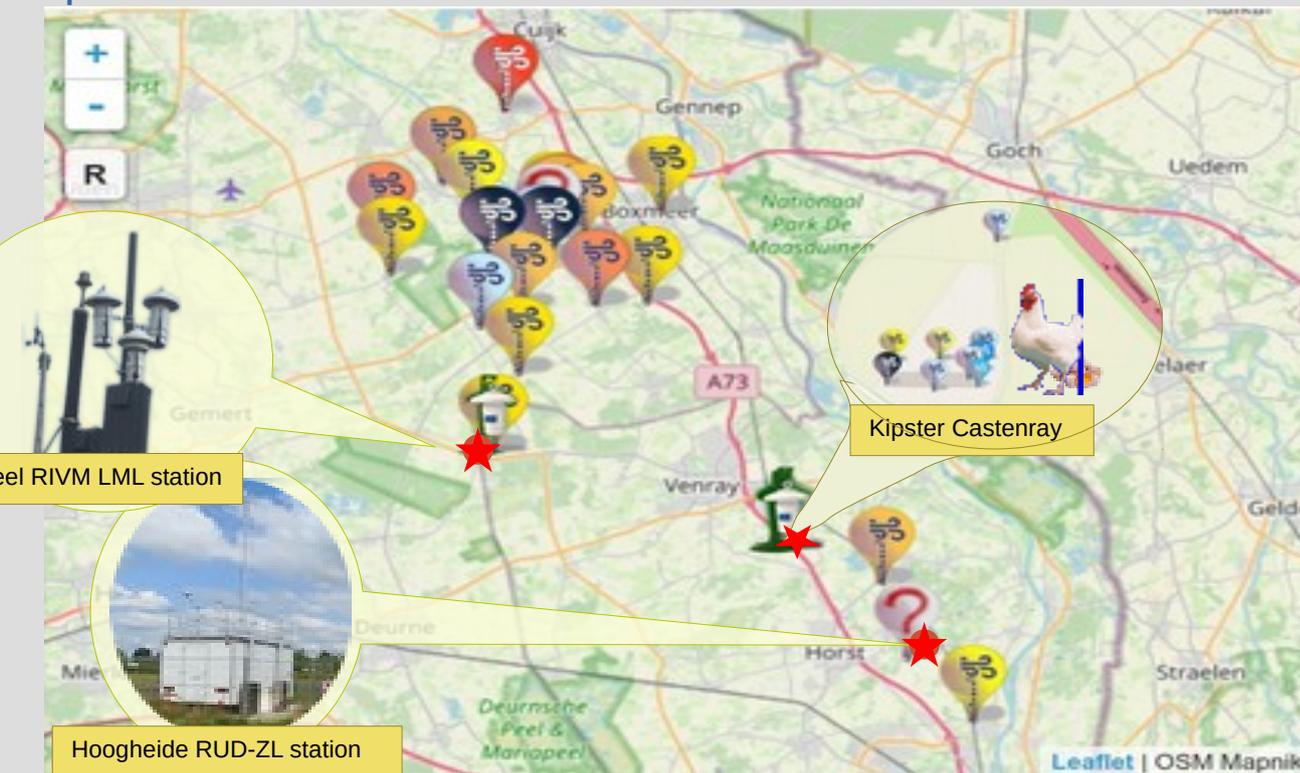
for detailed info see: notitie '3 jaar meten in agrarisch gebied. Wat nu?'

what we measure:

PM mass and particles, RH, temperature,
air pressure, 'VOC', GPS, battery level

rural municipalities: St Anthonis and Horst a/d Maas

<http://BehouddeParel.nl/meetkits/>



Vredepeel RIVM LML station

Kipster Castenray

Hoogheide RUD-ZL station

4 examples of air quality initiatives with an undefined framework **Phase 4 ACTION**



★ April 2011 Horst a/d Maas Hoogheide LML meetstation (PLIM/RUD-ZL)

