DNIT technological model for direct enforcement on Brazilian federal highways

TECHNOLOGY CONVERGENCE 2023

Gustavo G. Otto   Davi C. Melo   Bráulio F.L.B. Junio   Adosindro J. Almeida   Welington L. Repette   Amir M. Valente

ISWIM

6 - 10 November 2023
Brisbane, Australia

UFSC

IMT | FORUM

Introduction

TECHNOLOGY *CONVERGENCE* **2023**

PPV: First LS-WIM sites in Brazil using Weight Stations

ANTT: Weight Stations full automated with WIM for pre-selection

ANTT: WIM for Direct Enforcement SandBox

2007   2014

2020   2021

WIM Network and other types of **traffic monitoring, enforcement systems, ITS** and **smart roads**

1974

2017

2024

ANTT/CCR: HS-WIM research for Direct Enforcement

DNIT/PPM: HS-WIM sites for pre-selection and for Direct Enforcement applications

DNIT/HS-WIM: beginning of WIM applications in Brazil

DNIT/PIAF: 35 HS-WIM sites for pre-selection a weight station full automated
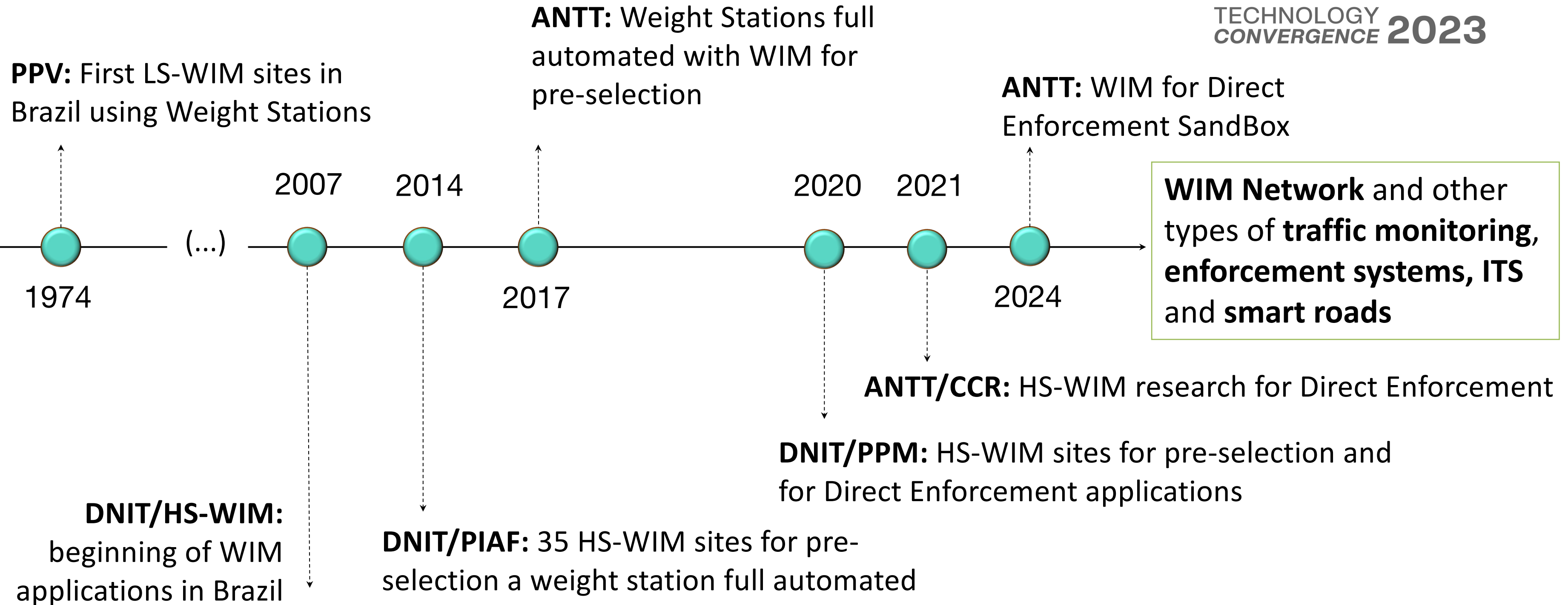
Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

DNIT technological model of a Mixed Weighing Staion (PPM)

