Towards more use of ICT in Road Engineering

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University of Antwerp

Annual Conference and Awards Ceremony   *24 November 2015*

Today's special

In Flanders road engineering important steps are taken towards more use of Information and Communication Technology (ICT)

Aims are :

Higher quality level of material use by re-use and recycling
Safety improvement during works and in service conditions
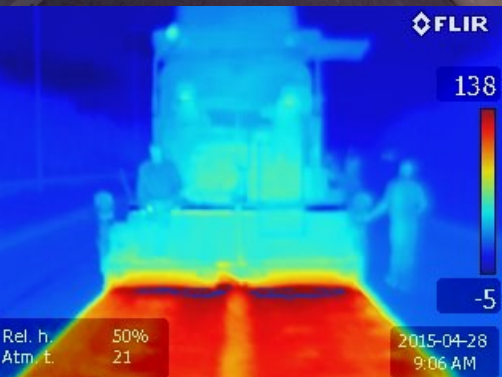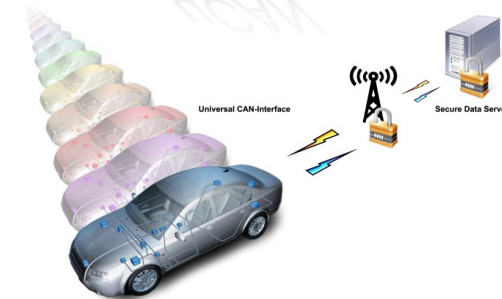Environmental and economical benefits

2 cases: Sensovo Project and ROAD_IT

University of Antwerp
Faculty of Applied Engineering
Road Engineering Research Section (RERS)
MOdeling of Systems And Internet Communication (MOSAIC)
i-Minds
&
Research Centres , Road Agencies, Road-, Mobility-, Transport sector

uCAN

Case 1

Sensovo Project
Mosiac

Spokesman: dr. Peter Hellinckx

University of Antwerp
Department Elektronics and ICT
Faculty of Applied Engineering
iMinds - Internet Technologies Department

VIM – Vlaams Instituut Mobiliteit
Partners: Agiv, Aswebo, Athlon, AWV, Beijer Automotive, Caeleste, Coyote, Datavision, Haven Gent, Melexis, Mobistar, OCW, Op3Mech, Siemens Industry Software NV, TaSS, **Universiteit Antwerpen CoSys Lab**, VAB, VITO en Voxdale..

Case 1: Sensovo?

Discontinuities in pavement

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High traffic densities

Case 1: Sensovo?

System which allows detecting traffic problems on beforehand

High traffic densities

Discontinuities in pavement
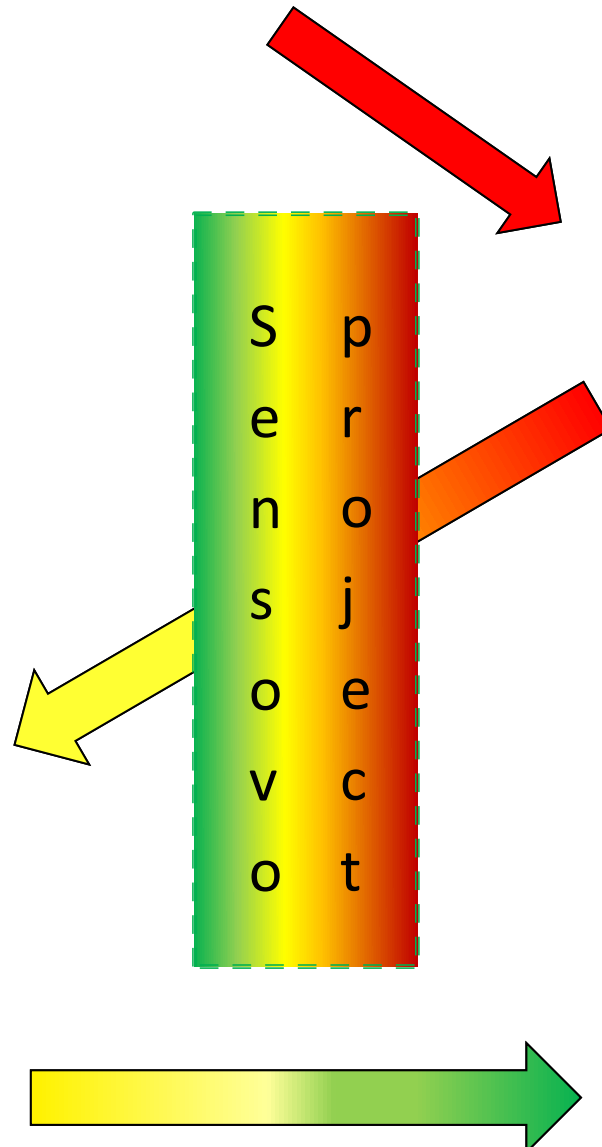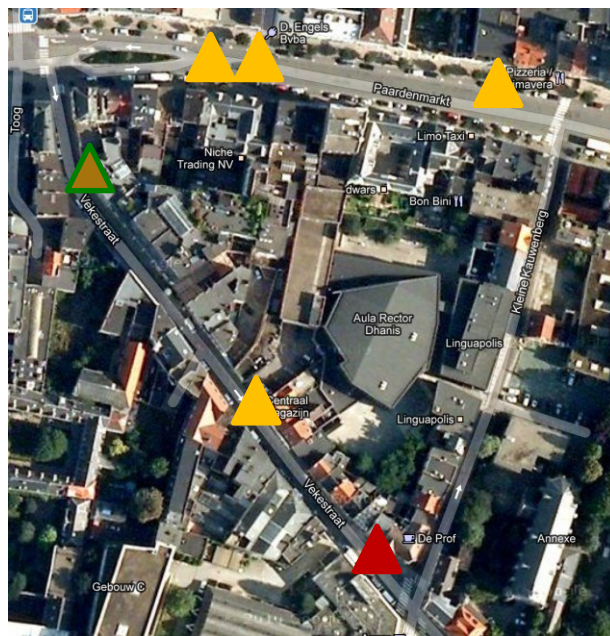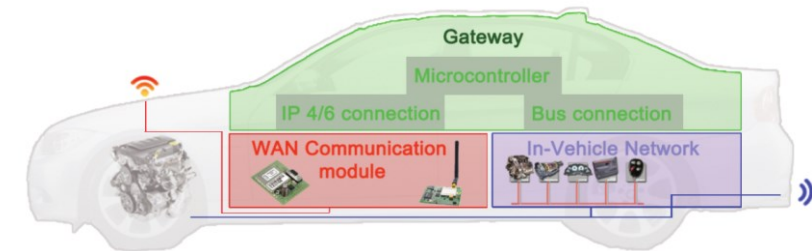
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Society and economics: Safety and Ecosavings

