

Authors Jayne Yeo	e-mail address of corresponding author
Title of presentation What role for the EU regulator as regards Human and Organisational Factors (HOF) in railway automation?	Institution European Union Agency for Railways
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Abstract <p>Railways are experiencing an automation revolution potentially leading to the following opportunities:</p> <ol style="list-style-type: none"> 1. Optimisation of normal operations – highly reliable automation can optimise the operation so that capacity and performance are improved under routine operations, whilst also ensuring consistency and improving safety. 2. Global optimisation – automation can consider a broader range of variables than a human operator and so provide for optimisation over a larger area. 3. Standardisation of rules – automation can drive the standardisation of rules and provide a business case for investment to remove unnecessary variation in the railway. 4. Reduce staffing – reliable automation can reduce operator workload and allow for a smaller workforce. <p>Nevertheless, as the lessons learnt from two recent ETCS-L2 incidents demonstrate it is overly optimistic to believe that automation alone will reduce risks and improve safety.</p> <p>“The human role in relation to highly automated and extremely complex signalling systems has to be considered thoroughly.</p> <p>These issues seem to be underestimated today. All-technology solutions cannot solve the problems alone, and can create new ones.”</p> <p>It is a myth to think that automation will eliminate humans from the socio-technical system in railways. The human contribution is not eliminated, but rather moved from the operational to a different level: design, supervision of the system, maintenance, certification and regulation.</p> <p>The integration of HOF will still be necessary as two recent examples from other transport domains demonstrate:</p> <ul style="list-style-type: none"> • Road - deadly crash of an autonomously operating Uber taxi in Arizona in 2018; • Aviation – 2 crashes of Boeing 737 Max killing 348 passengers allegedly due to automation - Maneuvering Characteristics Augmentation System (MCAS) <p>The latter of the 2 examples is from aviation where the integration of HOF for designers and manufacturers is regulated whereas this is not the case with railways today. Although entities in charge</p>	

of maintenance (ECMs) are certified at the moment designers and manufacturers do not have a “certification scheme” whereas they are involved in safety critical tasks.¹

Do railways need to regulate the integration of HOF for designers and manufacturers? Should there be a certification scheme for them as there is in aviation? Railway has already developed rules and standards on the integration of HOF but there is a need to analyse what exists and determine whether it has been implemented or not and in the case of the latter guidance is necessary. If there are gaps in the legislation concerning integration of HOF for designers and manufacturers then this needs to be addressed.

In conclusion we need to ensure that HOF are taken into account in establishing standards and the drafting of legislation with the resulting certification and oversight for railways but this will be challenging.

¹ Capt Chesley Sullenberger, whose landing of a crippled aircraft on New York's Hudson River was turned into a Hollywood film, told a Congressional hearing into the 737 Max that the “crashes are demonstrable evidence that our current system of design and certification has failed us”.