TECHNOLOGY *CONVERGENCE* **2023**
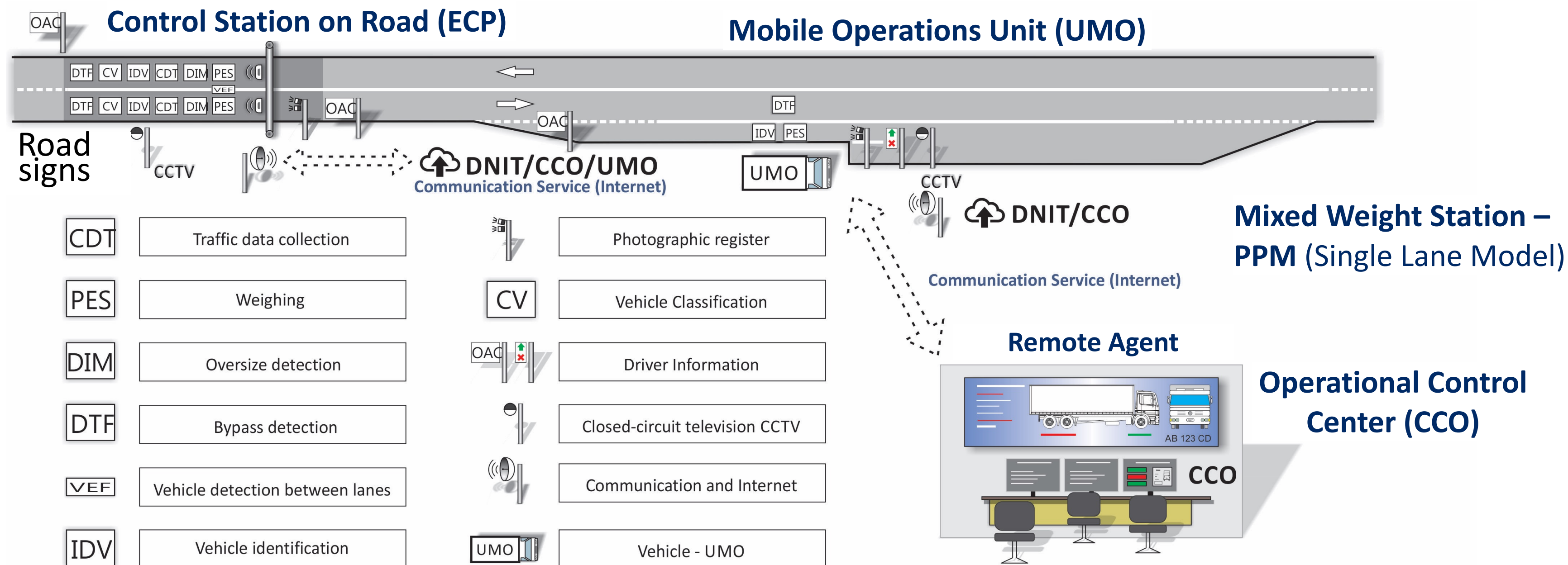
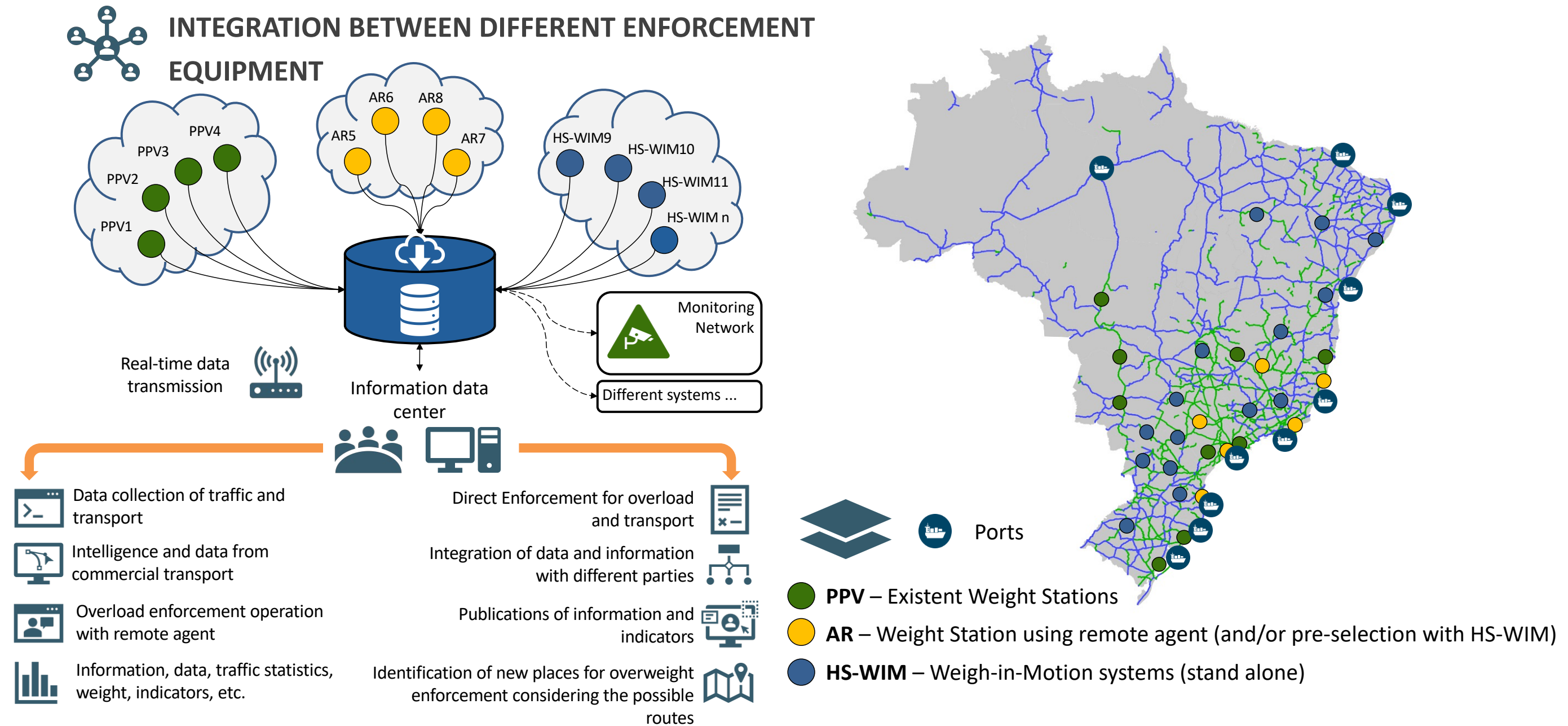Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