EMIB — Energy & Materials in Infrastructure & Buildings — University of Antwerp

MOSAIC — Modeling Of Systems And Internet Communication — University of Antwerp

Sensovo: using existing sensors

	Voertuigsystemen				
	ABS	TCS	ESP	Active steering	(Semi-)Active Suspension
Wheel velocity sensoren	x	x	x	x	x
Steerwheel angle sensor			x	x	x
Acceleration sensor			x		x
Yaw-sensor			x		x
Altitude sensor					x
Acceleration sensor (contruction)					x

(Sensoren)

Sensovo project

How does it works?
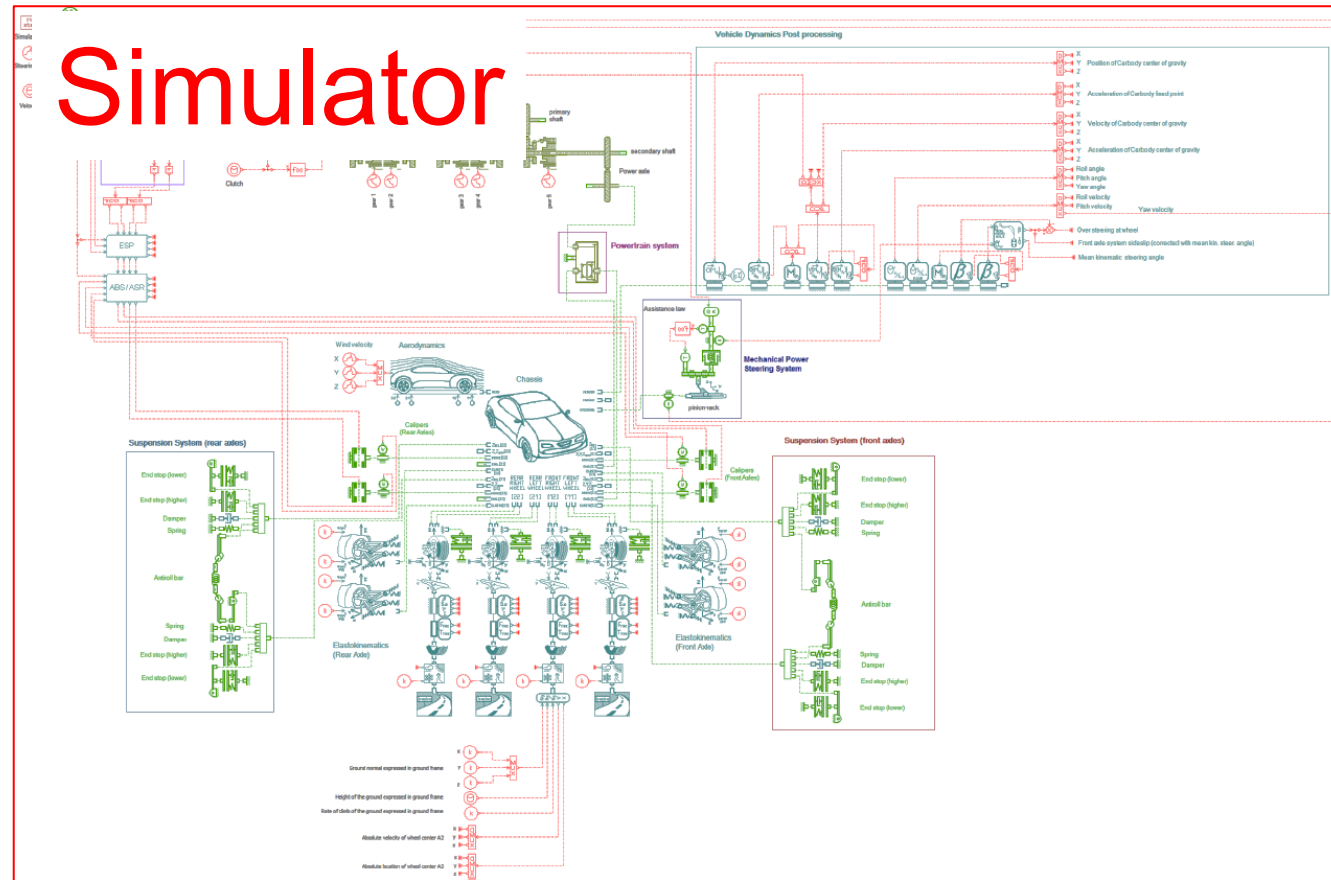
Simulator

Simulation Results

Algorithm

BRRC Pavement management system

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Data con

Algorithm

Defect DB

Maps, GPS
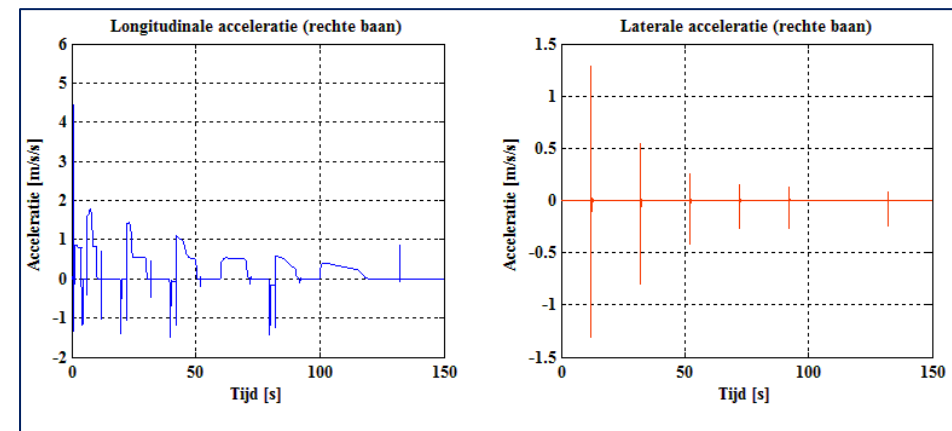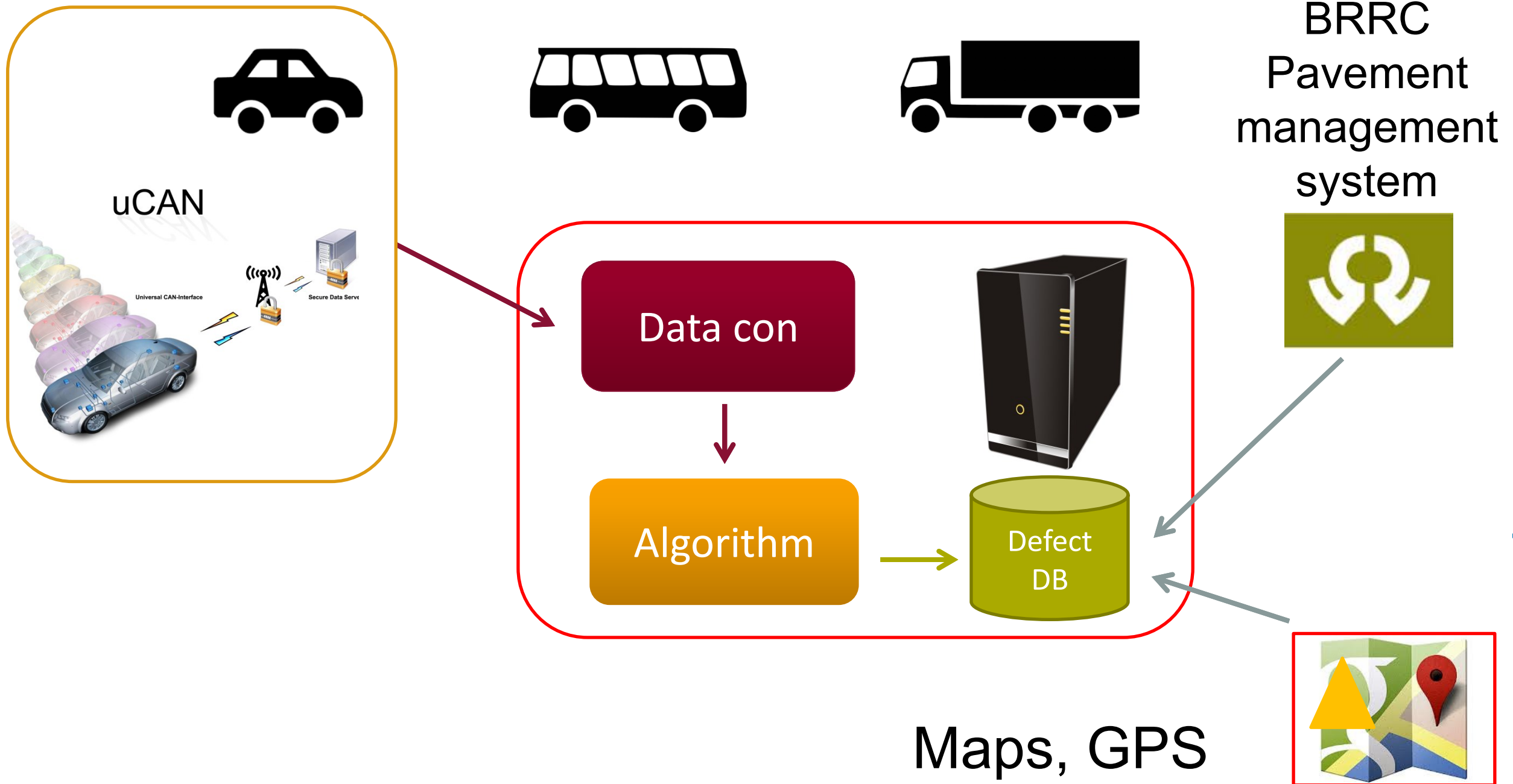
Fleet test: in situ test

