



## Impact Assessment Report

**Subject:** ODO & DMI interface

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<b>Control Group</b>	04/07/2013
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In April 2012, a Memorandum of Understanding was signed between

- the Railway Sector,
- the Commission,
- and the Agency

aiming at facilitating the deployment of ERTMS.

- (d) ERA, with the support of the signatories, will produce a concept paper setting out the main options, challenges, costs and benefits related to the definition of the DMI interfaces and of odometer interfaces by 1 June 2013. A first draft should be ready by the end of 2012.



Date	Activity/Milestone
April 2012	MoU Baseline 3 signed
September 2012- December 2012	5 Bilateral Meetings with Vehicle Suppliers joined with ERTMS/ETCS On-Board Suppliers (+2 written feedbacks)
January 2013	First Draft of the Feasibility Study Published on Extranet (Economic Survey Group)
February 2013	Presentation of Study in ESG
February – March 2013	Bilateral meeting with selected Railway Undertakings to discuss a) the study b) possible working topics to be included in the final study
March – April 2013	Detailed assessment of the feasibility of such interface taking into account the view of the other vehicle applications
May 2013	Draft Final Study
June – July 2013	Pre-Discussion with UNISIG/UNIFE and CER Presentation of the final study in CG/ESG



## Topic 1: Odometry-interface



- **Problem 1:** A number of vehicle applications require the installation of sensors for speed and distance measurement:
  - It is difficult to find “free” space for sensors
  - Increased one-time costs (investment) costs and operational (maintenance) costs due to the number/variety of sensors
- **Problem 2:** Exchange of EVC in a vehicle might require the exchange of all sensors (and other constituents within the vehicle);
- **Problem 3:** Some RUs report low performance of ETCS odometry;



## Topic 1: From Problems towards Objectives

Objective	Priority (low; medium; high)
1. The standardisation of the <u>odometric</u> interface should facilitate the renewal of the ERTMS/ETCS on-board system;	High
2. The standardisation of the <u>odometric</u> interface should contribute to an improvement of the performance of the <u>odometry</u> ;	High
3. The standardisation of the <u>odometric</u> interface should reduce the number of <u>odometric</u> sensors within a vehicle;	Low/Medium
4. The standardisation of the <u>odometric</u> interface should allow <u>interchangeability</u> of <u>odometric</u> sensors;	Low/Medium



- **Option A: Interface to a Centralised Odometry**

This interface is an “application internal” interface where the subsystems of the application are connected to a centralised odometry.

- **Option B: Interface to Odometry Sensor (sensor sharing)**

This interface is at sensor level. In this way, the different vehicle applications could share a sensor. The communication between the sensors and the different odometry applications can be made in 2 ways.

- bus: sensors and application systems connected to a bus (as presented in the picture below); the application might need a specific “driver” software to communicate with the sensor via the bus.
- direct connections from each sensor to each application (each sensor with multiple connections to the applications).



- **Option C: Interface between Adhesion Control/ Brake Control and ETCS On-board**

This interface is at application level. It is a specific interface between the main performance and safety critical applications (ETCS, brake control and traction control) to exchange:

- Odometric information
- Status of the brake and the traction control
- Commands to ask for a specific status of an axle at the time x (e.g. unbraked/ unpowered)





## Topic 1: Analysis of benefits

Objective	Priority (low; medium; high)	Option A	Option B	Option C
1. The standardisation of the <u>odometric interface</u> should facilitate the renewal of the ERTMS/ETCS on-board system;	High	Yes	Yes	Yes (in case of providing reference speed with confidence intervals)
2. The standardisation of the <u>odometric interface</u> should contribute to an improvement of the performance of the <u>odometry</u> ;	High	No	No	Yes ( <u>unbraking/unpowering of axle</u> )
3. The standardisation of the <u>odometric interface</u> should reduce the number of <u>odometric sensors</u> within a vehicle;	Low/Medium	Yes	Yes	Yes (in case of reference speed with confidence intervals)
4. The standardisation of the <u>odometric interface</u> should allow <u>interchangeability of odometric sensors</u> ;	Low/Medium	No	Yes	No
5. Other benefits/opportunities	Low/Medium			<u>Verification of the data entry from the train-driver in ETCS</u>



- **Option A:** Total (one-time) cost impact € 14 M – € 70 M ;
- **Option B:** Total (one-time) cost impact € 0,7 M and € 7 M;
- **Option C:** Implementation of the interface, re-certification of current products – similar as for option B;