Brazil plans for on-road overload enforcement

INTEGRATION BETWEEN DIFFERENT ENFORCEMENT EQUIPMENT

PPV4
PPV3
PPV2
PPV1

AR6 AR8
AR5 AR7

HS-WIM9 HS-WIM10
HS-WIM11
HS-WIM n

Monitoring Network

Different systems ...

Real-time data transmission

Information data center

Data collection of traffic and transport

Intelligence and data from commercial transport

Overload enforcement operation with remote agent

Information, data, traffic statistics, weight, indicators, etc.

Direct Enforcement for overload and transport

Integration of data and information with different parties

Publications of information and indicators

Identification of new places for overweight enforcement considering the possible routes

Ports

PPV – Existent Weight Stations

AR – Weight Station using remote agent (and/or pre-selection with HS-WIM)

HS-WIM – Weigh-in-Motion systems (stand alone)

Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente
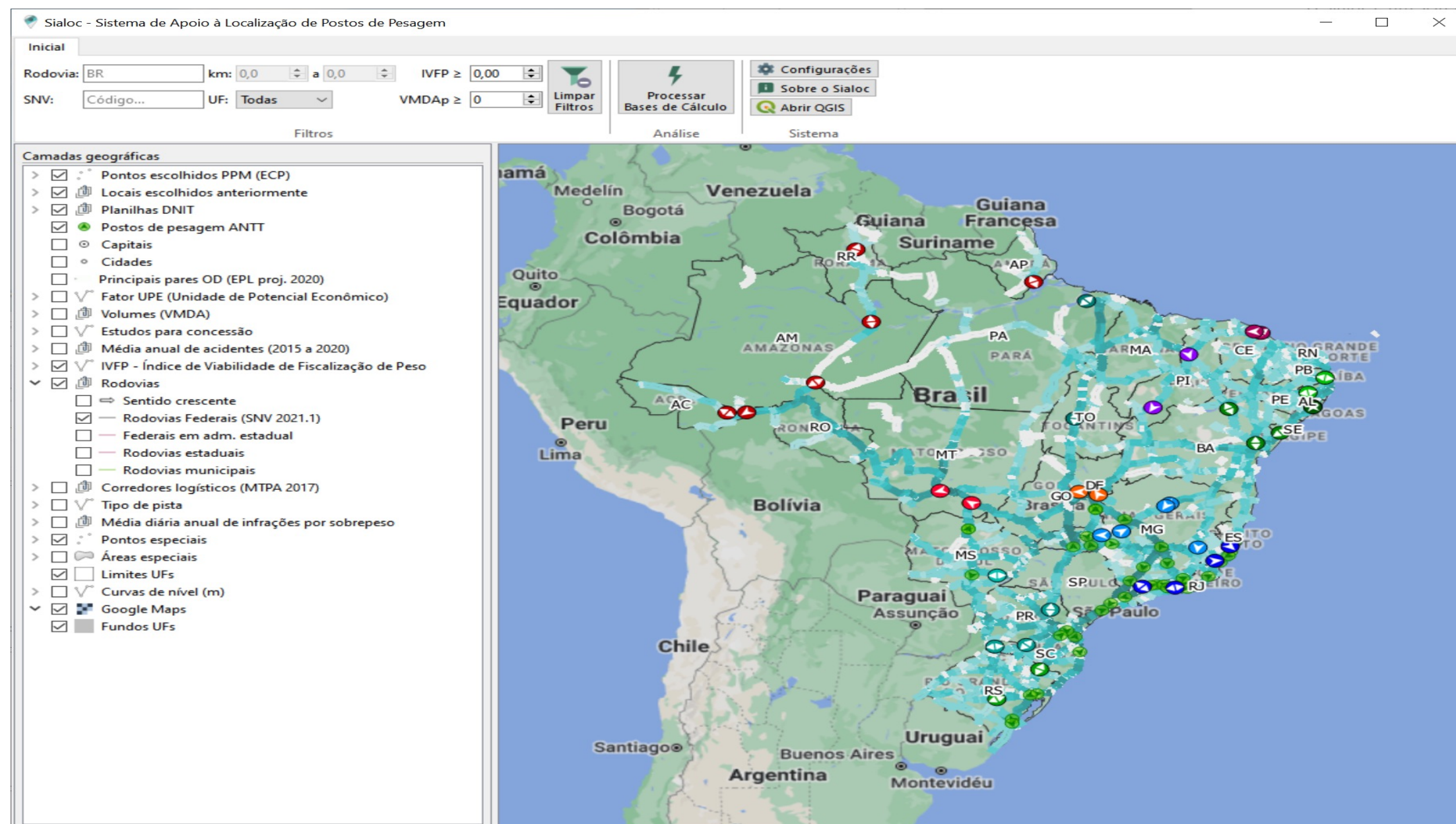
Operational architecture
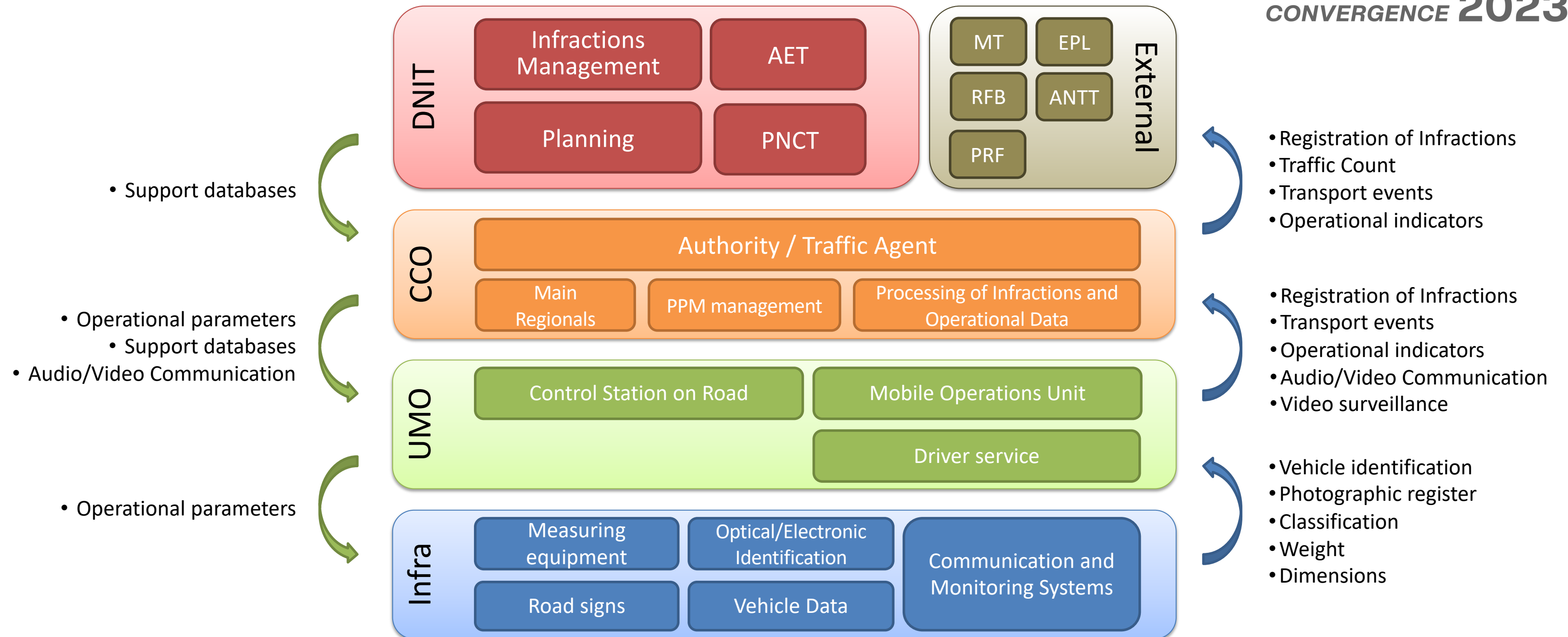
Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

