



# Visualisation of the Exposure of Cyclists to Traffic on Roads

Presentation by

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# Consortium



Research and consultation on sustainability, Amsterdam



Kooperationsstelle Hamburg



Dutch Cyclists' Club



German Cyclist's Club



Lithuanian Cyclist's Club



Hungarian Cyclist's Club  
[www.vectorproject.eu](http://www.vectorproject.eu)



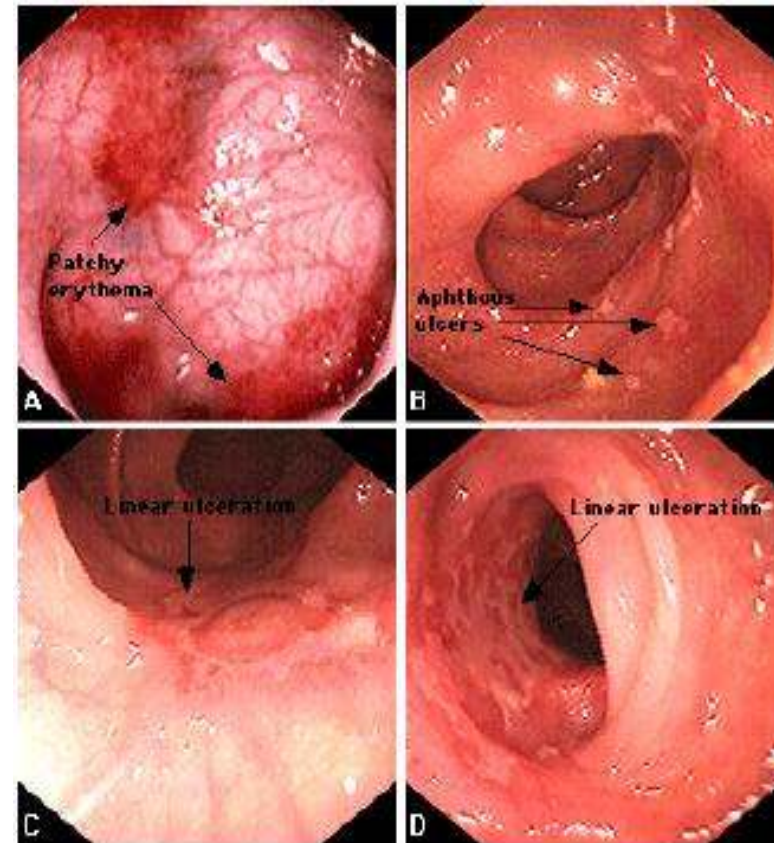
## What is UFP?

- UFP = Ultra Fine Particles
- Particles with a diameter less than 0,1 micrometer ('subfraction' of PM10)
- 300 000 EU-residents die prematurely yearly because of UFP
- Expenditures because of UFP exceed 609 billion EUR in 2020



# Effects of inhaled UFP

- Goes deeper than PM<sub>10</sub>
- Stays longer in the lung
  - Above PM<sub>10</sub> 1 month
  - Under PM<sub>10</sub> ~3-4 months
- Causes asthma and other illnesses
- Carcinogenic



# Where does UFP arise?

UFP comes in various forms of emission

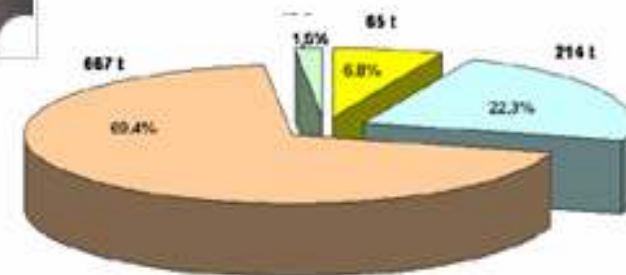
- From Diesel/other engines
- From heating
- From factories
- Etc.

The larger particles, covered by PM10 comes

- From brakes wearing down
- From tires breaking down
- Etc.



PM<sub>10</sub> Emissions in Südtirol



■ Heating ■ Industry ■ Traffic ■ Other



# Present regulation is NOT sufficient

- Measuring points are too far from pedestrian and cycling traffic
- Present system (based on threshold limits) is not sufficient
  - UFP accumulates in human organism because of the long emptying period
  - Even extremely low concentration can be harmful if the exposure time long enough
  - Only daily averages are measured; not high 'peaks' of exposure



# Action Plan

- Virtual universities/desk research
- Measurement and devices
- Communication/disseminating



# Target

- Reliable measuring of exposure of cyclists to UFP (dust under PM 10)
- Investigating different traffic situations in 4 European cities (Hamburg, Utrecht, Budapest, Vilnius)
- Visual demonstration of exposure by PIMEX method