- All options provide benefits which are higher than the costs. Nevertheless option B in combination with option C provide similar benefits (and more opportunities) as option A with less costs and the specification and later implementation of the interface is considered to be feasible;
- The Agency recommends to the railway sector to start with analysing option C in more detail e.g. by specifying a first FIS (functional interface specification)– this requires commitment from suppliers for ETCS on-board units and suppliers for brake and traction control;



## Topic 2: DMI Interface



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- **Problem 1:** DMI-display is not interchangeable;
- **Problem 2:** Limited space on train drivers desk to cover all applications (ERTMS, Class B, Train Control Motion System);
- **Problem 3:** Failure of the DMI-display leads to punctuality problems;
- **Problem 4:** Upgrade of EVC requires modifications of odometry, DMI, Balise reader, Juridical recorder interfaces;

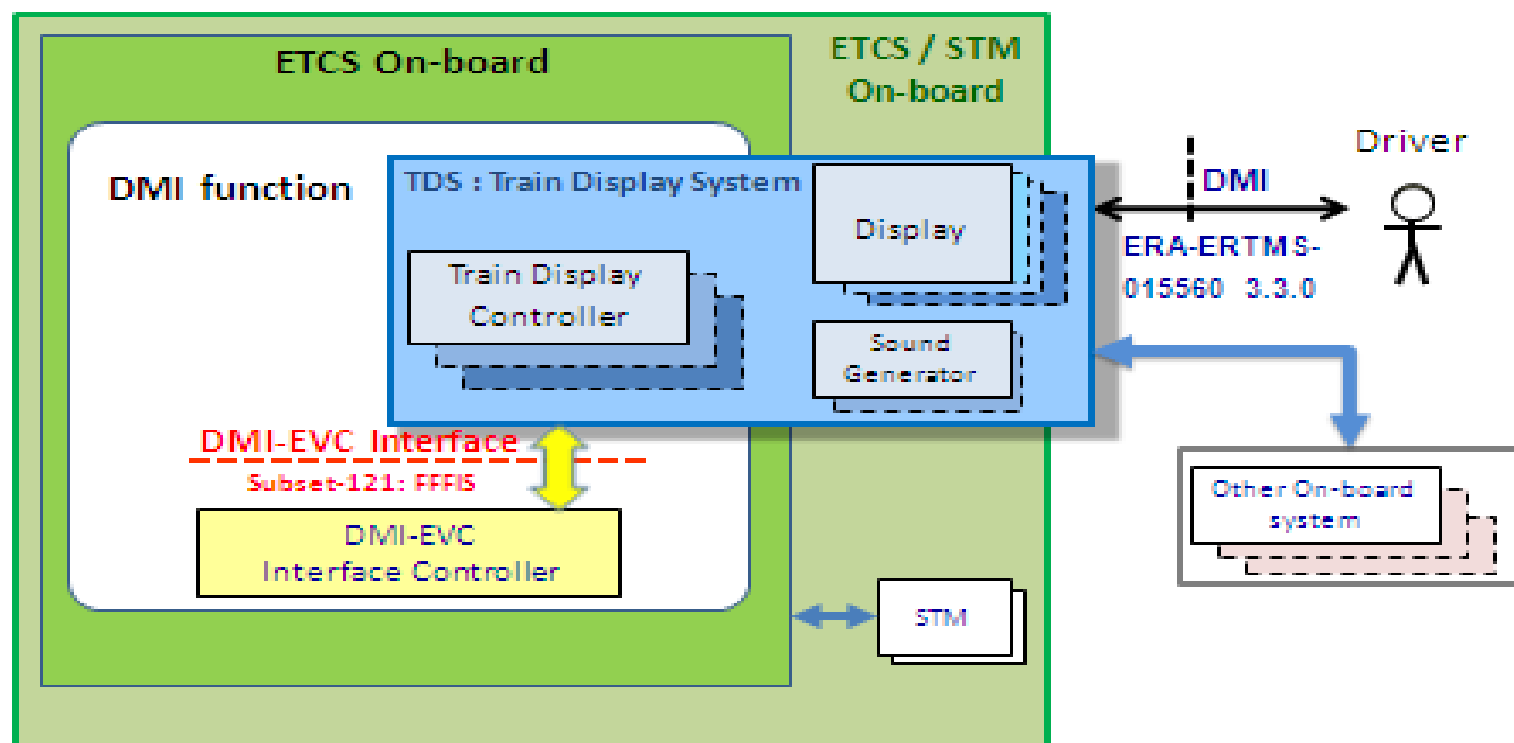


## Topic 2: From Problems towards Objectives

Objective	Priority (low; medium; high)
1. The standardisation of the interface should facilitate the interchangeability of the EVC (e.g. in case of upgrades/renewals);	High
2. The standardisation of the interface should allow the interchangeability of the display;	Medium
3. The standardisation of the interface should facilitate the scaling of different applications into one display;	Medium
4. The standardisation of the interface should allow the switching of applications between the available displays on the train drivers desk;	Medium



