



22nd  
**ITS World Congress**  
Bordeaux, France  
5 to 9 October  
2015

# Weigh-in-motion (WIM): a tool for compliance of HCVs

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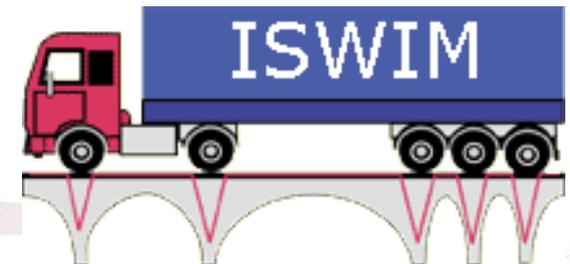




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# International Society for WIM ISWIM



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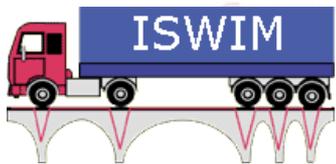


# ISWIM: [www.is-wim.org](http://www.is-wim.org)

- Non profit making association, based in Zürich, CH
- To support advances in WIM technologies (R&D), standardization & tests, better and more widespread use of WIM (data)
- To disseminate knowledge & understanding of WIM: conferences, seminars, publications
- 400 individual members, 40 countries  
16 vendors: CAMEA, Captels, Cestel, Cross Zlin, ECM, Haenni, Intercomp, IRD, Kalibra, Kapsch, Kistler, MSI, SF Dynamics, Sterela, TDC, TDS
- 6 International conferences ICWIM (1995-2012) + 2 regional workshops (1999-2011)
- **ICWIM7: Brazil, Nov 7-10, 2016**



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# Challenges and WIM Technologies

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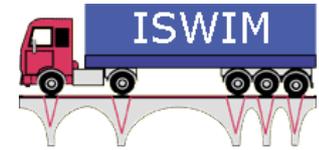


# Challenges



- Compliance of HCV weights and dimensions with the National/ International regulation (e.g. Directive 96/53EC)
  - Fair competition between companies/modes
  - Infrastructure safety and durability
  - Road safety
- **Need of weights and dimensions data on a large scale + enforcement**

# WIM Technologies



Static weighing:  
long, inefficient, costly...

Low speed (LS) WIM:  
dedicated area, checks

High speed (HS) WIM:  
at speed, in the traffic flow

- Various type of road scales/sensors: load cells, bending plates, piezos...
- Multiple-sensor (MS-)WIM to cope dynamic effects (pavement evenness...)
- Bridge WIM: developed since early 2000's
- On-board WIM
- Specification (COST323) and standards



