

Crowd Sensing Bike-Lane Quality

Rijkswaterstaat

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Problem description

Crowd sensing bike-lane quality

Improve safety



Problem description

Crowd sensing bike-lane quality

Improve safety



Social media considered harmful

No input while cycling

Minimal effort from cyclist



Road quality

What is road quality?

Damage and obstacles



Smoothness

Weather

Traffic

Air pollution

Lighting



Our focus

Non-technical

Stakeholders

User incentives

Privacy

Technical

Data acquisition

Analysis

Privacy

Seasonal effects

Stakeholders

<i>Road authorities</i>	RWS, provinces, municipalities
<i>Bike providers</i>	OV-fiets, rental companies
<i>App features</i>	Insurance, tourist offices
<i>Other apps</i>	Fietsersbond & Eneco
	Natuurmonumenten
	Fiets!
	ANWB Fietsen
	...

User profiles



User profiles

	<i>Racing</i>	<i>Recreational</i>	<i>Commuting</i>
<i>Quality</i>	High		
<i>Stats</i>	High		
<i>Routes</i>	High		
<i>Eval</i>	High		
<i>Photo</i>	Medium		

User profiles

	<i>Racing</i>	<i>Recreational</i>	<i>Commuting</i>
<i>Quality</i>	High	Medium	
<i>Stats</i>	High	Medium	
<i>Routes</i>	High	High	
<i>Eval</i>	High	Medium	
<i>Photo</i>	Medium	High	

User profiles

	<i>Racing</i>	<i>Recreational</i>	<i>Commuting</i>
<i>Quality</i>	High	Medium	Medium
<i>Stats</i>	High	Medium	Low
<i>Routes</i>	High	High	Low
<i>Eval</i>	High	Medium	Low
<i>Photo</i>	Medium	High	Low