- ♦ 2015 Horst a/d Maas (Behoud de Parel & RIVM) financial and operational support denied
- ♦ 2018 Horst a/d Maas (Behoud de Parel, 11 MySense kits e.g. Kipster)

★ Januar 2020 municipalities in the region signed Schone Lucht Akkoord (SLA)

- ♦ 2020 St. Anthonis:
 - foundation Citizen Science Land van Cuyk (20 MySense sensor kits)
 - consultancy group (6 MySense sensor kits, 1 year)
- ♦ 2020 Venray:
 - consultancy group (6 MySense sensor kits. 1 year)
 - RIVM farmers and neighbours (Boeren en Buren) project (30 RIVM sensor kits, 1 yr)

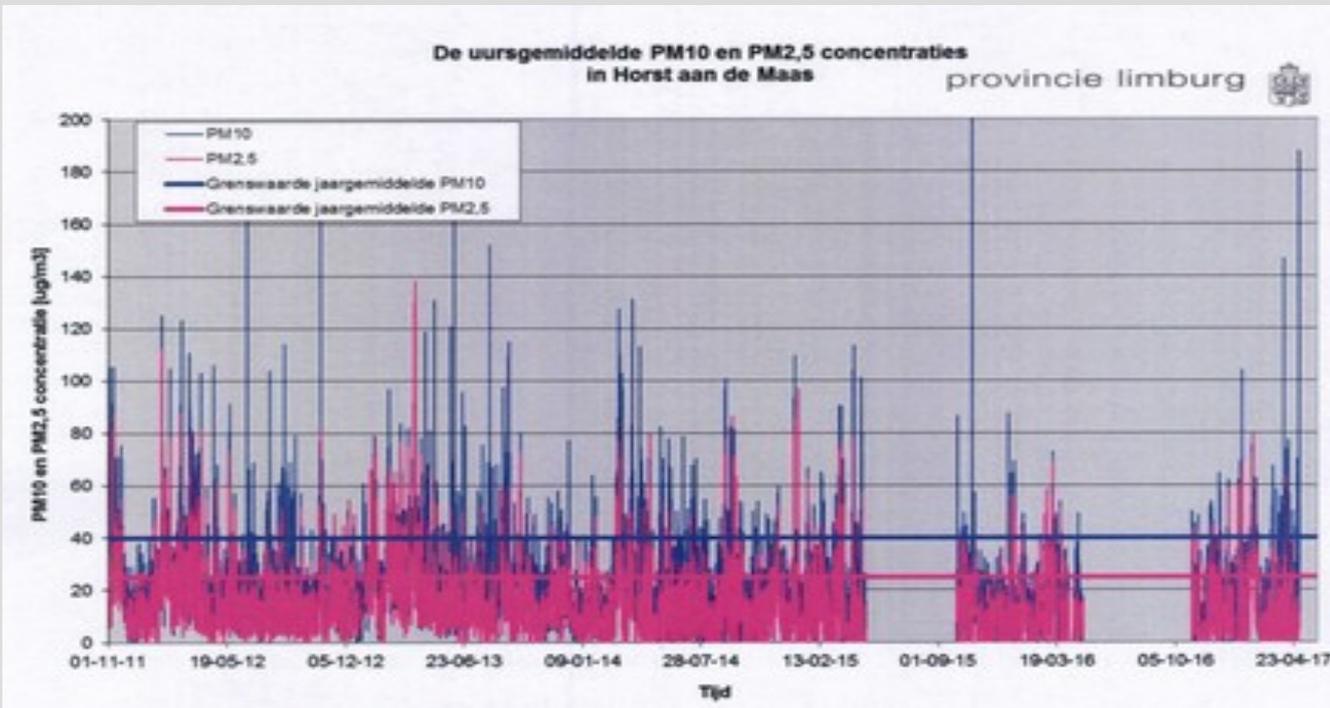
★ April 2021 project **Grenzeloos Meten**, Horst a/d Maas, Venray, and Maas en Peel

