PN Measurement - a Brief History

- 1988 WHO: Diesel exhaust probably carcinogenic (class 2)
- 1990 OSH: tighter Diesel exhaust limits at the workplace ➡ Swiss tunneling projects at stake!
- 1994 VERT: PN superior metric - stop measuring PM ➡ induce change of paradigm PM -> PN in exhaust measurement
- 2000 SUVA: DPF mandatory in tunneling sites ➡ DPF must be PN certified (VERT protocol)
- 2002 BAFU: DPF mandatory on all construction machines ➡ ensure that each single DPF is working properly !?!
Archway to Healthier Breathing Air

- **check result**
- **PN-based ambient monitoring**
- **field measurement of PN emission**
- **enforce**
- **implement**
- **DPF retrofit of large vehicle fleets**
- **less emissions**
- **better air quality**
- **PN replaces PM**
- **exhaust detoxification**
- **wall-flow DPF**
- **possible solution**
- **VERT: PN-based selection**
- **certification**

- **increase precision**
  - solid, insoluble nanoparticles, correlated to PN!

- **fundamental issue**
  - DEP are carcinogenic, fine particles kill
PNC Beyond the Tailpipe

Homologation: OK! (PMP)
- passenger cars – Euro 5b (2011)
- heavy duty vehicles – Euro VI (2013)
- Non-Road Machinery – 2016?
- USA? Japan?

Mobile homologation (PEMS)

Conformity of Production testing?
In-Use-Compliance testing?
- Inspection&Maintenance testing - PN Regulation in CH

Measuring Equipment is Available
Flow-Through Filter System

(filter failure is not always as obvious)