Data to quality

Sentiment mining



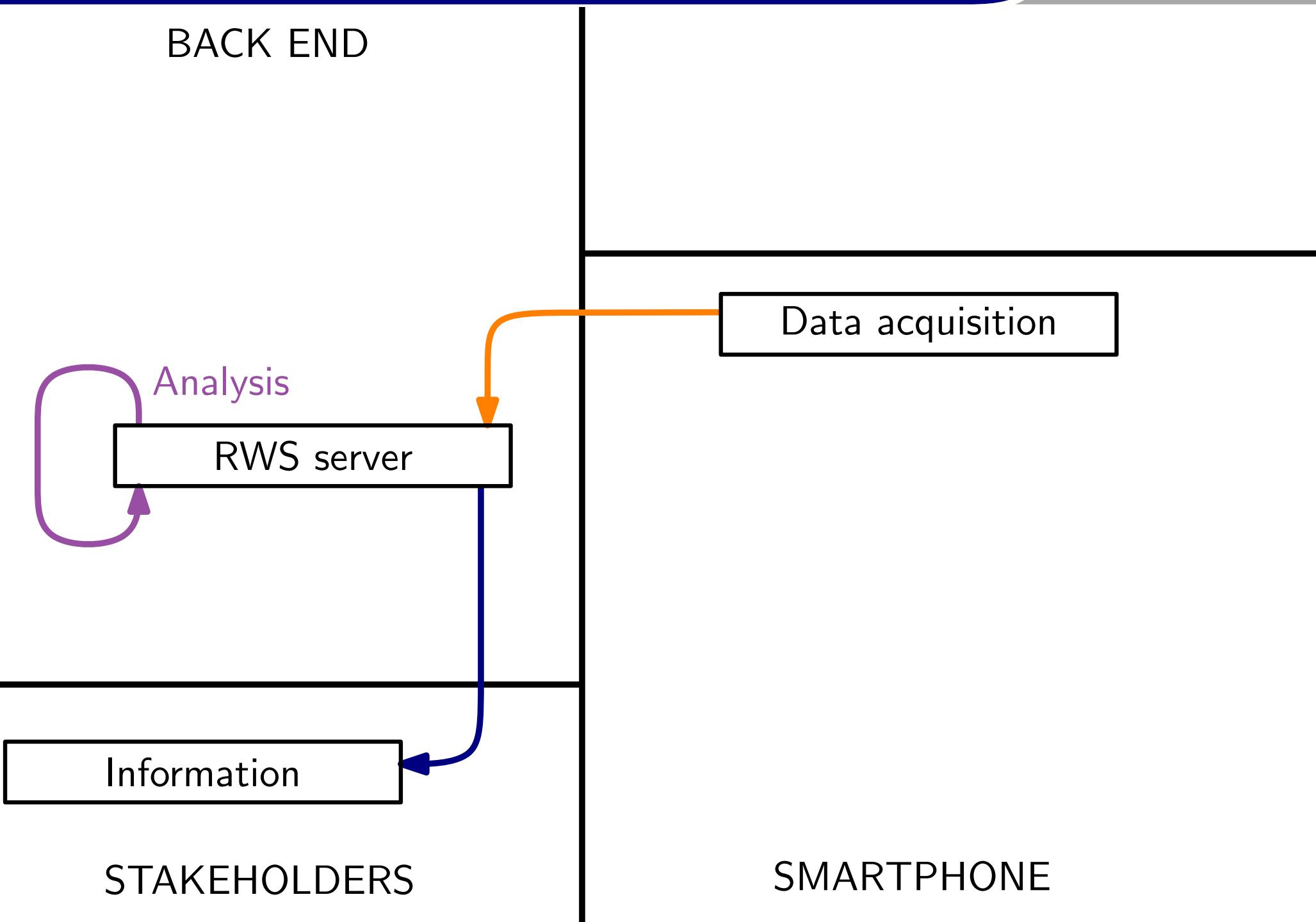
Sensor data



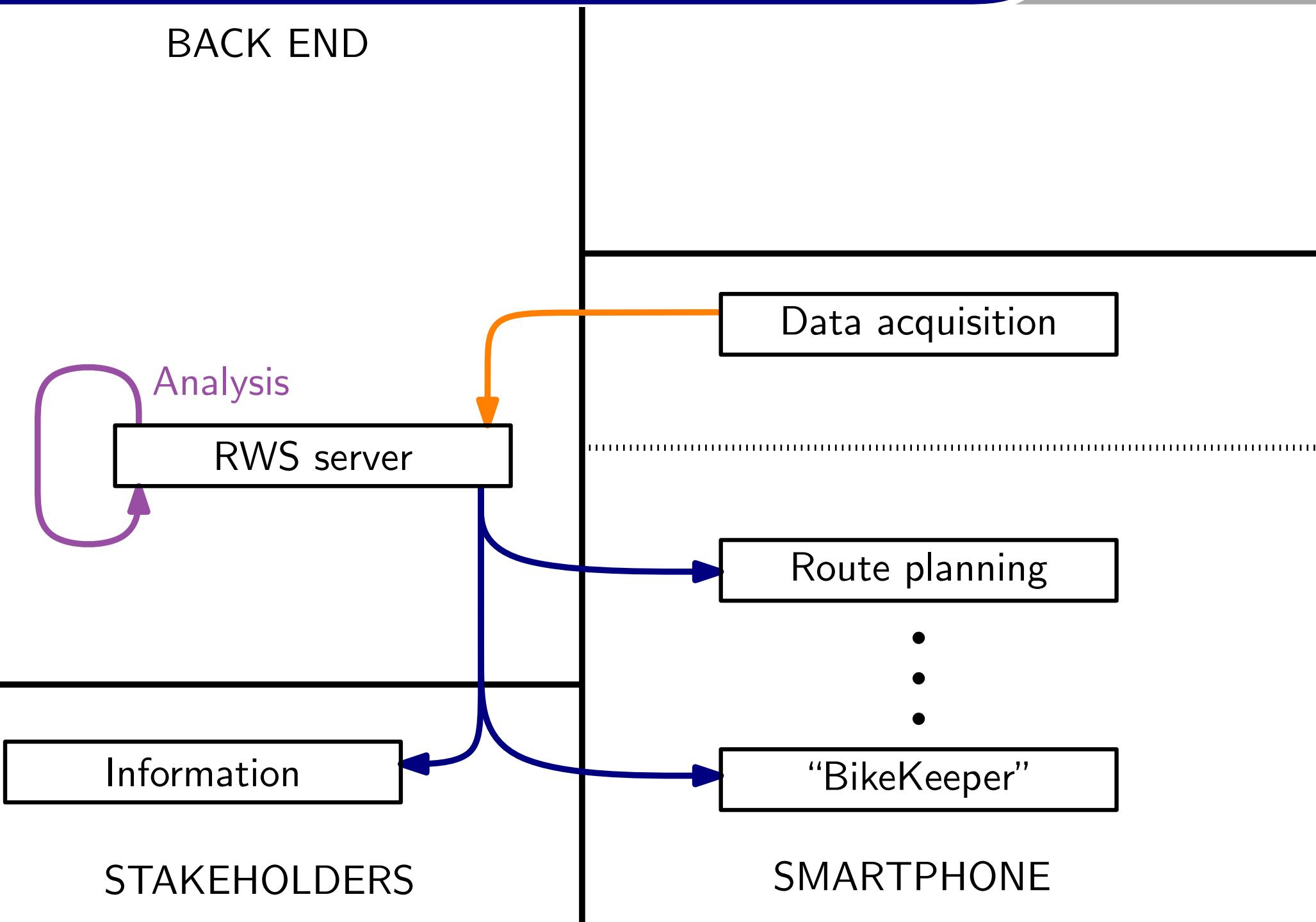
