



SMART-TRANSPORTATION DIVISION

BEFORE THE U.S. DEPARTMENT OF TRANSPORTATION

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FEDERAL RAILROAD ADMINISTRATION

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FRA-2018-0027

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May 7, 2018

These comments are on behalf of the Transportation Division of the International Association of Sheet Metal, Air, Rail and Transportation Workers (“SMART”). The SMART Transportation Division, formerly the United Transportation Union, is an organization representing approximately 125,000 transportation employees with active rail members working in all operating crafts including engineers, conductors, trainmen, switchmen and yardmasters.

This is in response to the FRA requesting information and comment on the future of automation in the railroad industry – FRA 2018-0027.

### **General Comments**

As the FRA considers the future of rail automation it must not forget its mandate from Congress, “[i]n carrying out its duties, the Administration shall consider the assignment and maintenance of safety as the highest priority, recognizing the clear intent, encouragement, and dedication of Congress to the furtherance of the highest degree of safety in railroad transportation. 49 U.S.C. § 103(c). As such, safety must be first and foremost when discussing the future of automation of our nation’s railroads. It would be unethical and would violate the mandate of Congress to sacrifice safety for potential profits. With the guiding principle of safety in mind, SMART submits the following comments.

### **Safety and Security must be our Number One Priority**

As noted above, safety must be the highest priority when considering the introduction of autonomous rail operations in the United States. In considering issues of automation in the American rail system, it is important to examine: (1) the essential job functions performed by humans that cannot be replaced by automation, (2) automation in other countries and distinguishing characteristics between those nations and the United States, and (3) the ever-present threat of hostile actors looking to inflict mayhem on our nation’s railroads.

### **Essential Job Functions of Human Railroad Employees Cannot be Automated**

In valuing safety as the highest priority, it is important to understand the essential roles that human employees play in the safe operation of trains. There are countless essential functions that humans perform, using their perception and judgment that cannot be replaced by automation, especially on America’s vast rail system that covers an incredible geographical and weather diversity.

Railroad crews are responsible for detecting issues before they become dangerous. They do so by inspecting trains in roll by inspections and by walking the length of a train to determine if there are issues with couplers, wheels, brakes, handholds, steps and doors, etc. Employees also monitor track conditions, both in yards and on the road, to check for misaligned switches, track obstructions, and weather-related damage. Finally, employees also observe traffic at crossings, including the speed at which vehicles are moving, in order to determine whether it is safe to proceed at normal speed or if there exists the potential for a collision requiring immediate action. While responsible for their own trains, rail crews also observe other trains for any noticeable

defects, including shifted loads and mechanical failures. Additional, it requires two employees to separate a train to open a blocked road crossing and to make most federally required airbrake tests.

The above is a small sampling of the duties of railroad crews that impact safety and security. A more exhaustive list is attached to these comments. See Attachment 1, List of Duties of Railroad Crews. The integration of autonomous operation should focus on supporting these human functions to increase safety rather than replacing them. As explained in more detail below, humans cannot be replaced by autonomous operations in the performance of many essential functions.

### **Autonomous Operations in Other Countries and American Infrastructure**

In its Request for Information, questions pertaining to both autonomous operations in other countries and infrastructure were raised. SMART believes that the two issues go hand-in-hand with safety considerations.

All can agree that upgrading our nation's infrastructure is of critical importance in America remaining an economic power and improving safety and our quality of life. But the reality is that the United States lacks adequate infrastructure to fully support our current rail operations, much less autonomous trains. In addition to inadequate infrastructure, the rail industry's initial implementation of train automation in the forms of positive train control, plus Leader and Trip Optimizer has added to the complexities of operating trains. This puts additional strains on the human crews that operate these trains, which would be compounded further with automated operations.