RUD-ZL air quality station Hoogheide

only PM_{2.5} and PM₁₀ BAM1020 hourly measurements



- ♦ Nov 2011 – Dec 2021 in Horst a/d Maas
goal: silence citizen worries, budget 5 years € 100K (real costs ca € 40K/yr)
- ♦ May 2017: environmental permit and start building 2 meat farms

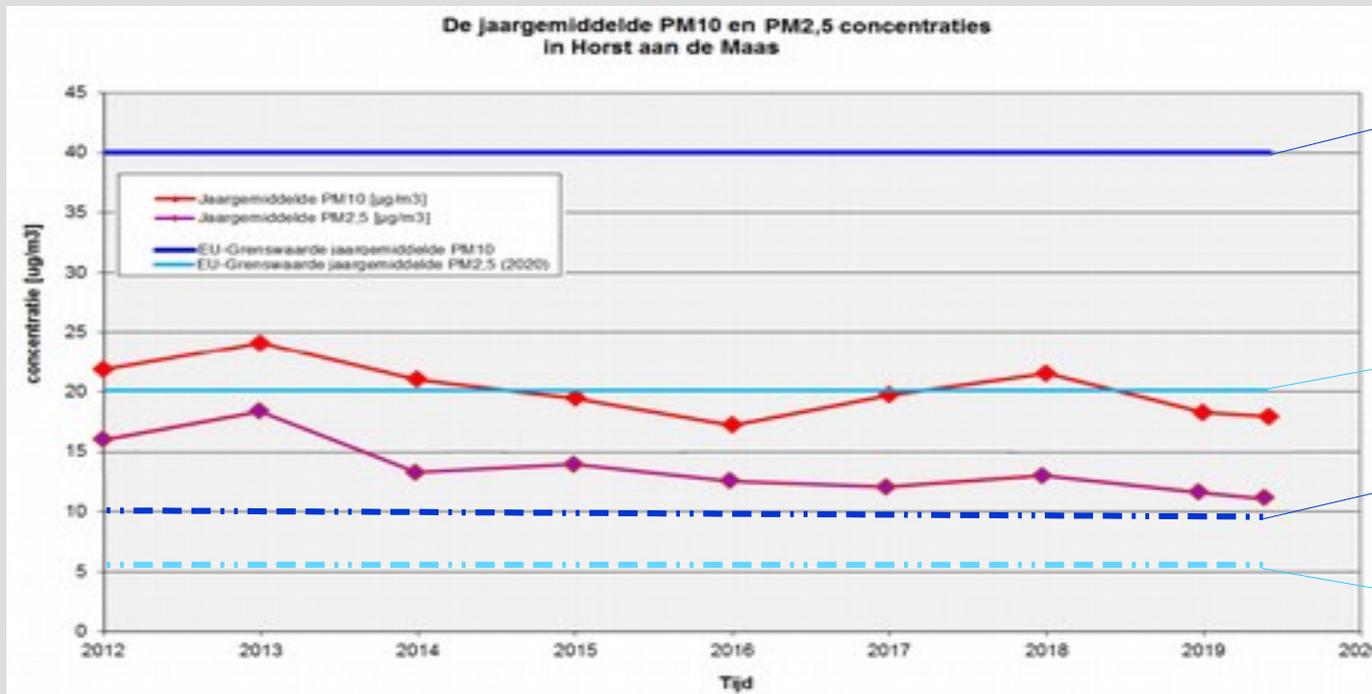


measurement LML station Hoogheide

PM_{2.5} and PM₁₀ BAM1020 hourly measurements



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EU 2011:
PM₁₀ 40 $\mu\text{g}/\text{m}^3$

EU 2011:
PM₁₀ 40 $\mu\text{g}/\text{m}^3$

WHO 2021:
PM₁₀ 10 $\mu\text{g}/\text{m}^3$

WHO 2021:
PM_{2,5} 5 $\mu\text{g}/\text{m}^3$

the real Hoogheide goal?