Route evaluation



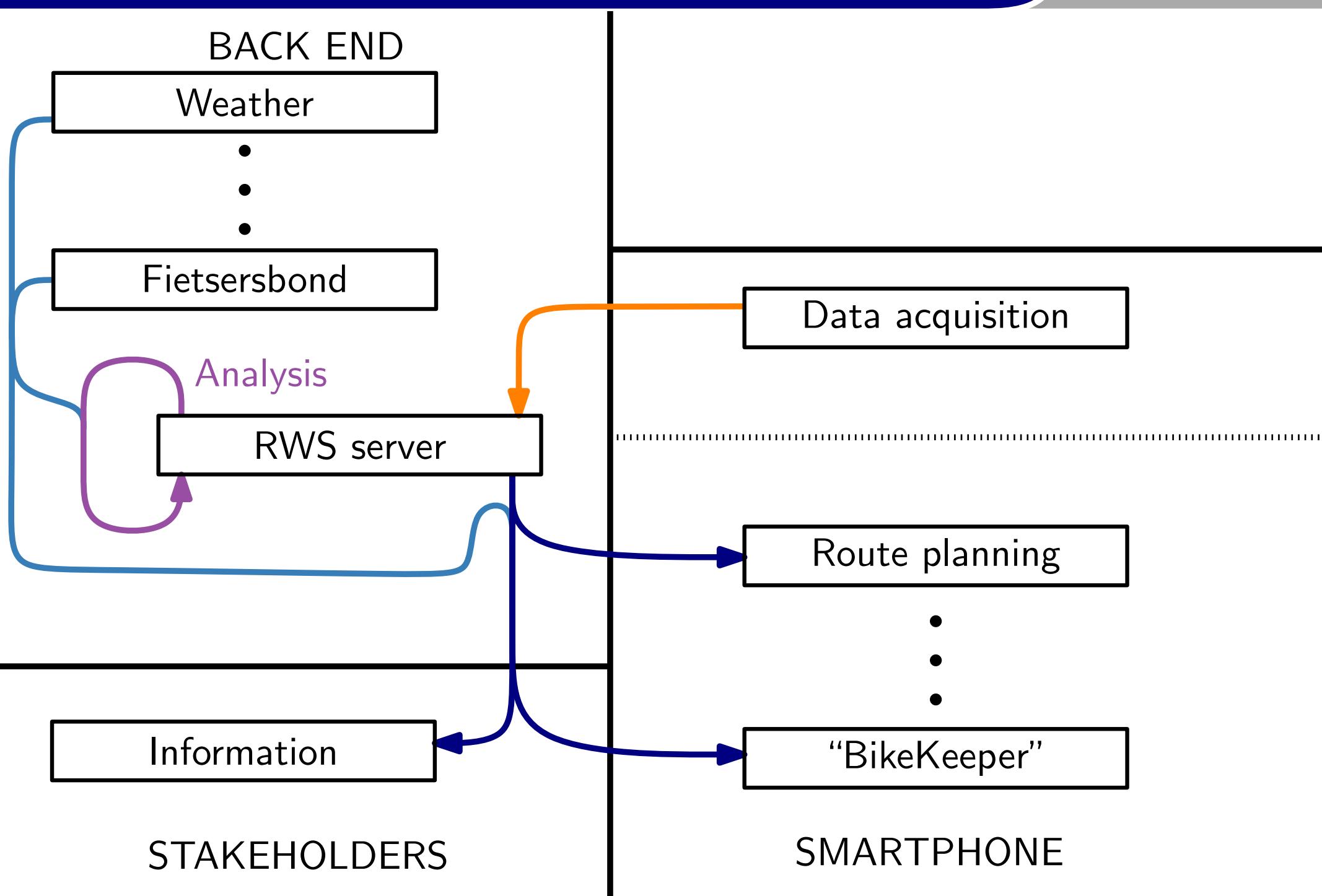
System



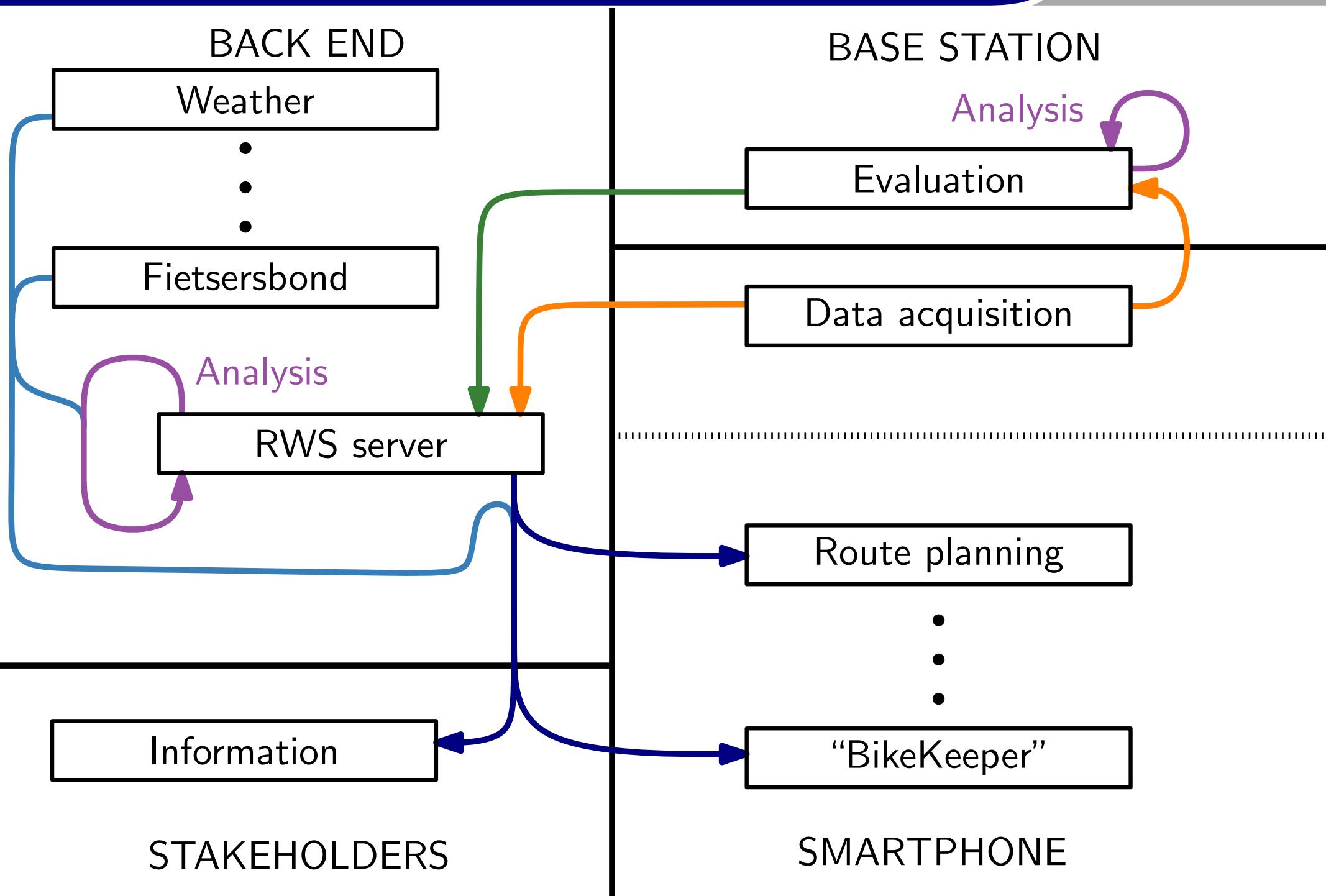
System



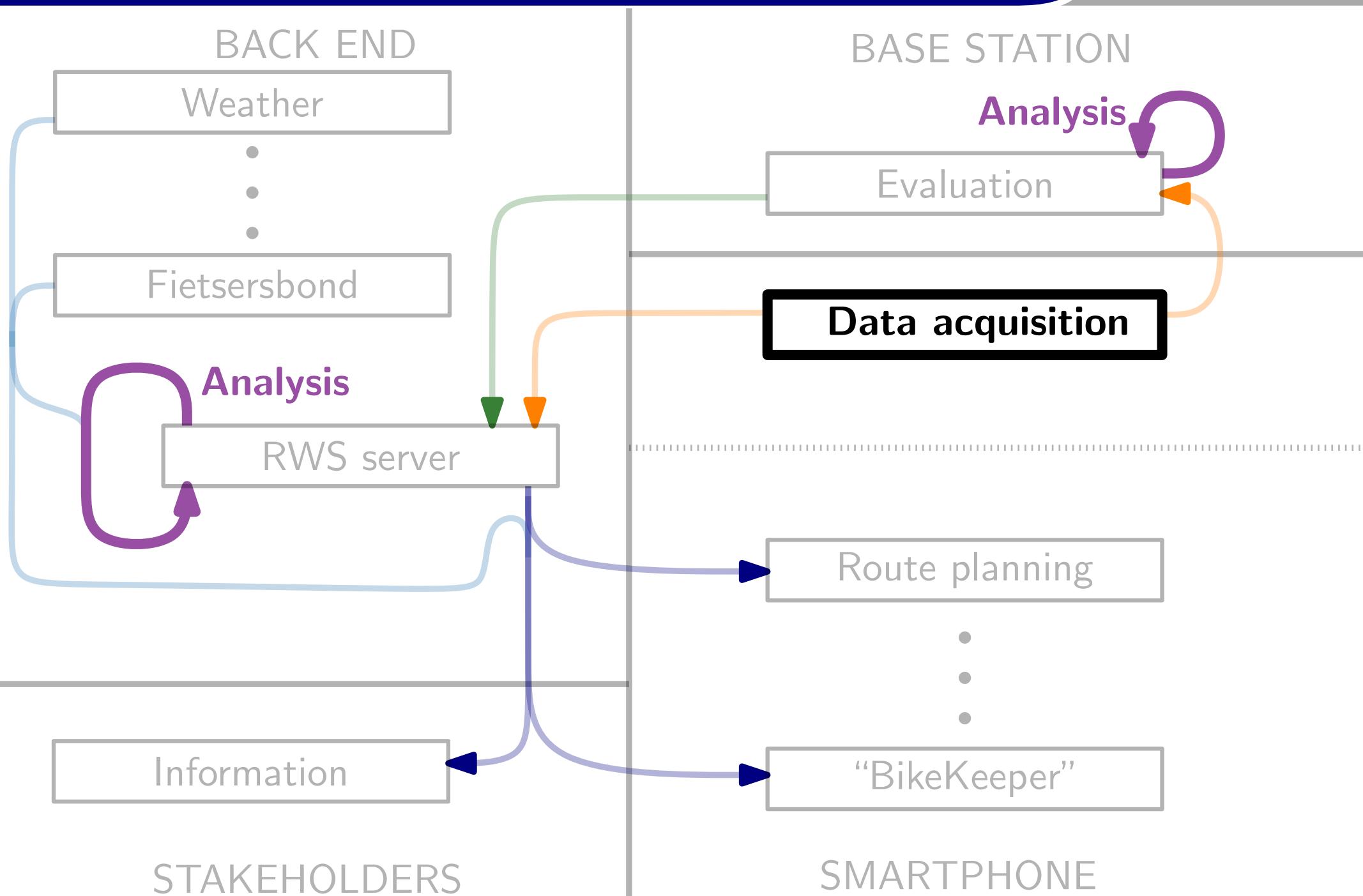
