

# Future of Technology within the Rail Industry

ARDA Technology Section – April 2020

By Jenni Moore, GISP, PMP – Bartlett & West

We are bombarded with technology-focused buzzwords every day. We hear the words but don't always know exactly what they mean or how they may impact us. It may be easy to relate to these words in our daily lives but how do they impact us at work within the rail industry?

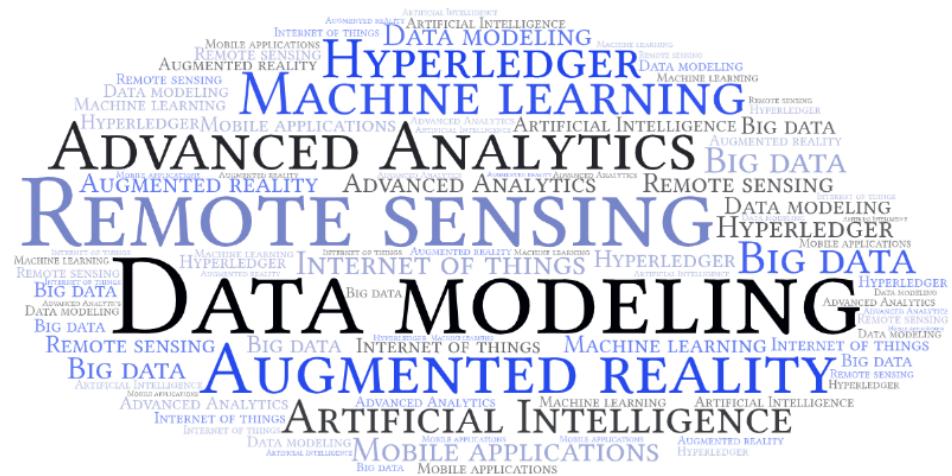


Figure 1 – Technology buzzwords of 2020

This article will dive into the historical impact of technology advancements throughout the ages, how technology is being used today within the rail industry, and explore what the future may hold.

# Technological Revolutions Throughout History

There have been three major revolutions in world history based on the invention and application of key ideas. According to Klaus Schwab, founder and executive chairman of the World Economic Forum, the International Organization for Public-Private Cooperation, a revolution can be described as the appearance of “new technologies and novel ways of perceiving the world [that] trigger a profound change in economic and social structures” (Trailhead 2020).

These key ideas were steam, science and mass production, and digital technology. The steam age shifted culture from being largely agrarian to much more urbanized and industrial. The age of science and mass production brought us the means to produce goods faster and do more. This shift brought about the modern world. Lastly, the implementation and proliferation of digital technology has brought us to where we are today. “The move from analog electronic and mechanical devices to pervasive digital technology dramatically disrupted industries, especially global communications and energy. Electronics and information technology began to automate production and take supply chains global” (Trailhead 2020).

## Today's Applications

The application of digital technology within the rail industry is nearly ubiquitous today. Concepts that were historically captured manually on paper and distributed in hard copy have since been digitized and are accessed, maintained, distributed, analyzed, and synthesized via various technology touch points such as web and mobile applications. Why pursue the application of digital technology? What is the goal? There are numerous benefits to these technological advances – increased productivity, increased safety, enhanced security, better plans, and working smarter (Stagl and Sneider 2016).

What impact does this have on the rail industry? The ability to implement digital technology and its advancements is changing the way work is done in all facets of the railroad business. Increased collaboration is one of the most noticeable impacts. This collaboration exists between teams, departments, railroads, vendors, and especially the public.

### Focus: Increased Safety

Did you know that there have been over 2,000 vehicle-train collisions every year since 2012 in the United States? (Operation Lifesaver 2020)