- Option A: interface at application level;
- Option B: interface at graphics card level;





## Topic 2: Assessment of benefits

Objective	Option A Objective fulfilled (yes; partially; no)	Option B Objective fulfilled (yes; partially; no)
The standardisation of the interface should facilitate the interchangeability of the EVC (e.g. in case of upgrades/renewals);	Yes	Partially (DMI-logic inside EVC)
The standardisation of the interface should allow the interchangeability of the display;	Yes, in case of smart DMI-displays (including the train display controller functionality)  Partially, in case of use of individual train display controller (depends on the interface between TDC-DMI)	Yes
The standardisation of the interface should facilitate the scaling of different applications into one display;	Yes	No
The standardisation of the interface should allow the switching of applications between the available displays on the train drivers desk;	Yes	Yes



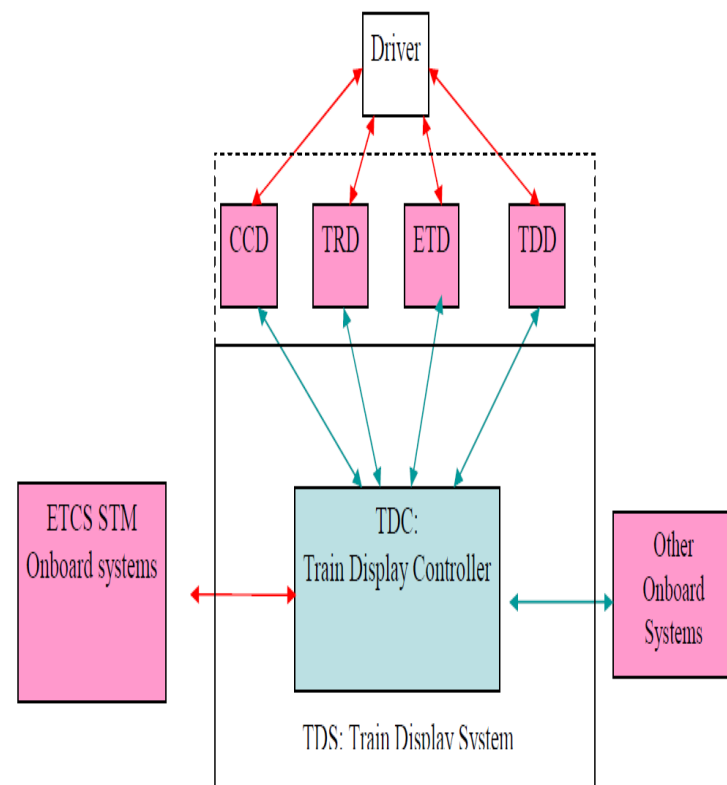


- **Option A:**
  - One-time cost impact for ERTMS-suppliers is estimated between 10 to 100 MEUR for redesign and reauthorisation of the interface (high complexity of the interface due to re-allocation of functions);
- **Option B:**
  - One-time cost impact for ERTMS-suppliers is estimated between 1 to 10 MEUR for redesign and reauthorisation of the interface (low complexity of the interface);
- **Graphics functions allocated to EVC or to TDC:**
  - Allocation of graphics functions to the EVC (instead of to a TDC/DMI) could increase the cost of the EVC (as being a system with higher safety level than the TDC/DMI);



## Topic 2: Conclusion

- Option A (interface ETCS-TDC/DMI at application layer) and the option B (technical interface between display and TDC) have a positive economic outcome, with option A fulfilling the highest priority (facilitating the inter-changeability of the EVC);
- The ERA supports both the activities of UNISIG (standardisation of the interface EVC-DMI controller) and the activities of the CENELEC WG (standardisation of interface between other applications and DMI controller);





- The ERA has no intention to include further activities in the ERA Work Programme related to the DMI-interface & ODO-interface (priorities on interoperability aspects);
- The feasibility study shall be used by the ERA to support activities in line with the conclusions of the report;
- The railway sector has already taken the actions to standardise the DMI-interface;
- The railway sector should take actions to start with analysing option C in more detail;



## Questions/Comments