System



System



System



Sensors

GPS

Location, speed, direction

Accelerometer

Smoothness, breaking

Gyroscope

Hazards

Light sensor

Social safety

Magnetometer

Number of cars

Camera

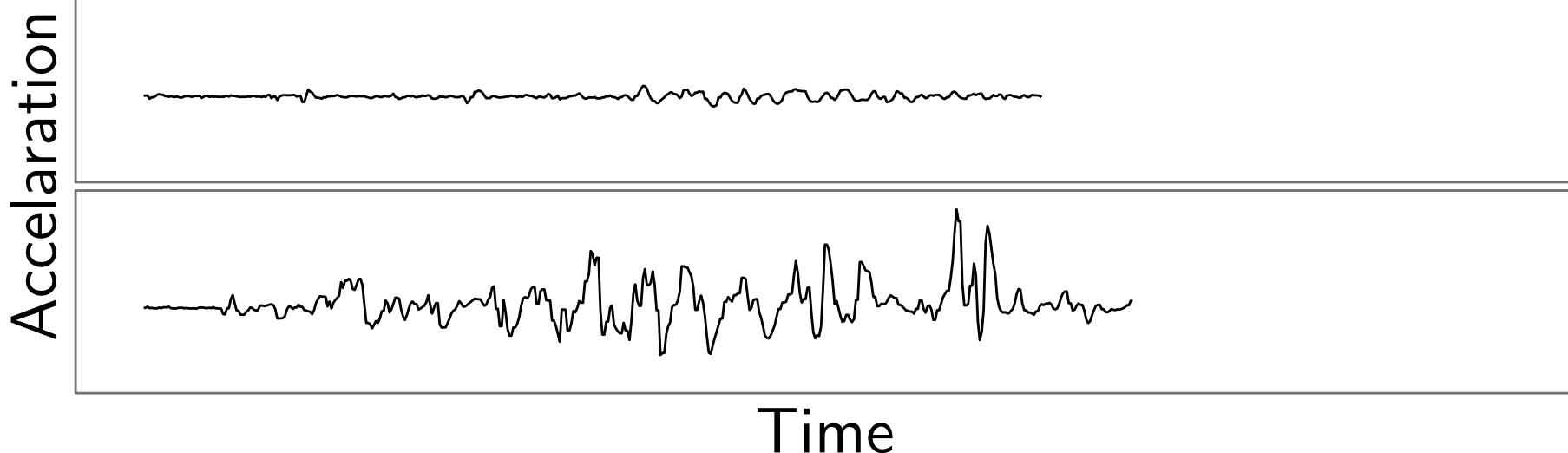
Evidence, detection

Acquisition & analysis

From preliminary data

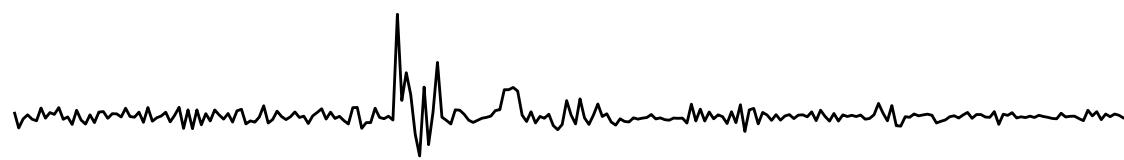
Small effects from bike/cyclist

Where is the phone?