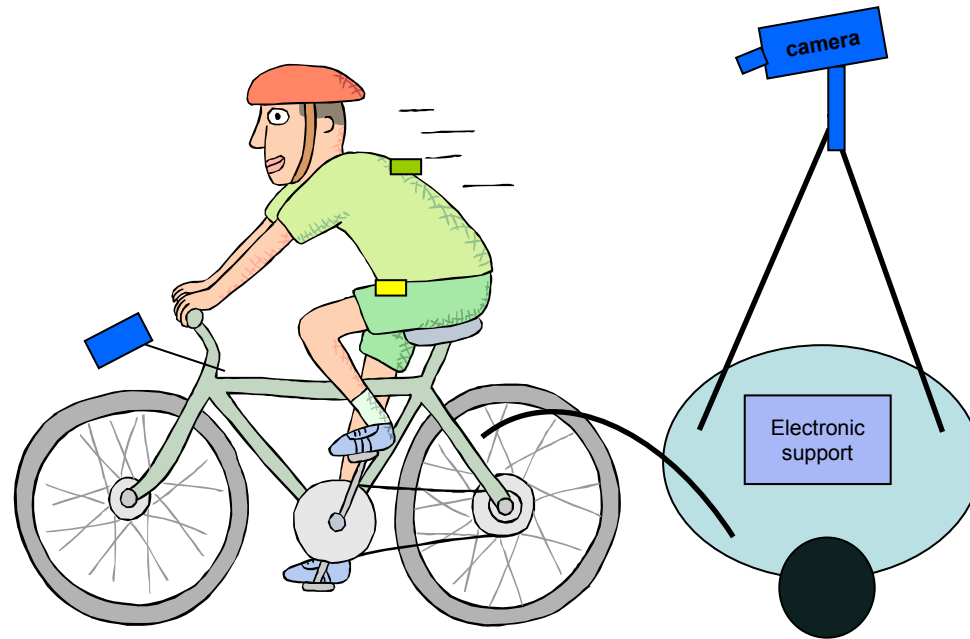


## Requirments for measurement and devices

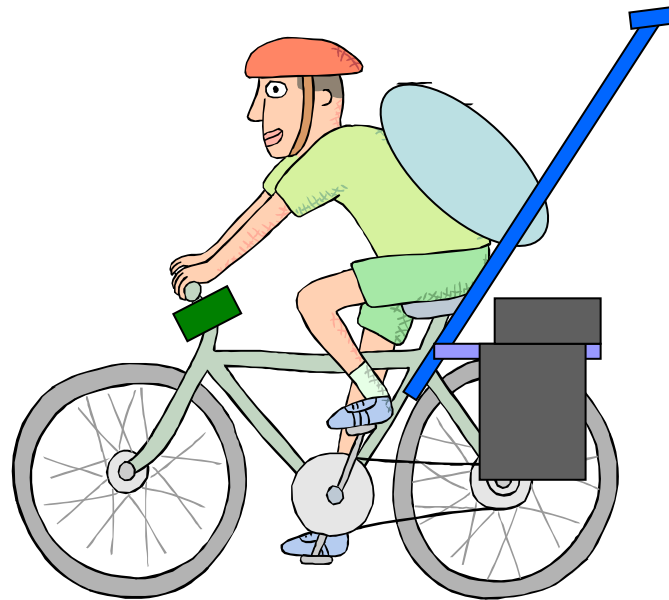
- It should be easy to put the measurement on any normal bike
- It should be easy to handle
- It has to work on normal streets and on a difficult road surface



# The first draft



# The final measurement bike



Helmet camera  
on a rod

GPS

Electronic  
Support (on the  
luggage carrier)

Backpack

## Measuring devices

- ❖ One TSI 3007-2 CPC as particle counter
- ❖ One TSI 'DustTrak' as mass counter
- ❖ Special devices as flow meter, tubes, cartridge, batteries
- ❖ A helmet camera
- ❖ A GPS (Garmin 60csx)
- ❖ An anemometer and a hydrometer
- ❖ Two digital cameras
- ❖ Fixing devices and the backpack
- ❖ A notebook with the PIMEX software and equipment (data logger, etc.)



Helmet  
camera mounted  
on a rod



## The implemented system



Saddle bag with a notebook, a camcorder  
(only as recorder), microphone



## Procedure of a measurement

- ❖ Testing and fixing of all measurement devices
- ❖ Measuring of the background exposure
- ❖ Measuring of wind speed and humidity
- ❖ Start of all devices
- ❖ Start of the cycle trip
- ❖ First cyclist leads the group as he knows the route
- ❖ Second “the measuring cyclist”
- ❖ Third “Follow the measuring cyclist” to help and look at specified activities
- ❖ End of the trip - Saving and transferring of the data to safer storage devices



## Quantitative frame of the measurement task

- ❖ 4 – 6 reliable measurements per city
- ❖ 10 measurements per day (max.)
- ❖ Ca. 20 minutes measuring time



# Collected data

- 20 hours PIMEX video (traffic situations, measured values, and actions)
  - Demonstration video: <http://kerekpárosklub.hu/vector-pimex-video>
- 72 000 measured data per tool
- GPS data/weather data
- Further data by personal observation





## Measurements/press conferences

- ❖ Hamburg (October 2007)
- ❖ Budapest (14. - 20. April 2008)
- ❖ Vilnius (20. - 23. May 2008)

**Thank you for your attention  
CU tomorrow at 1 P.M. !**