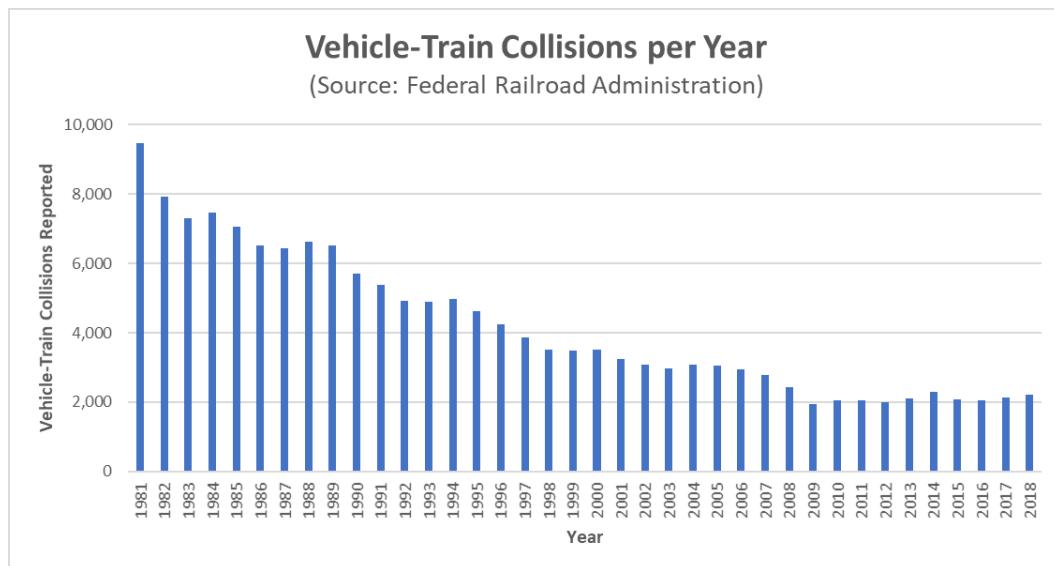


Figure 2 – Graph of vehicle-train collisions per year (Operation Lifesaver 2020)

Will Miller, Public Safety Director at Norfolk Southern, presented at the ARDA Executive Forum in February 2020 about initiatives underway at Norfolk Southern to improve grade crossing safety for the public by partnering with social mapping applications such as Waze. The goal was to create a method to notify motorists when they are nearing a railroad crossing through a safety pop-up window within the Waze application. To make this happen, data sources and safety message content was supplied by Norfolk Southern to Waze for integration within the application. A pilot project was rolled out to select cities that are greatly impacted with Norfolk Southern's rail network. This was deemed a success and efforts are now underway to rollout this solution to all geographic areas along Norfolk Southern's rail network with support from Waze.

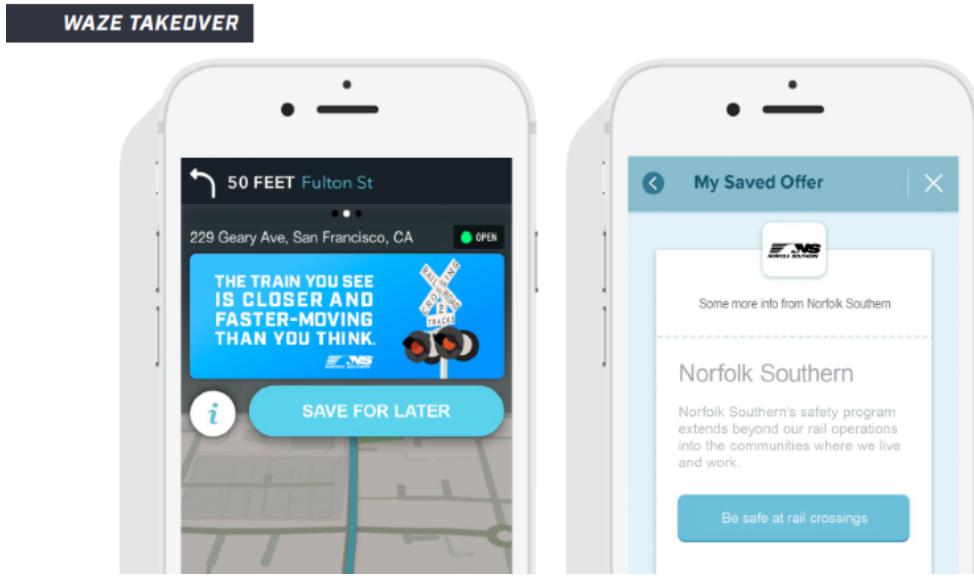


Figure 3 – Norfolk Southern's Grade Crossing Safety Messaging Program with Waze

Erik Henderson at CSX, a leading supplier of rail-based freight transportation in North America (CSX 2020), has been on the forefront of the application of digital technology in the rail industry throughout his career.

According to an article by Josh Belhadj, Esri business manager in the trucking and railroad industries, Henderson and his team “have created an app that uses real-time awareness from drones, GIS, and the IoT to help CSX immediately assess storm damage and speed recovery while protecting workers” (Belhadj 2020). The impact of this application was immense in the recovery of the CSX rail network in the aftermath of Hurricane Florence that struck North Carolina in September 2018.