Trains in the United States are significantly longer than in countries where limited automated operations exist. Many U.S. trains stretch far more than two miles long, with some over three miles in length. This creates a number of complications that are not present in other countries. For example, most railroad crossings in the United States are "at grade," meaning they are at street level. Therefore, vehicles are struck at a high rate, resulting in thousands of collisions and over 200 deaths per year.<sup>1</sup> Since roads are commonly built on section lines that are one mile apart, and trains are usually longer than one-mile, blocked crossings result in limited access by emergency crews in the event of a collision. Without a conductor to pull the pin to separate rail cars at the crossing and an engineer to move the train, access to accident accidents are significantly impeded, resulting in a delay of life-saving care. Additionally, trains frequently derail or strike automobiles in already difficult to access areas. Care would be further delayed if an employee had to be transported to the accident site in order to conduct the above-described functions. Any autonomous operations would need to account for these deficiencies, and the additional strain such operations will put on local emergency personnel, resulting in preventable loss of life due to delayed response times at accidents.

In addition to issues presented above, the excessive length of American trains results in significantly heavier trains than seen in other countries with limited autonomous operations. As

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<sup>1</sup> <https://oli.org/about-us/news/collisions-casulties>

a result, trains in the U.S. suffer more equipment failures and break-in-tuos that cannot be properly be addressed by an autonomous operation. Humans are needed on the scene to address these and other mechanical failures that require immediate action to potentially avert disaster.

### **Humans Play an Essential Rule in Thwarting Hostile Actors and Terrorism**

Railroads also are subject to dangers that go beyond the standard safety issues such as derailments and collisions. Dangers like terrorist attacks and cyber-attacks continue to loom, as trains are a prime target for hostile actors due to the potential colossal damage that can be inflicted. Humans have the ability to perceive threats and take action in a manner that autonomous operations cannot. Where there is the possibility of out-of-control trains carrying thousands of tons of hazardous materials, it is critical that discussions regarding train automation address these concerns in a substantial way, or the threat to life and property would be significant.

Unfortunately, trains are prime targets for terrorists or other hostile actors seeking to inflict massive damage to both life and property. News reports are rife with reports of both successful and unsuccessful attacks on rail systems. The role of human engineers and conductors in such incidents simply cannot be replaced by an automated system. For example, in October of 2017, an individual with allegedly terroristic goals attempted to take control of an Amtrak train and pulled the emergency brakes.<sup>2</sup> There, the train's conductors helped to physically subdue the perpetrator before any loss of life occurred. In the 2015 Thalys train attack, a man wielding an AK-47 opened fire on a crowded train.<sup>3</sup> While the perpetrator was famously halted by passengers onboard, witnesses stated that the acts of the conductor were heroic as well.<sup>4</sup> While these are stark examples, they clearly show that a human presence can mean the difference between life and death when terrorists try to take lives. This is the world we live in, and when the development of autonomous rail systems is considered, such stories need to remain at the forefront of our thinking.

### **Cyber-Attacks are a Growing Threat to Railroads**

In addition to traditional terror attacks, cyber threats grow more prominent every day. The response of automated systems would be severely limited in such events. An automated rail system would be a prime target for a cyber-attack, as present events have made clear. For example, recently, the San Francisco Municipal Transportation Agency was subjected to a ransomware attack where hackers took control of a number of devices and demanded a ransom in return.<sup>5</sup> While the hackers did not take control of any rail operations, the attack was a stark wake-up regarding potential new avenues of disruption and danger through attacks on railroad computer systems. All systems that use a computer network are susceptible to hacking, but in an autonomous rail operation, the results could become catastrophic. In the event hackers are able to take control of a fully autonomous hazardous material train, no human would be present to

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<sup>2</sup> <http://time.com/5089950/taylor-michael-wilson-supremacist-amtrak/>

<sup>3</sup> <https://www.theguardian.com/world/2015/aug/21/amsterdam-paris-train-gunman-france>

<sup>4</sup> <http://www.lefigaro.fr/cinema/2015/08/24/03002-20150824ARTFIG00083-thalys-jean-hugues-anglade-nuance-ses-propos.php> (French)

<sup>5</sup> <https://www.sfmta.com/blog/update-sfmta-ransomware-attack>

manually intervene to stop a cataclysmic event. With the increasing frequency and severity of reports regarding computer hacking, we think any serious consideration of this technology is at the least premature until such threats can be addressed and foolproof preventative measures can be taken to ensure safety.