Definition of locations for enforcement systems
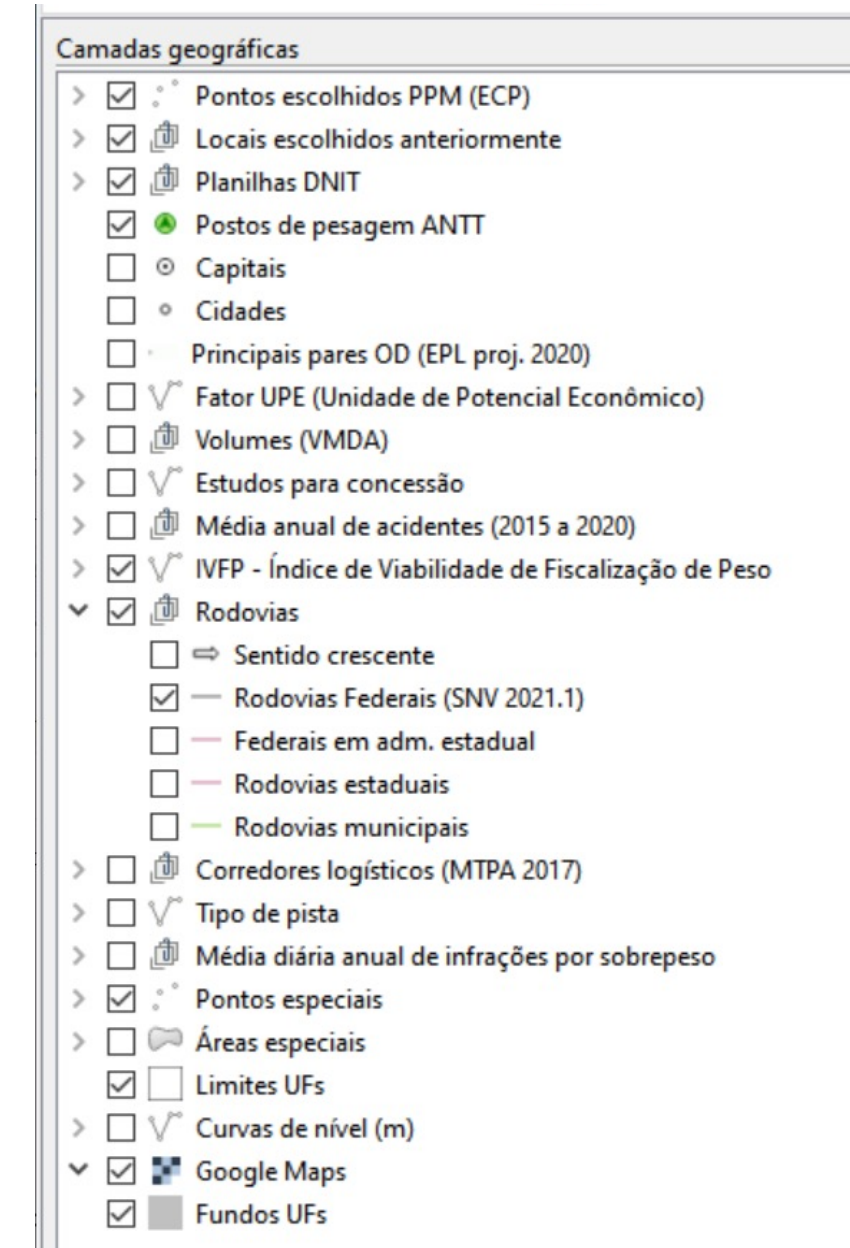
Author/s:

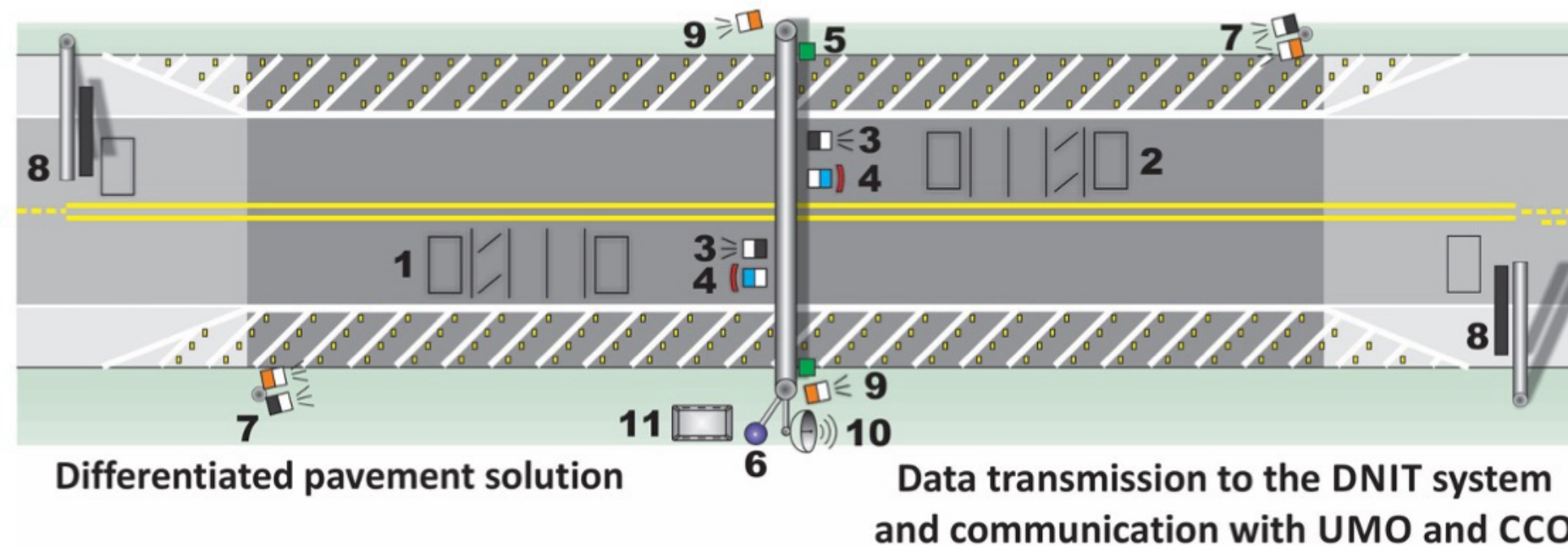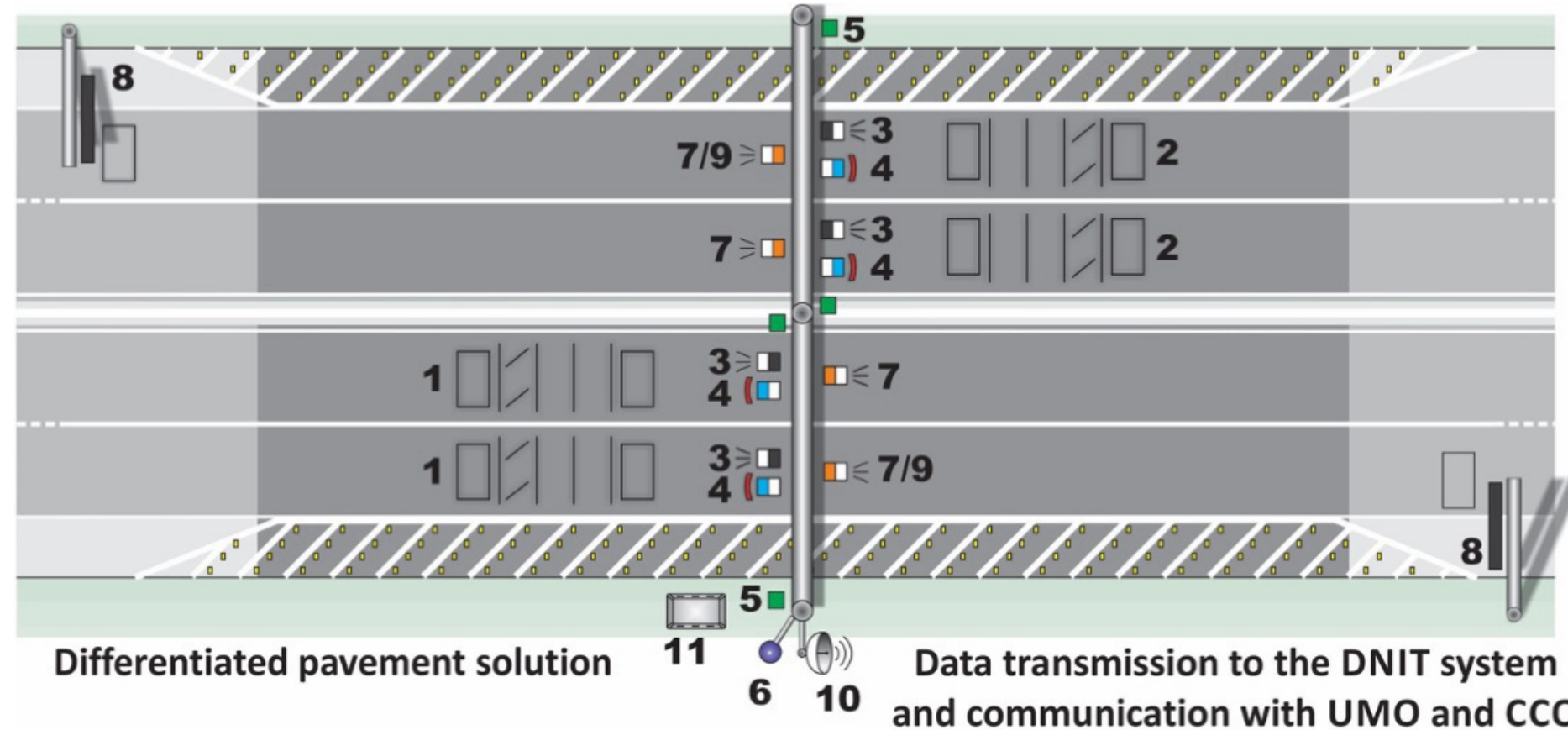**G. G. Otto**, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