Results: benefits

Real time communication of dangerous road elements to vehicles

Direct focus to problem (deterioration) zone for extra controll tests

Free fleet information

BRRC Pavement management system

Extra tests
Continous update
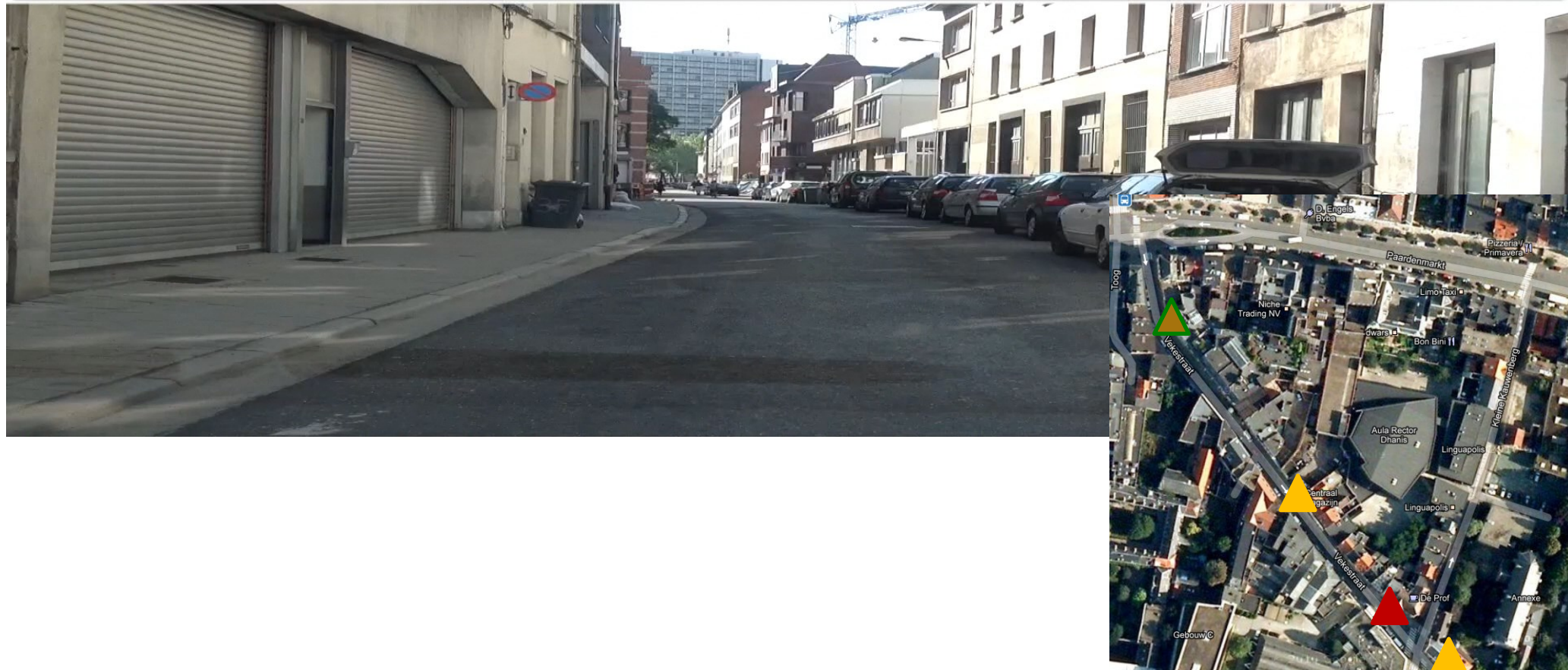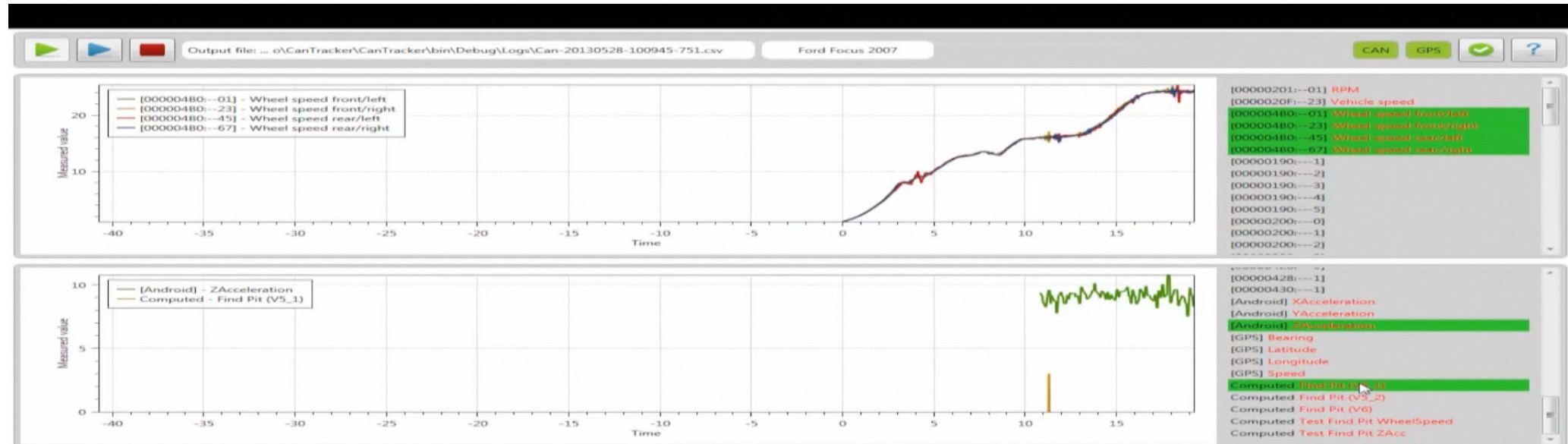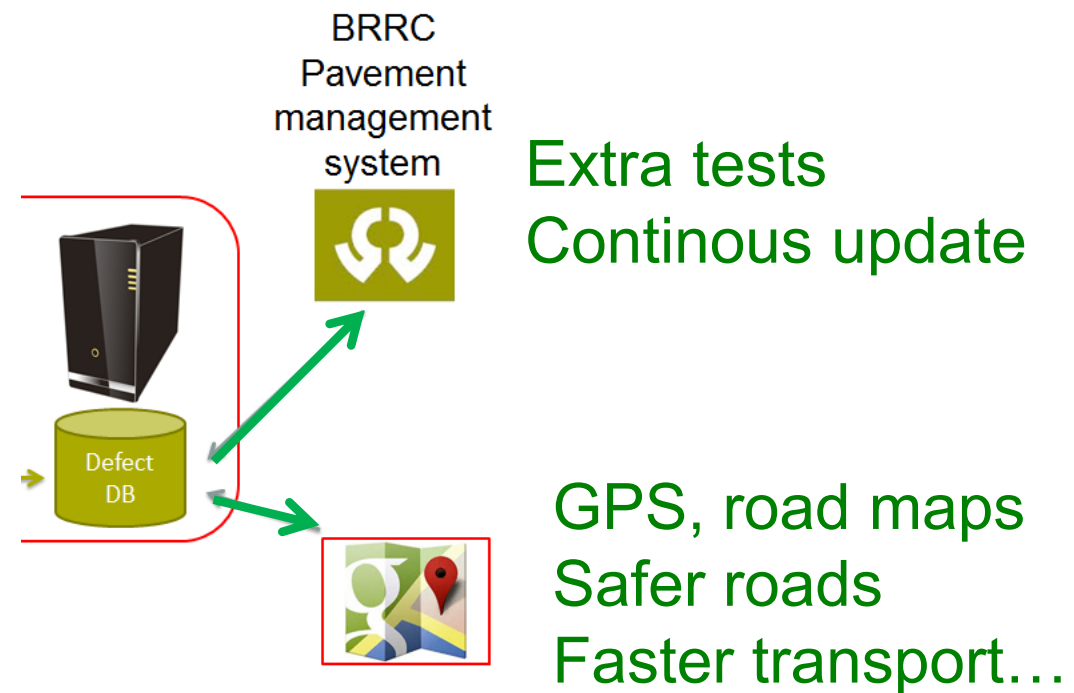
Defect DB

