

## MONITORING OF VEHICLES AND INFRASTRUCTURE

Life-cycle-cost (LCC) considerations need a consistent monitoring.

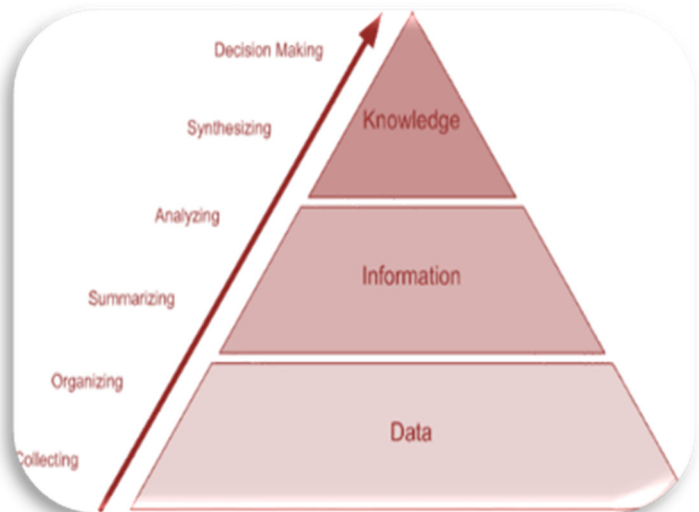
- Ongoing documentation of the current status to check the efficiency of implemented maintenance measures
- Information at your fingertips for internal and external validation
- Long and mid-term optimization for LCC considerations
- Independence of measurements, increase internal Know-How
- Today's technology allows for constant infrastructure and vehicle driven data collection and analysis



*Wayside cabinet to record data from passing vehicles*

### Fleet monitoring

Setup at neuralgic network nodes, wayside monitoring units primarily collect sound and vibrational data of passing vehicles.



### Infrastructure monitoring

Train borne monitoring units installed in regular vehicles record noise, vibrational data and pantograph impacts. A few regular vehicles collect much more statistically robust data in considerable shorter time than dedicated measuring vehicles can do.

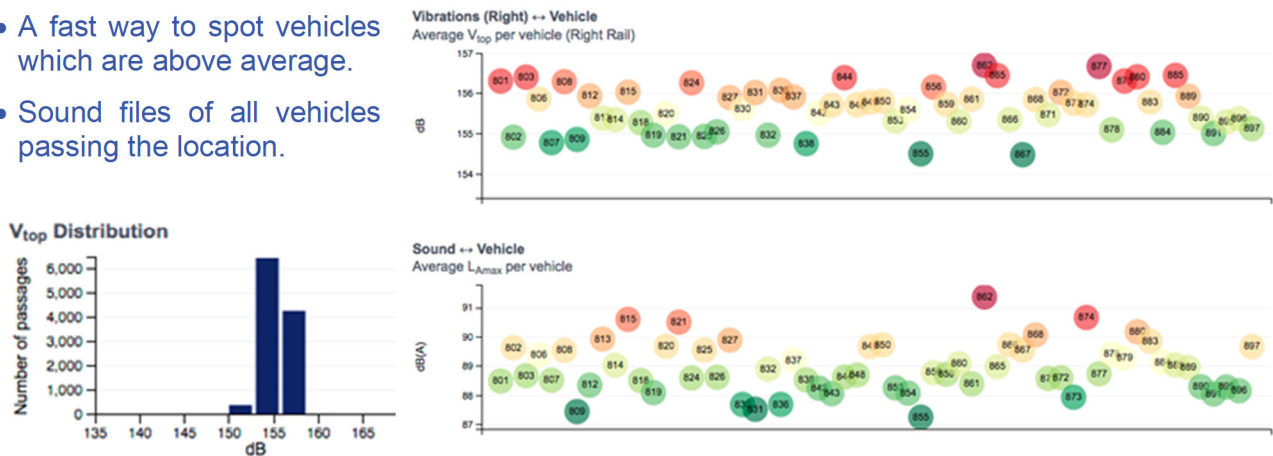


*Device installed in vehicle bogie*

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### Fleet dashboard – parameters by vehicle

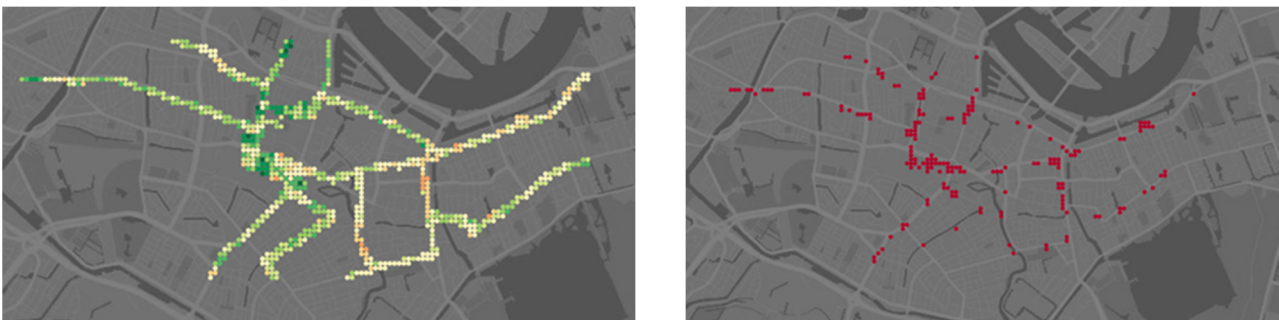
- A fast way to spot vehicles which are above average.
- Sound files of all vehicles passing the location.



Time	$V_{top}$ (left)	$V_{top}$ (right)	Speed	$L_{Amax}$	Humidity	Vehicle
2016-06-06 15:59:12	168.3	154.3	17		1	824
2016-06-22 09:59:28	162.5	157.3	17	94.7	1	868

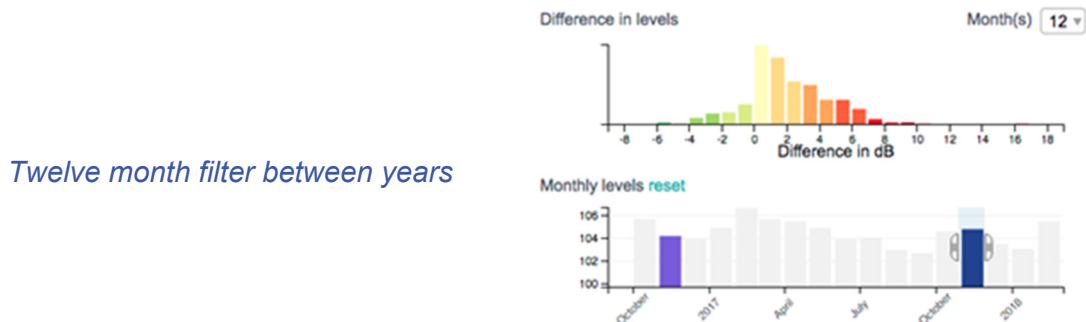
Visualize individual vehicle data, organized by passages

### Infra dashboard – collected data from reference vehicles



Average network noise and vibration compared to filtered hot spot regions

- A few clicks to filter for problematic spots or regions of the network with suspicious characteristics.
- Comparisons between months helps to track the efficiency of implemented measures.



Twelve month filter between years