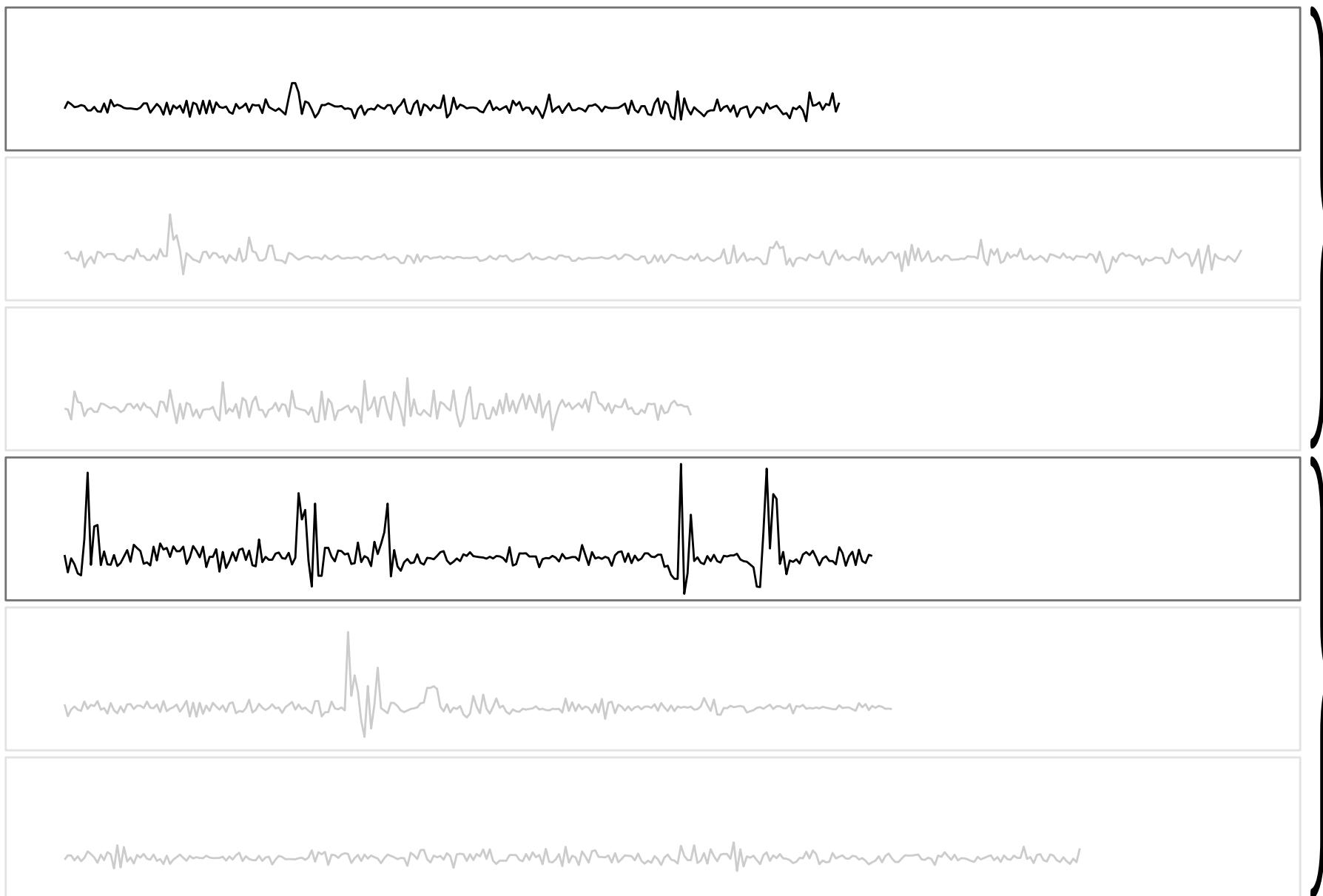
Acquisition & analysis

Acceleration



Acquisition & analysis

Acceleration

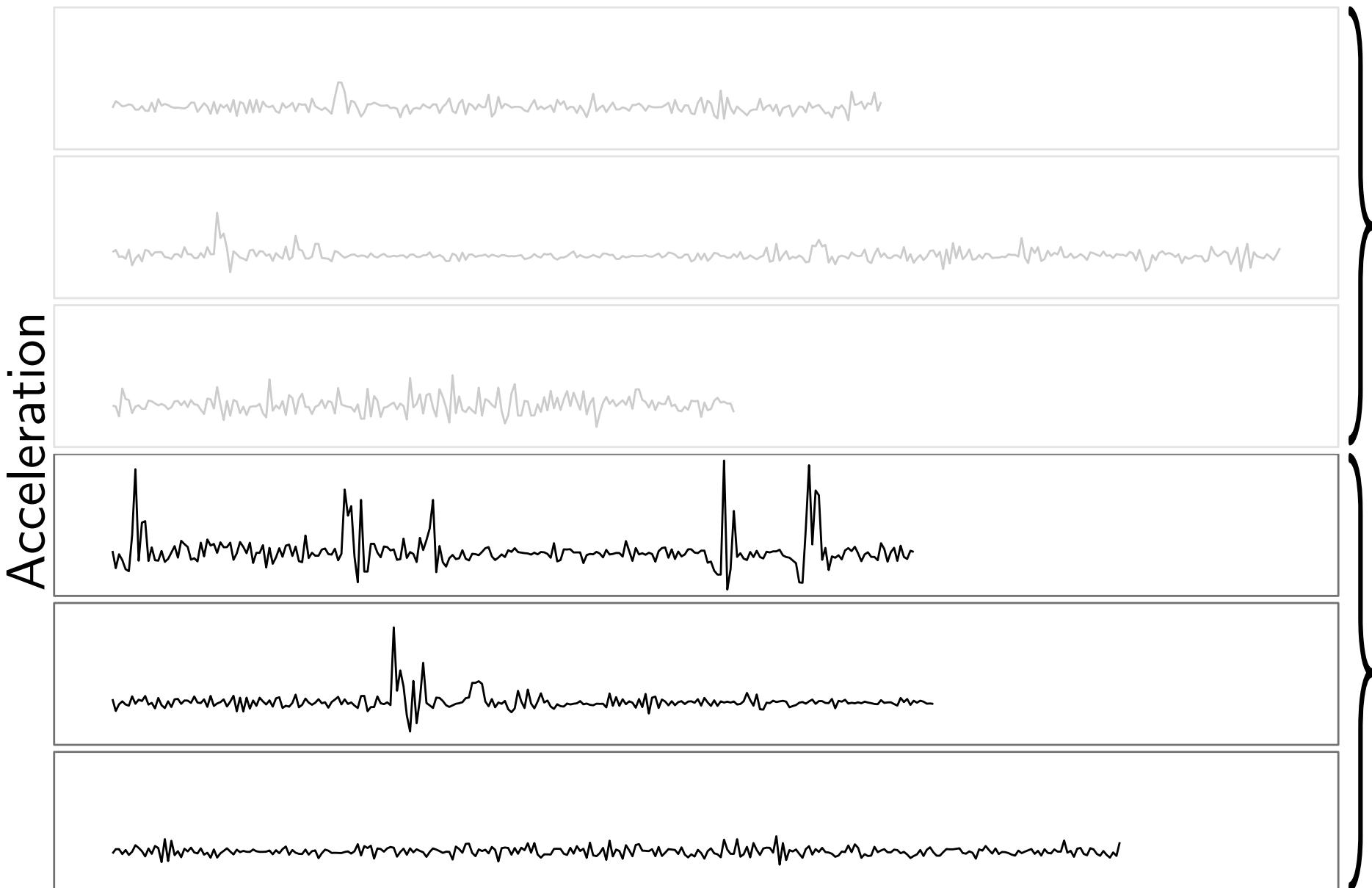


Acquisition & analysis

Acceleration



Acquisition & analysis



On a map



Outlook

Pilot study

Dialogue with stakeholders

Computer vision possibilities