GPS, road maps
Safer roads
Faster transport…

Smart Transportation Alliance

ROAD_IT: Efficient management process for road construction by implementation of IT tools
EMIB - CoSysLab

Spokesman: dr. Ing. Wim Van den bergh

University of Antwerp
Department Construction
Faculty of Applied Engineering
Road Engineering Research Section

Partners: Belgian Road Research Centre, Flemish Government
Supported by : Aswebo, Aannemingen Van Wellen, Colas Belgium, Stadsbader, Deckx A.O., Wawebo, Hoogmartens Wegenbouw, Grizaco, Topasfalt, Wirtgen Belgium ouwunie Infrastructuurwerken, BVA, VlaWeBo, COPRO, Port of Antwerp

EMIB
Energy & Materials in Infrastructure & Buildings
University of Antwerp

MOSAIC
Modeling Of Systems And Internet Communication
Univeristy of Antwerp

ROAD_IT

General Innovative Objective:
to develop and demonstrate an integrated and coherent IT process control system for the entire Flemish asphalt sector whereby all existing sensors and actuators -with their own operational data processing system- communicate with one another, in a workable way and archiving data for real time and later purpose.

ROAD_IT: scope
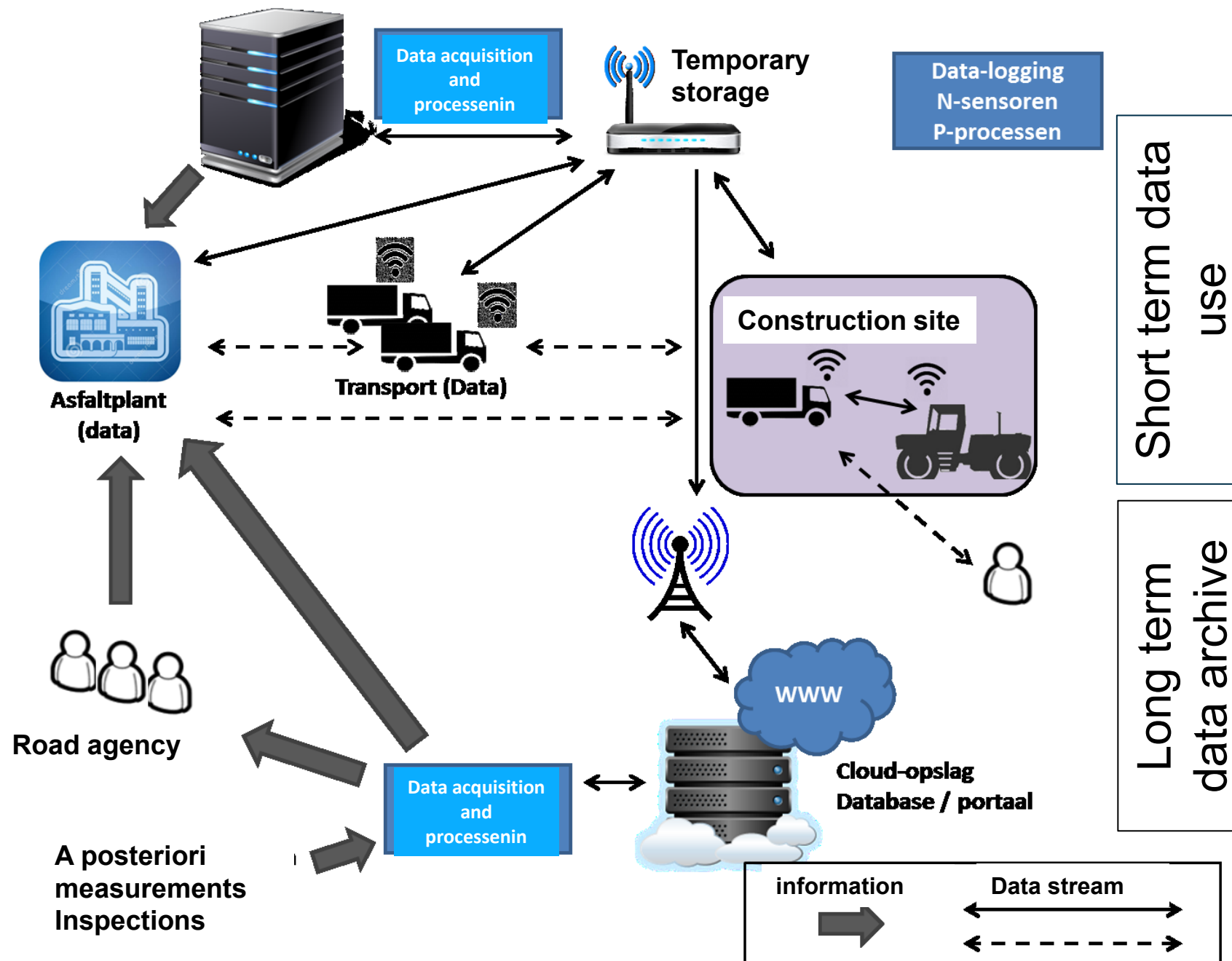
Asphalt process : production – transport – service – renovation – recycling