the problem: technology driven



- ★ **local government:** silence the citizens' anxiety?
- ◆ **local citizens:** doubt on innovative air filter installations of bio-industry
- ◆ **local new meat 'farms'** (45.000 pigs, 1.200.000 chickens, ...): economics



year 2022

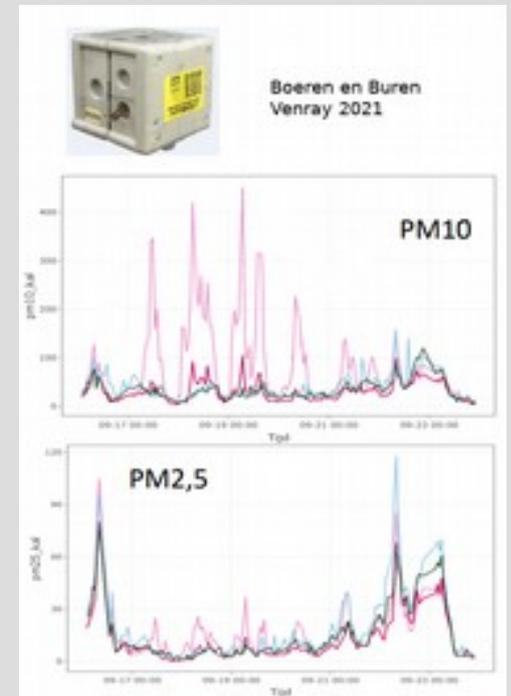
Grenzeloos Meten project

region: north of Limburg, Holland



the preplay: the story of technology – executives mismatch

- ★ **2016** Dec: start development MySense sensor kits. Know how exchanges RIVM, etc.
- 2017 Mar: request municipality (financial & quality) support MySense ... denied
- ♦ **2019** May: intensive livestock farms get permissions to start building farms
- ★ **2020-2021**: 5 measurement projects in the region:
 - Castenray: Kipster 9 MySense sensor kits (permanent)
 - St Anthonis: 20+6 MySense sensor kits (20 kits permanent)
 - Venray: 6 MySense sensor kits
30 RIVM sensor kits (¾ year)
- 2020 Nov: MySense gets national acknowledgement
- ★ **results 2021** end reports for St. Anthonis and Venray:
yes we can measure: different sensor types, humidity/wind problems



year 2022

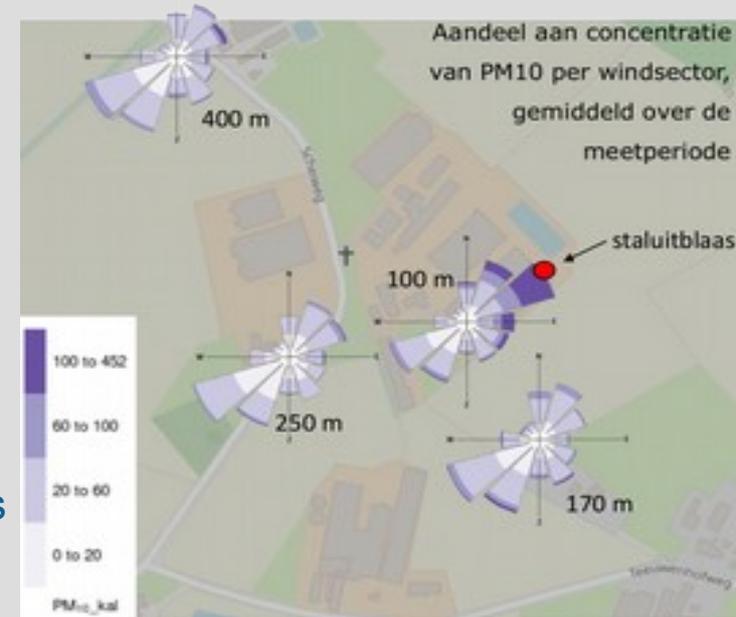
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- ♦ **2020-2021**: 4 measurement projects in the region:
 - Castenray: Kipster 9 MySense sensor kits (permanent)
 - St Anthonis: 26 MySense sensor kits (20 kits permanent)
 - Venray: 6 MySense sensor kits
30 RIVM sensor kits ($\frac{3}{4}$ year)
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- ♦ **results 2021** end reports for St. Anthonis and Venray:
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Tompoes contrives a trick: apply the Dutch Clean Air Agreement SLA goal 50% reduction to WHO 2021 (?) levels by 2030