On-Road Control Station

On-Road Control Station
(Single Lane Model)

8

9 5 7

3 2
4

1 3
4

8

7 11 9 10
6

Differentiated pavement solution

Data transmission to the DNIT system and communication with UMO and CCO

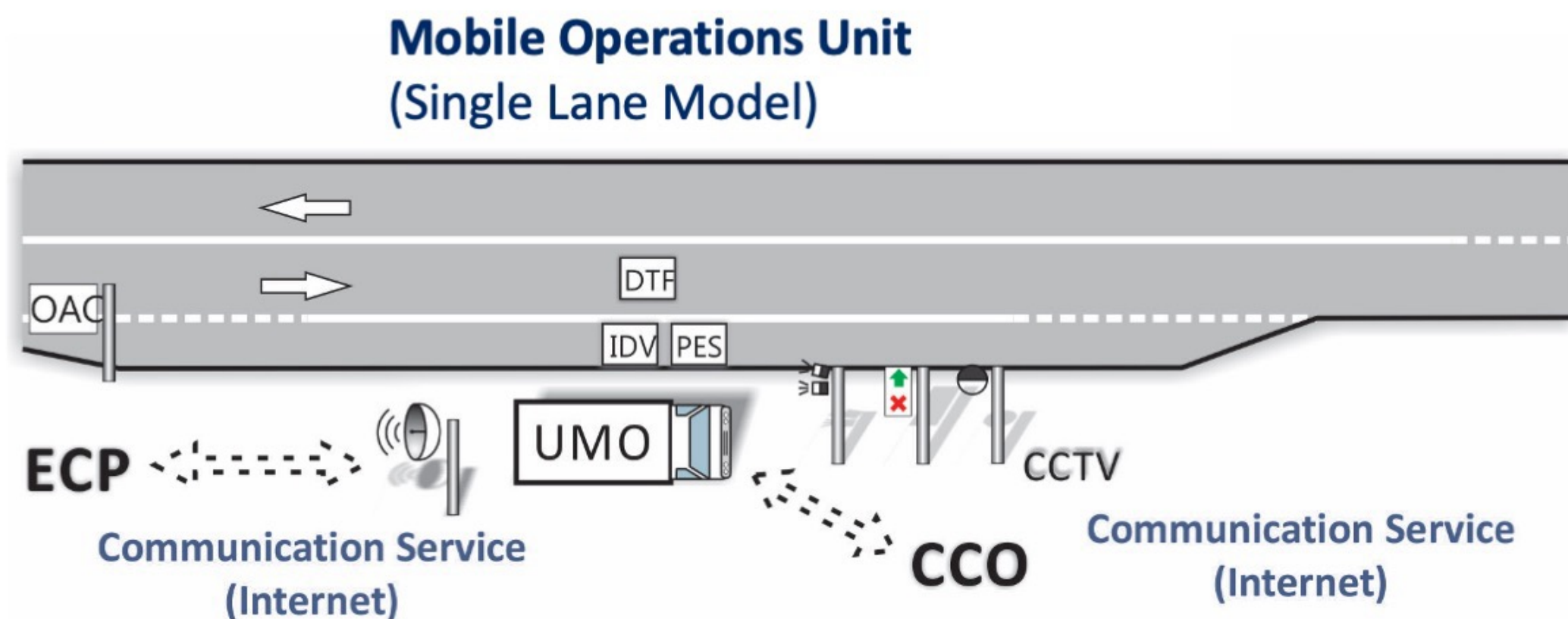|	
High performance pre-selection WIM with 4 lines, WIM Quartz or Strain Gage.	
Dimension detection, laser scanner.	
Inductive loop type presence detector, triggering devices and/or speed.	
Dual wheel and side position detector, Double WIM Polymer.	
Height detection, Laser Beam.	
Driver Orientation, VMS Variable Message Sign in Half-gantry.	
Photographic record with character reading.	
Overview photographic record, Camera.	
Closed Circuit TV, PTZ camera.	
Communication and Internet, fiber, cable, radio or GPRS	
Control System and Integration of Different Technologies.	

Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

On-Road Control Station

Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

Mobile Operations Unit

Mobile Operations Unit
(Single Lane Model)

ECP — Communication Service (Internet)

UMO

CCO

CCTV — Communication Service (Internet)

PES	Weighing
DTF	Bypass detection
IDV	Vehicle identification
	Communication and Internet
	Photographic register
OAC	Driver Information
	Closed-circuit television CCTV
UMO	Vehicle - UMO

Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente
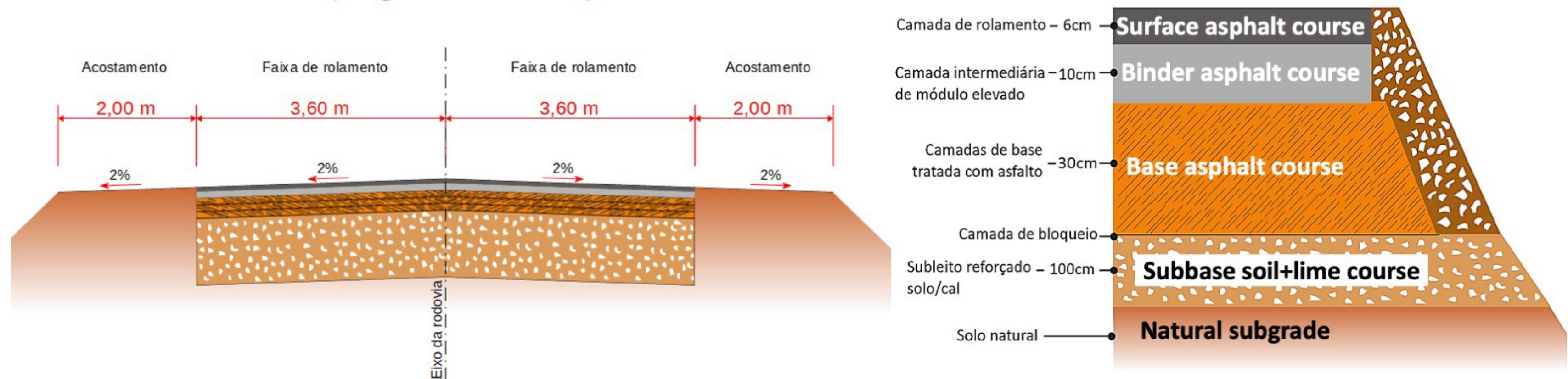
Operationa Control Center
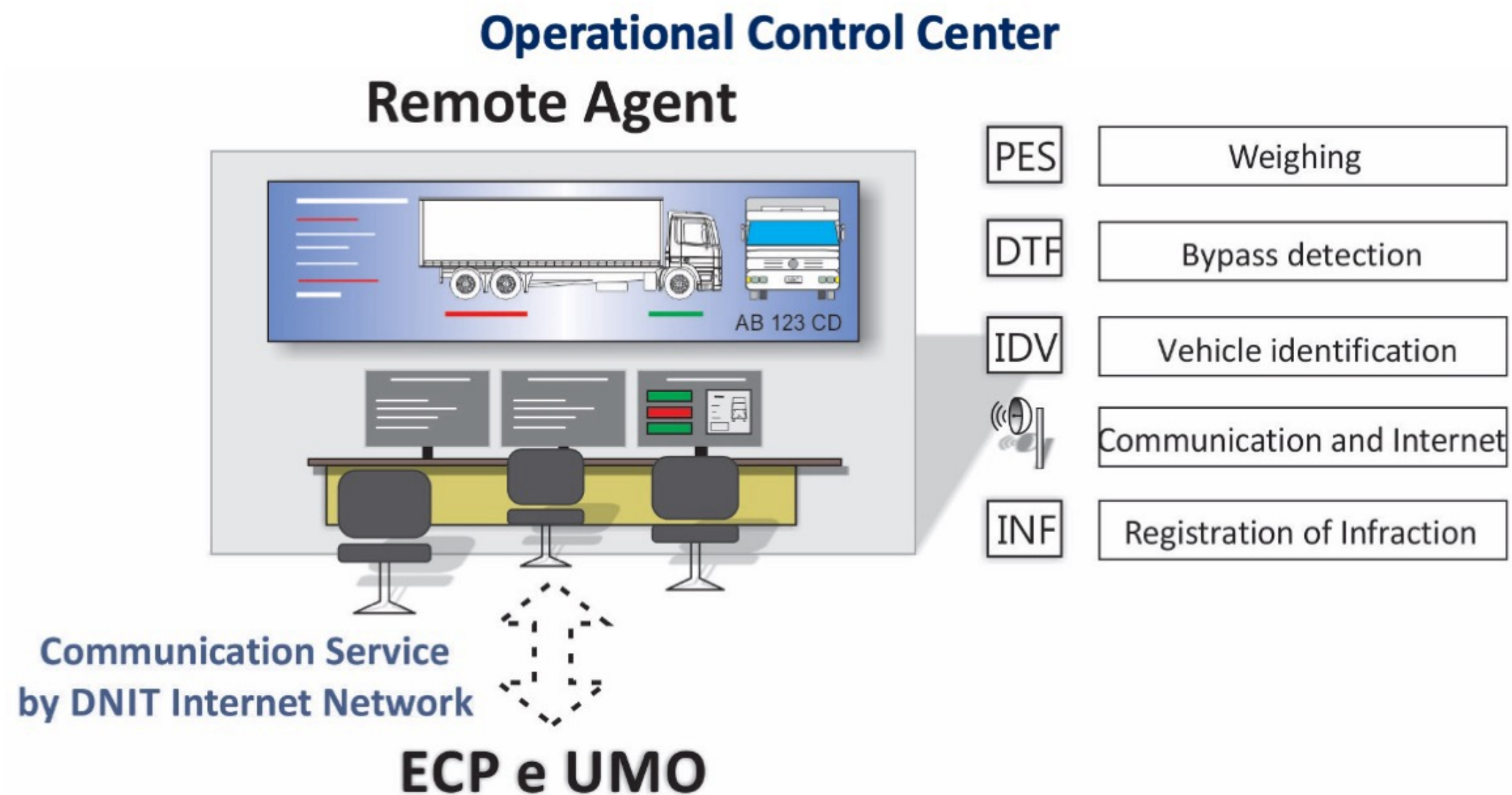
Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

Pavement for HS-WIM system

Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