ROAD_IT: combining all tools and steps into one system chain with short term and long term archive output

Materials
Energy
Safety
Efficiency

Homogeneity
Temperature
Production
Transport
Processing

Research

Short term data use

Long term data archive

Quality Controll
intern
extern

Assisting
  personnel

Improve
  Process
  Quality during
    construction
    service
    recycling
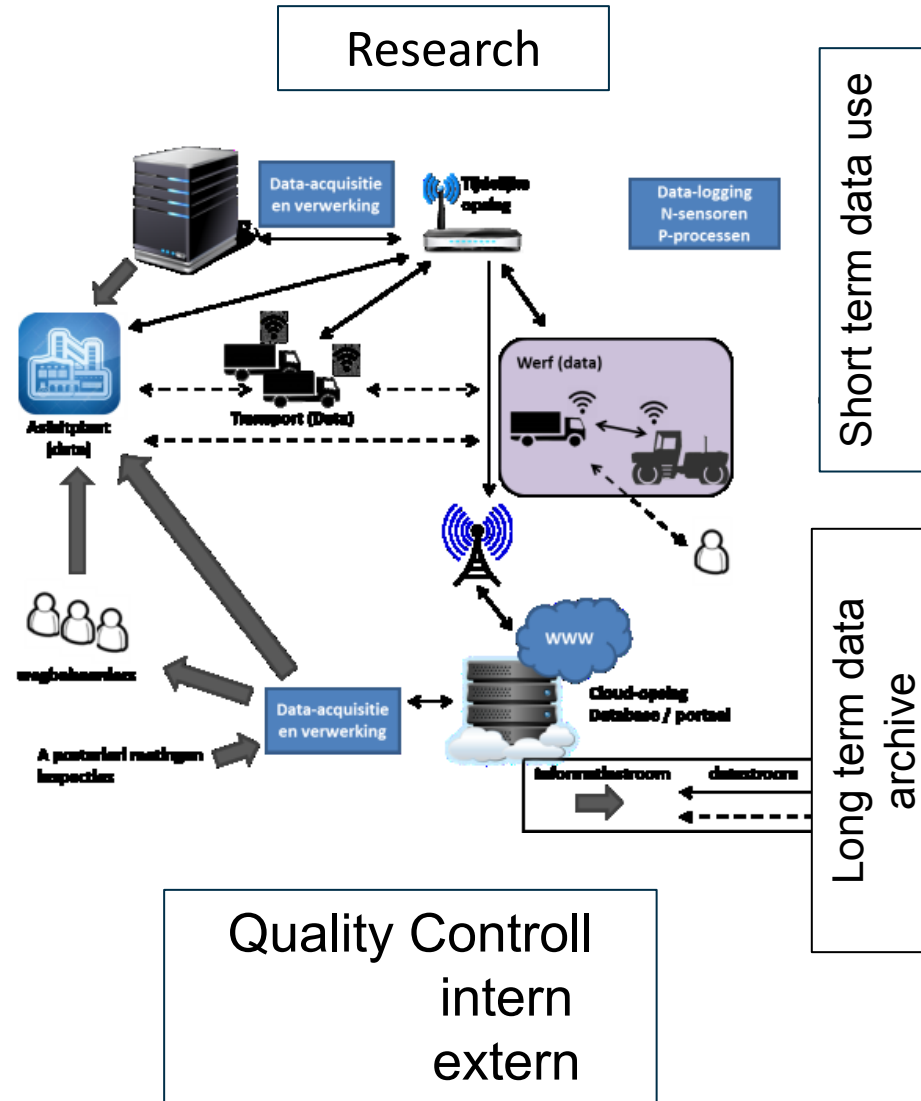 Safety at work
Environmental impact
  LCA / CO2 Calculation