Bridge (B-)WIM:  
instrumented bridge



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# Applications of WIM



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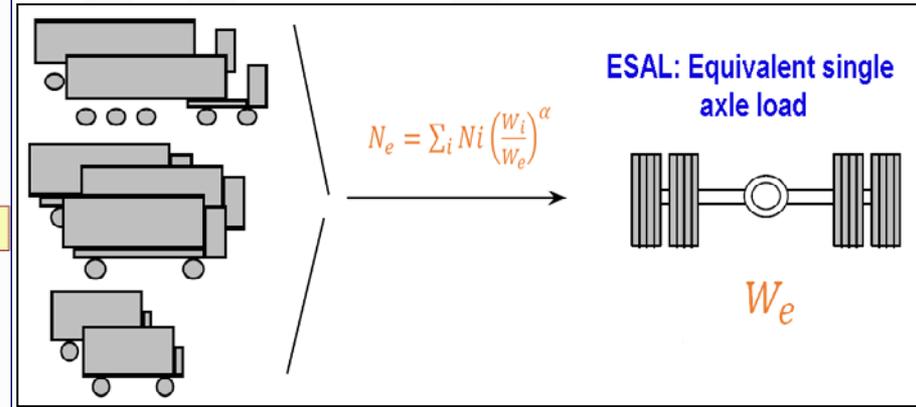
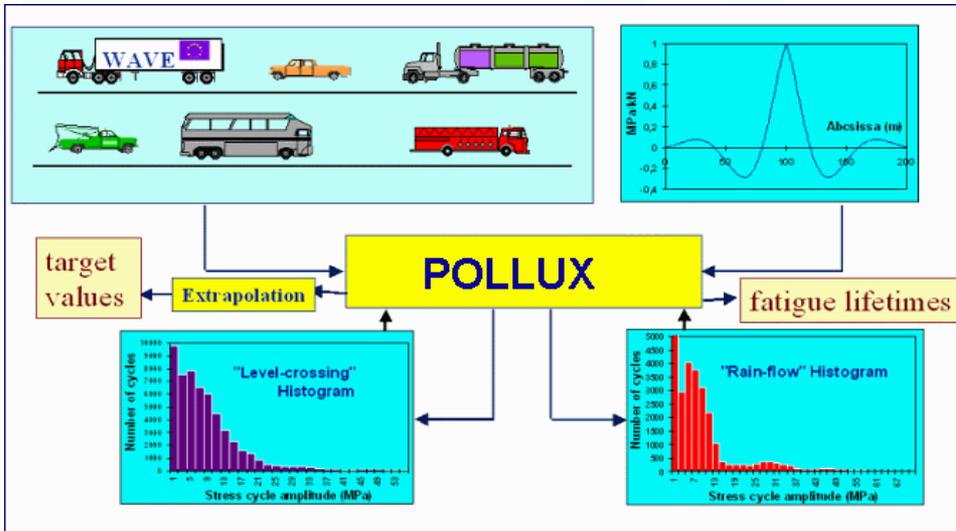
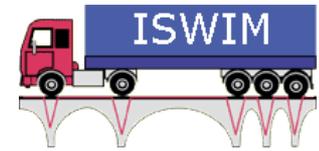
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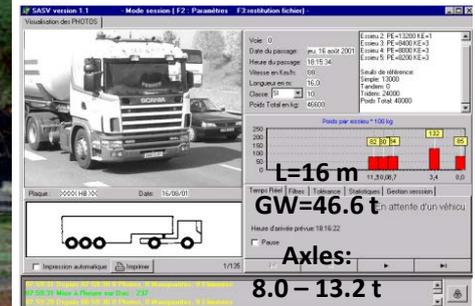
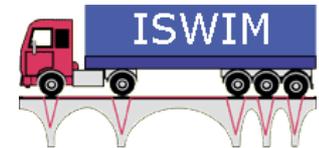
# Infrastructure



- Bridge and pavement design, (re)assessment, monitoring, repair
- Fatigue damage assessment, extreme loads and safety factors
- Coupling WIM + infrastructure instrumentation  $\Rightarrow$  ITS solution  
“smart structures”
- Data for asset management, road pricing, public/private partnership and concessionaries (shadow toll)

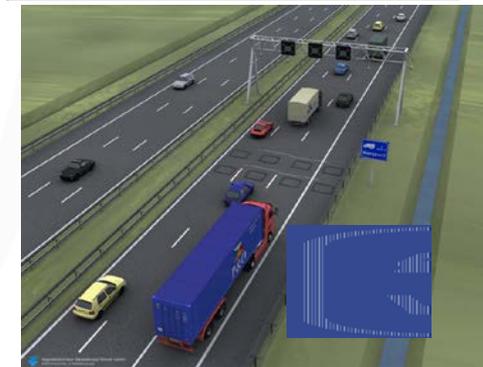
$\rightarrow$  **Axle loads, GVW, axle and vehicle spacing**  
**accuracy: C(15) [ $\pm 15\%$  GVW]**

