



# The smart city knows *what's* happening and *where* Case: Environmental health in Nijmegen



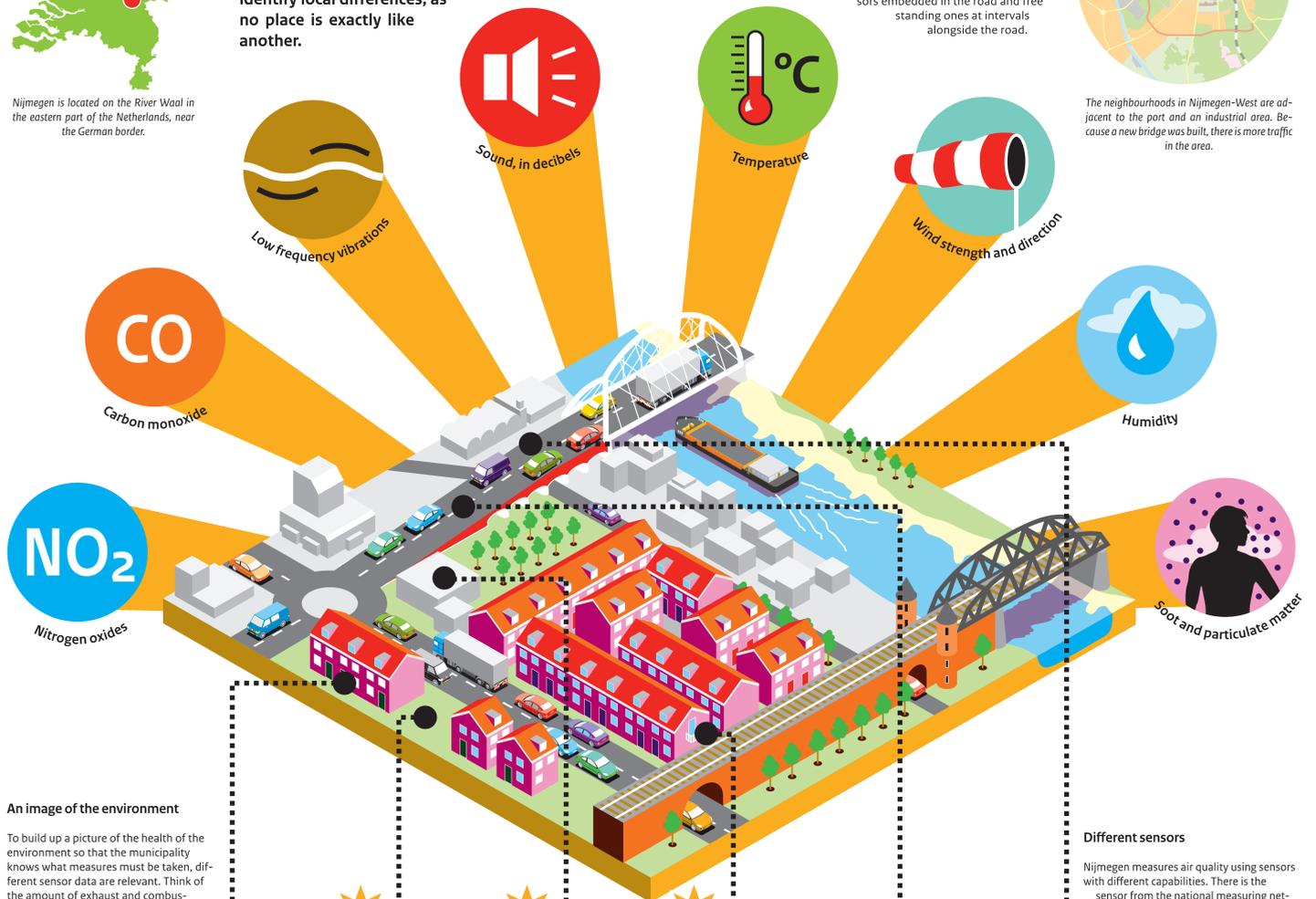
Nijmegen is located on the River Waal in the eastern part of the Netherlands, near the German border.

The environment is very important for people's health. That's why standards are set for the concentrations of pollutants. Sensors measure whether we keep within these standards using national monitoring networks. In addition, several municipalities and regions have their own sensors to identify local differences, as no place is exactly like another.

Nijmegen also monitors local environmental quality. With the advent of a new bridge and the construction of a ring road, the traffic situation in the western part of Nijmegen has changed. Developments in the port and the industrial area by the River Waal have been made, and residents in the nearby neighbourhood are worried about the health of their environment. The municipality is taking their concerns seriously and has placed sensors in the neighbourhood to measure the air quality and noise level. Nijmegen also wants to collate reports about bad odours. To monitor traffic flows, the municipality uses sensors embedded in the road and free standing ones at intervals alongside the road.