ROAD_IT: scope

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personnel

Improve
Process
Quality during
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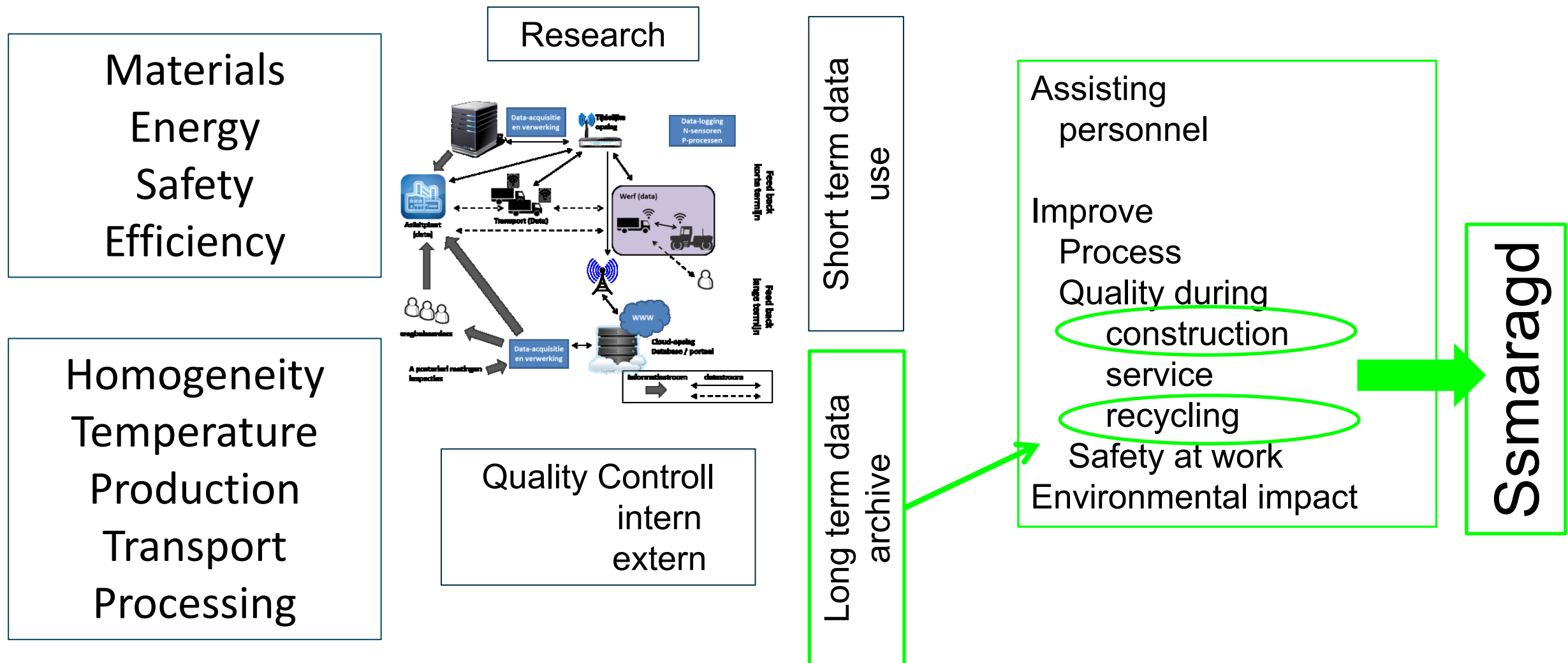service
recycling
Safety at work
Environmental impact

Ssmaragd

Smart Selection Model for innovative Application of Reclaimed Asphalt Granulate in road Design

SSMARAGD

Universiteit Antwerpen
Wim Van den bergh

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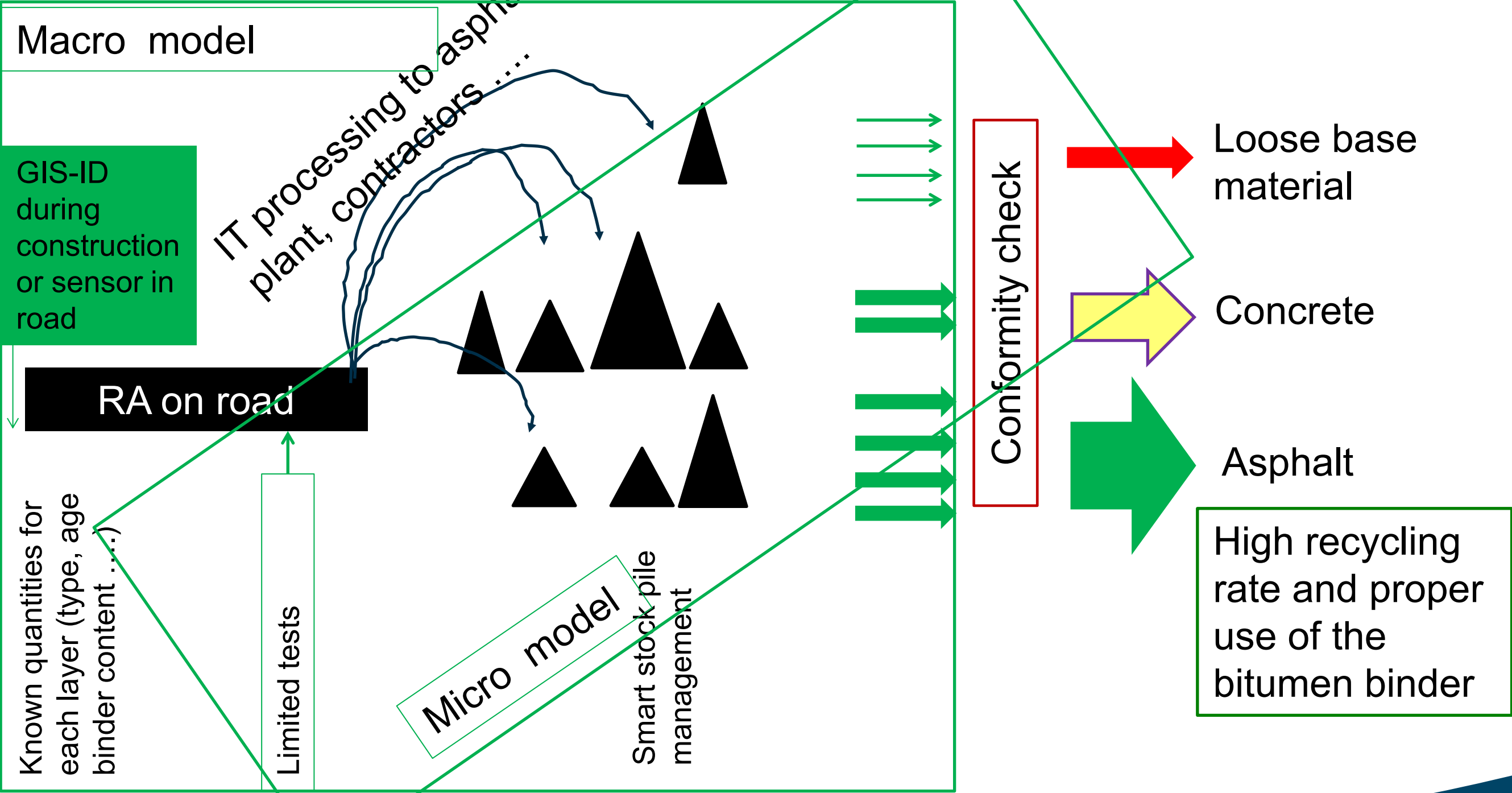University of Antwerp