★ **2021 Apr:** retry meeting with local government
result: yes! to the measurement network north of Limburg

Sep: first meeting: 6 municipalities take part

Dec: consultancy group writes a subsidiary proposal

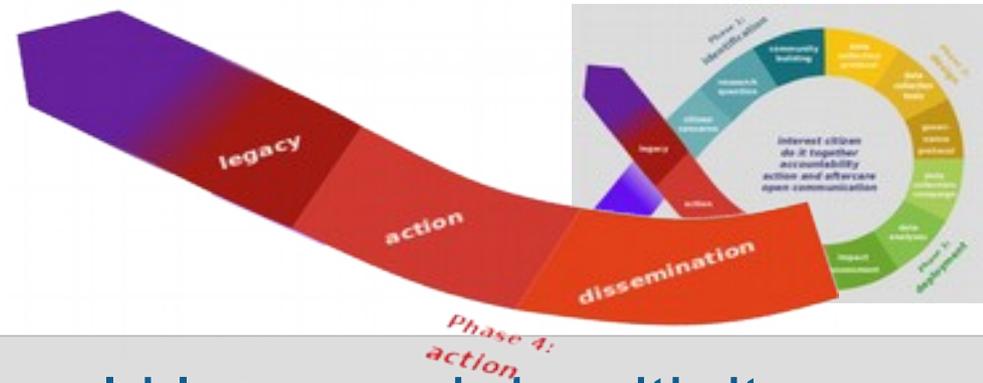
★ **2022 Jan:** project plan written without feedback stakeholders
... local government says they are busy with it?

★ **Nov:** stakeholder Behoud de Parel rings the alarm bell
status about the implementation measurement network plan?
3 municipalities take part

★ **Dec:** Behoud de Parel is told
to refurbish RIVM sensor kits from 3 years ago

SO, WE FAILED

our lessons learned (1)



- ★ define first what the world should learn and do with it
- ◆ rethink twice about data analyse and actions planned for whom am I doing this and which dialect do they use?
- ◆ incorporate from the start:
 - decision makers
 - politicians
 - your neighbours



★ forget your own technical dreams

our lessons learned (2)

this is only for the technology nurds

- ★ better robust meteo and dust sensors appear on the market
 - ◆ data communication via LTE-M and on-line maintenance
 - ◆ usual firmware software (C/C++) approach is antique
- ★ data acquisition and monitoring software is far more work as expected
 - ◆ monitor everything and build fault recovery in
 - ◆ urgent need for **measurement data exchange format**: together we measure
 - ◆ analysing measurements is still in a naive (too technical) state
- ★ w're not ready for a full scale up
 - ◆ commerce business plan needs to be redefined
- ★ **technology driven approach is misleading and needs to change**

some humble suggestions



★ how to use the measurements:

measure effectiveness SLA implementation actions?

require a real interest in the results

★ and **start to learn:**

- why and how people *listen*
- what the different people want to *hear*
- and how one get *commits* to actions



many thanks to:

Fontys Venlo GTL, MilieuDefensie, Kipster, Frank Koenders e.a., gem. St. Anthonis and foundation Burgerwetenschappers Land van Cuijk, association Behoud de Parel, RIVM, daily journals Trouw and de Volkskrant, local daily journals de Gelderlander and de Limburger

photo: Io Cooman, Volkskrant