### **Workforce Viability in an Autonomous World**

FRA also asks for information regarding the impact automation may have on workers. The automation of train operations has the potential to cause the loss of tens of thousands of good paying union jobs across America. The potential for the dislocation of workers in the event automated rail operations become common practice is extreme. The effect of technology on the workforce has already been seen, as remote-control operations in railroad yards have led to substantial job losses of locomotive engineers and yard switchmen. Automation is having a substantial impact on the craft of yardmaster as well. Unfettered train automation would affect significantly more employees and make the communities in which trains travel through far more vulnerable to all sorts of potential hazards. Add to this the potential automation in transit and the trucking industry and we will have a vast loss of opportunity for people without college degrees to secure a job that pays a decent wage, further increasing income inequality in our country.

### **Regulatory Issues and Implementation Hurdles**

The FRA also inquired as to regulatory hurdles that may arise regarding autonomous operations. It must be noted that the current regulatory framework governing rail safety is primarily built around a two-person crew operating trains. These two crewmembers interact constantly and double-check every decision that is made in the work place. The regulations currently in place are designed with this type of operation in mind, and govern matters such as air tests, cab communications, double-checking procedures, and cutting crossings, among a host of other procedures. In the event autonomous operations become widespread, a complete rewrite of most, if not all, of these regulations will be required. The same goes for railroad operating rules. They would need to be significantly rewritten to account for automated operations. Any rewrite of federal regulations must still comply with Congress' mandate regarding safety as the number one priority of the Federal Railroad Administration. Also, many regulations have been mandated by Congress, which would necessitate legislative enactments.

Railroads have been reducing the size of crews for decades, even when those reductions lead directly to accidents that could have been prevented with larger human crews. Being unable to self-regulate is the basis for the entire federal code of regulations that governs railroads. As such, railroads cannot be trusted to self-regulate themselves when it comes to the implementation of this technology, as a race to eliminate all paid positions for the sake of profit could lead to catastrophic results.

Even where new technology is regulated, railroads have demonstrated an inability to comply. The performance based Positive Train Control (PTC) rule is a good example of the significant shortcomings of the industry when it comes to the timely implementation of safety technology mandated by the FRA. PTC systems were mandated by Congress in 2008 to be fully implemented by December 31, 2015. When unable to implement the technology by said date,

the railroads were granted an extension by Congress to 2018-2020. As of this time, less than ten of the 37 railroads required to install PTC have fully done so, with many lagging woefully behind on meeting the extended deadline.<sup>6</sup> In addition to the cost, one major issue that has arisen is the difficulty in integrating the PTC software into currently existing programs. Railroad conductors and engineers who have experience with PTC can attest that, even when fully integrated, the PTC system does not work perfectly, sometimes instituting brake applications unexpectedly and without cause. Such technology is only useful when it works, and when it does not, can increase danger where it is relied on with no additional safeguards. The difficulty railroads have had in implementing PTC technology and the uneven results that have so far been obtained must be considered when examining feasibility of autonomous operations.

### **Conclusion**

We thank you for the opportunity to present our comments on behalf of our 125,000 members. Again, we wish to reiterate that safety must be the number one priority when considering the integration of autonomous technology into the current American railroad system. The functions of human crewmembers can never be fully automated in a way that maintains safety at its current level, let alone increases safety. In this industry, we are beset by challenges from all sides, and it is critical that at this juncture we take all of these challenges into consideration when it comes to automation, so as to keep railroads moving efficiently, profitably, and most importantly, safely.

Thank you for the opportunity to comment.

A handwritten signature in black ink, appearing to read "John Previsich". The signature is fluid and cursive, with a large loop at the end.

John Previsich  
President  
SMART-Transportation Division

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<sup>6</sup> <http://abcnews.go.com/Politics/railroads-meet-positive-train-control-deadlines-officials/story?id=53110861>