SSMARAGD: Objective

Currently: mixing together smaller and larger amounts of <u>recyclable asphalt</u> till one non-optimized recycling material (→ large variance in characterictics)
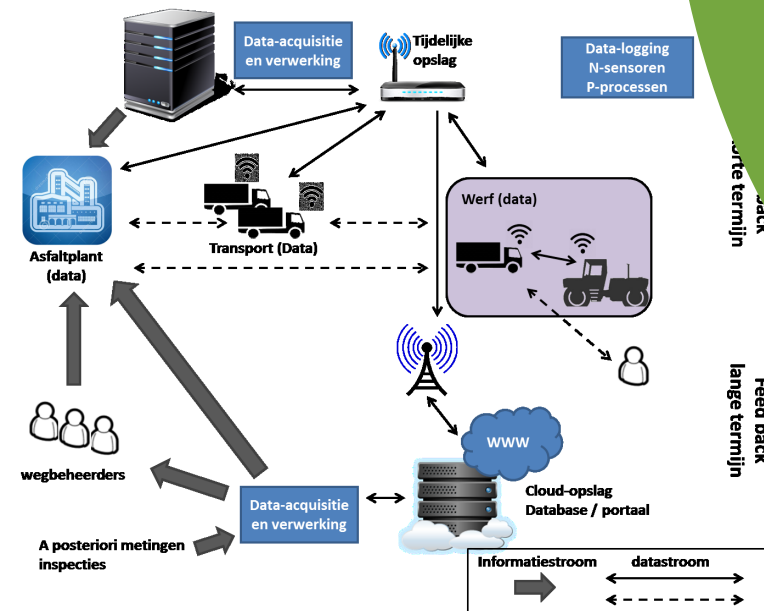

Asphalt plants, contractors...

RA on road

Quantities on road and quality : unknown

Identification of RA by cores and lab analysis

Usually mixing different smaller quantities to one semi-homogenous recyclable quantity

Conformity check for each application

Loose base material

Concrete

Asphalt

Low recycling rate and improper use of the bitumen binder

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ROAD_IT into SSMARAGD (Use of Reclaimed Asphalt)

Future optimization of use of RA by upcyclen: SSMARAGD by ROAD_IT tools

Macro model

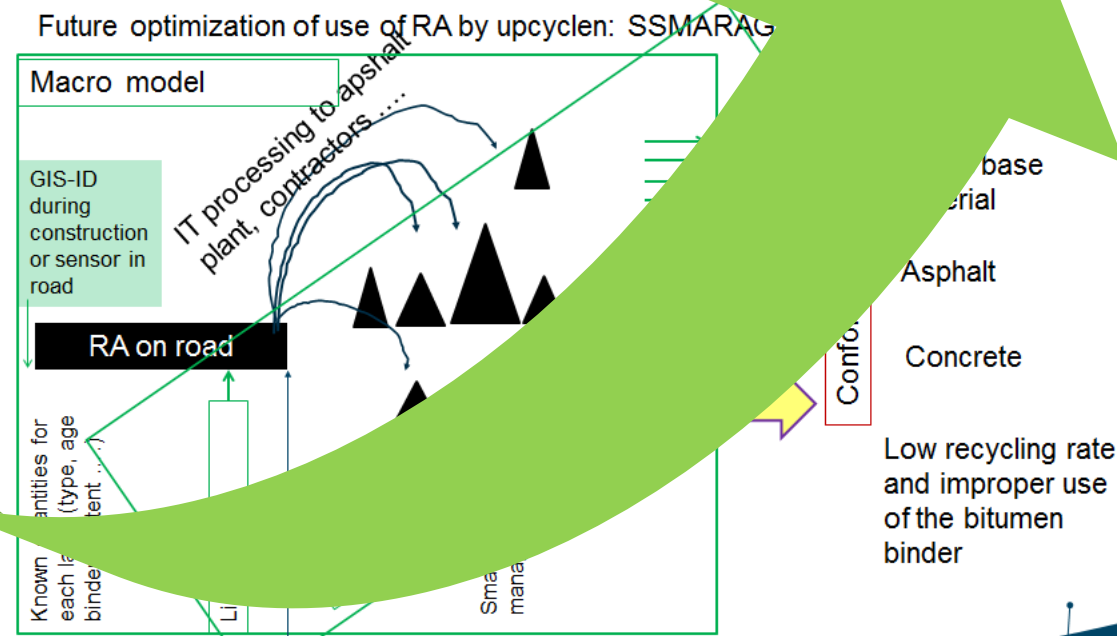GIS-ID during construction or sensor in road

RA on road

IT processing to asphalt plant, contractors ....

Known quantities for each layer (type, age binder content ....)

Limited tests

Micro model

Smart stock pile management

Conformity check

Loose base material

Concrete

Asphalt

High recycling rate and proper use of the bitumen binder

Conclusion

IT in road construction process

Thank you

Towards more use of ICT in Road Engineering

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