# Overload screening

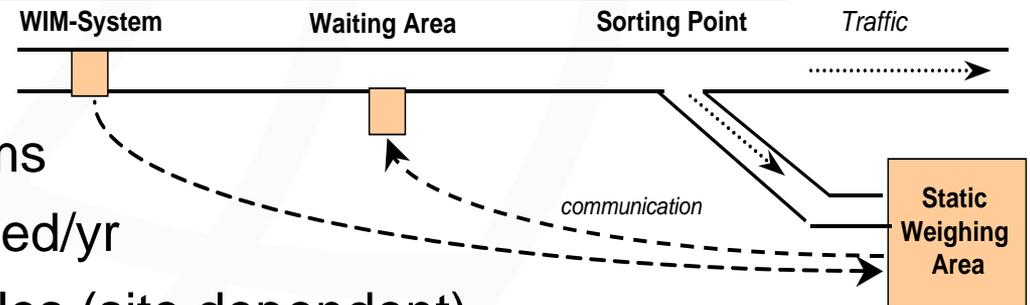
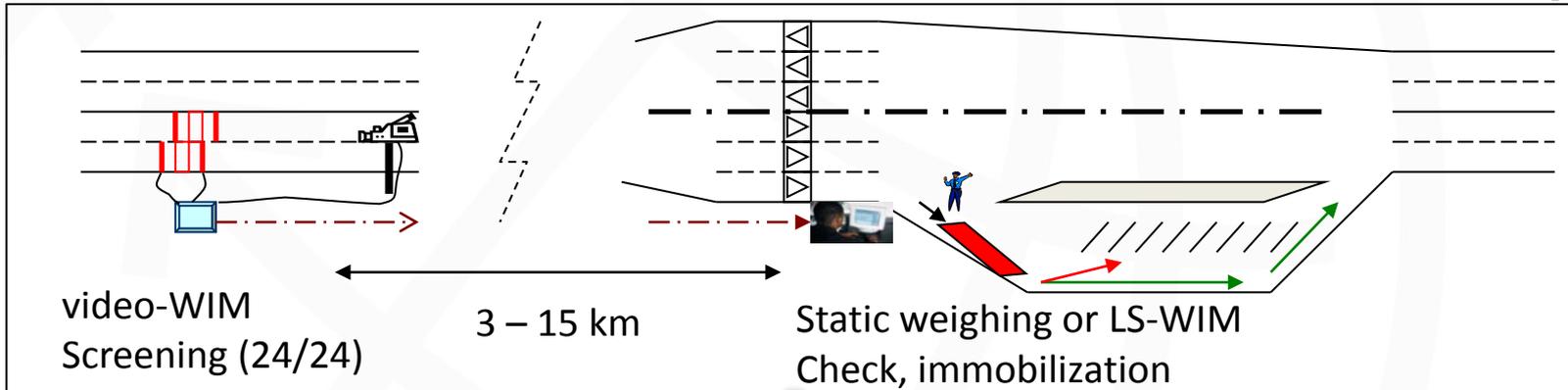
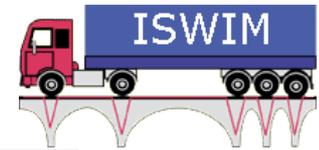


- HS-WIM systems (network) screening the main highways/motorways 24/24 and 7/7
- Coupling video-WIM + OCR → record/pics of all suspicious vehicles (loads, speed, lane)
- + record of all the vehicles for other purposes
- Targeting the checks and enforcement periods/sites
- Company profiling (letters of warning + checks in company)

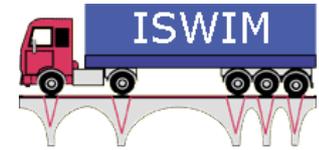
**Accuracy: B(10) [±10% GVW]**



# Overload enforcement



- NL: 20 systems, FR: 29 systems
- FR: 30 millions of HCVs weighed/yr
- 10 to 20% of overloaded vehicles (site dependent) by 5 to 10% mainly, up to 20% + overspeeding...
- Fines (FR): 135 €/ +1 t GVW and +0,5 t axle
- Immobilization + download above 8-10% in excess
- Automation of the selection process...



# Towards direct enforcement by WIM

**HS-WIM are not yet approved by the Legal metrology (OIML)**  
**Not 100% of the measurements are in the range of  $\pm 5\%$  (GW)**

- Technical challenge
  - The WIM system must detect/eliminate the measurements outside the accepted tolerances ( $\pm 5\%$  GVW,  $\pm 8-10\%$  axle)
  - The system must identify the validated violators
- Legal challenge
  - The law must be changed to accept HS-WIM as an evidence of an offence
  - The Legal Metrology organization shall deliver a type approval
- Reliability challenge: no wrong penalty, but no detection OK
  - CZ is a pioneer, but difficulties to implement...
  - FR launched a National research project



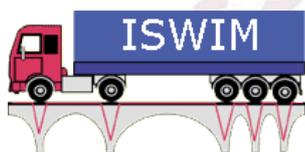
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# Thank you for your attention!



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