Conclusions

- Temporary PPM Program:
  - PPM serves as an interim measure for DNIT.
  - Awaiting legal approval for HS-WIM direct enforcement.
- PPM Components and Role:
  - Comprises ECP, UMO, and CCO.
  - Empowers federal agents to address overloaded vehicles.
- Infrastructure Design:
  - Utilizes a Thick Asphalt Concrete Pavement (TACP) for WIM application.
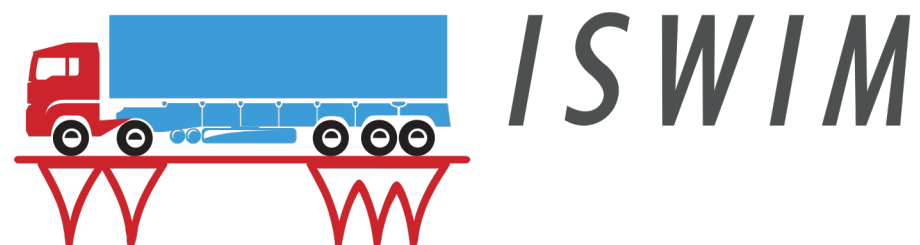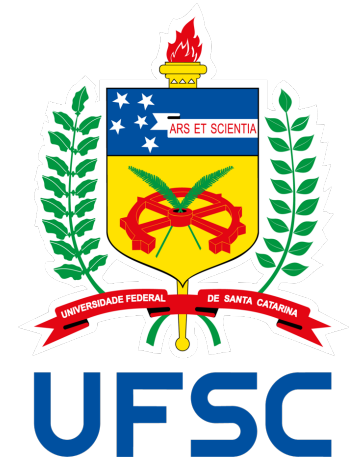 - Adheres to COST-323 recommendations and Brazilian norms.

Author/s:

G. G. Otto, D.C. Melo, B.F.L.B. Junio, A.J. Almeida, W.L. Repette, A.M. Valente

Thank you!

Gustavo G. Otto   Davi C. Melo   Bráulio F.L.B. Junio   Adosindro J. Almeida   Welington L. Repette   Amir M. Valente

6 - 10 November 2023
Brisbane, Australia