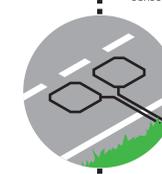


The neighbourhoods in Nijmegen-West are adjacent to the port and an industrial area. Because a new bridge was built, there is more traffic in the area.



### An image of the environment

To build up a picture of the health of the environment so that the municipality knows what measures must be taken, different sensor data are relevant. Think of the amount of exhaust and combustion gases (NO<sub>2</sub> and CO), soot and particulate matter, but also: the temperature, the force and direction of the wind and humidity. Sensors also measure noise, such as the number of decibels and low frequency vibrations. To measure traffic flows, there are bluetooth sensors and traffic loops. Measuring bad odours is still difficult for a sensor, so for this we are dependent on the human nose.



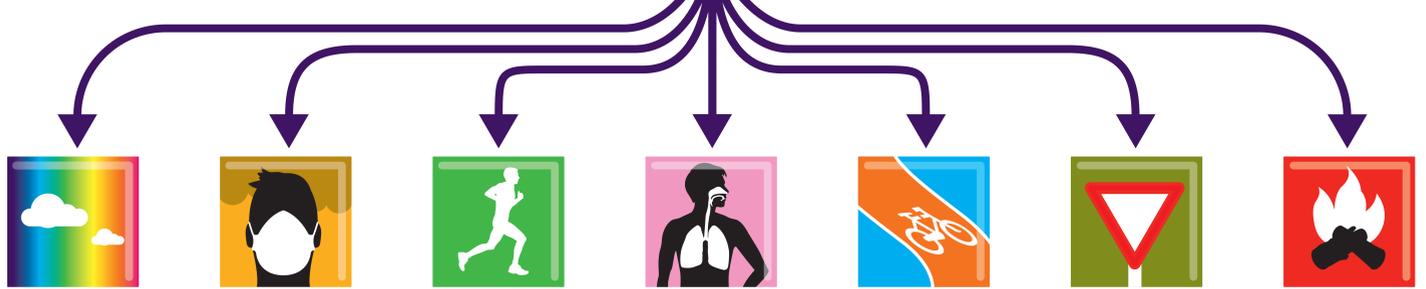
### Different sensors

Nijmegen measures air quality using sensors with different capabilities. There is the sensor from the national measuring network coordinated by the National Institute for Public Health and the Environment, there are seven specific particulate matter sensor units and, as part of a research project, the Radboud university has distributed a 'swarm' of thirty simple sensors among residents. One of the questions posed by this research is whether measurements taken by a large number of cheap sensors are just as reliable as measurements taken from a couple of expensive ones.

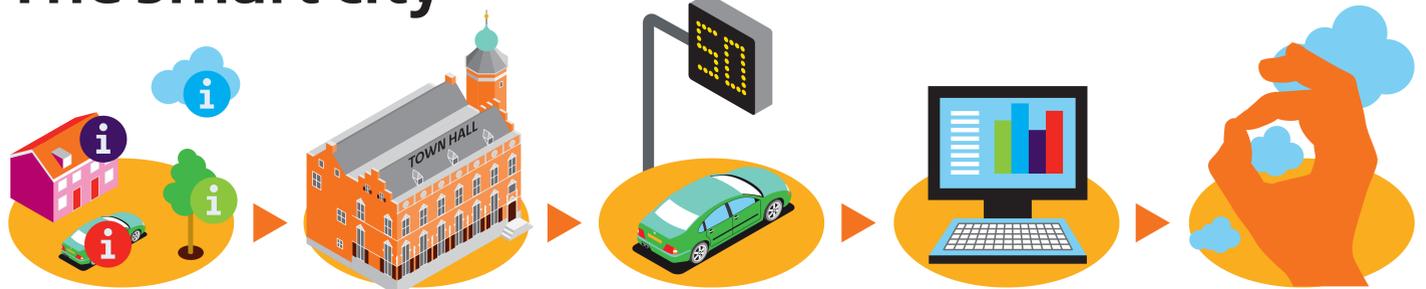


### Open data

The data from both the municipality and residents of this part of Nijmegen, are available as open data and technically accessible using an international standard, the SensorThings API. Combined with other data and, for example, calculation models, this data is crucial in various applications.



## The smart city from environmental monitoring to a dynamic management of the environment



## The smart residents well-informed residents create solutions themselves