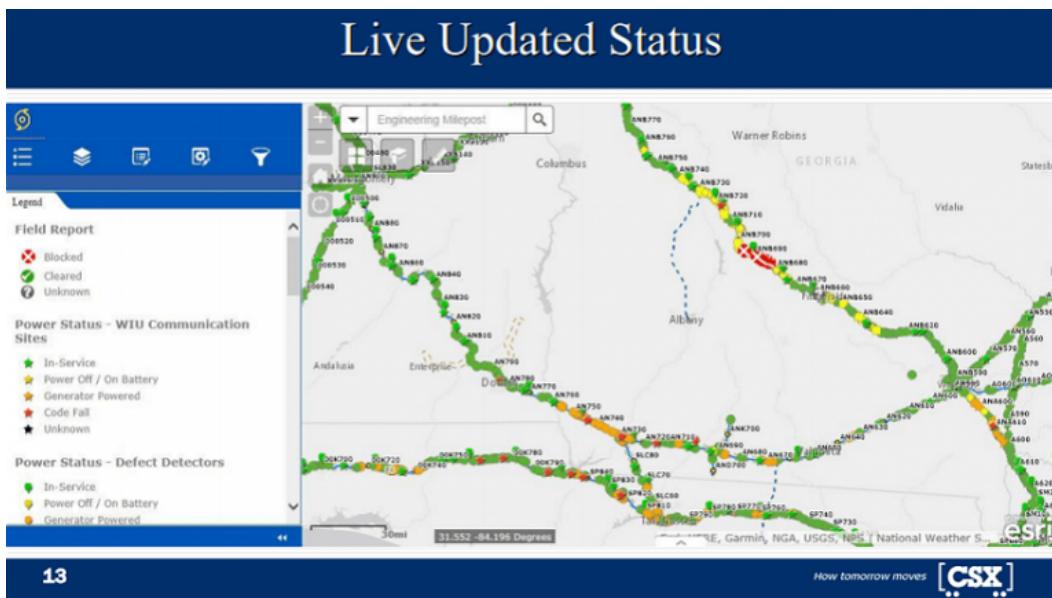


Figure 4 – Screenshot from “app that uses real-time awareness from drones, GIS, and the IoT to help CSX immediately assess storm damage” (Belhadj 2020)

## Focus: Working Smarter

According to Business Insider, Rio Grande Pacific (RGP) is leveraging the “Railway Internet of Things to collect and analyze large amounts of data quickly” (Dell Technologies and Intel 2018). The variety of connected devices that comprise the Railway Internet of Things along the rail corridor allows for data collection, data storage, and data transfer to a secure data solution that encourages further analysis and decision making. Increased safety in track inspection and maintenance efforts, increases to on-time performance, and overall cost savings are just a few of the benefits RGP is seeing from their ability to embrace and implement this emerging technological concept. Greg Hackborth, President of Rio Grande Technology, states that the “technology advances that we are recognizing today will be beneficial to all railway operators” (Dell Technologies and Intel 2018).



Figure 5 – Use of technology in the field at RGP (Dell Technologies and Intel 2018)

OmniTRAX, a transportation and infrastructure holding company based out of Denver, Colorado, has a goal “to make shipping by rail as easy as shipping by truck” (OmniTRAX, Inc. 2020). This can be done in part by leveraging a multitude of digital data sources into a collaborative platform for shippers, customers, and OmniTRAX personnel to facilitate “Rail Made Easy”. They boast flexibility, reliability, and cost savings as benefits of their company. The “Rail Made Easy” solution highlights the use of technology for solving larger, more complex problems within their rail network.

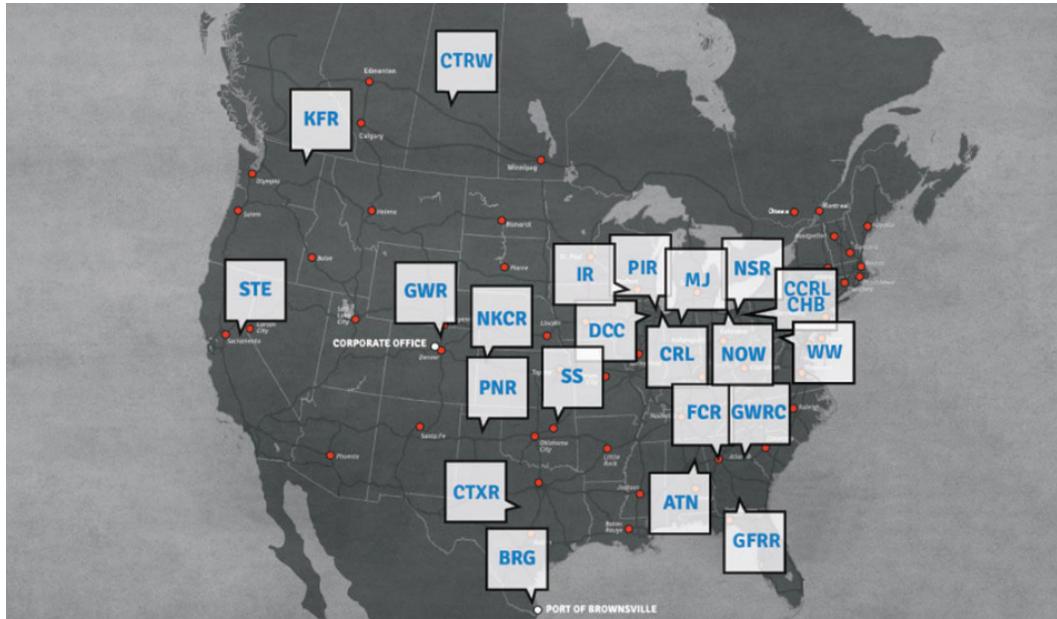


Figure 6 – Map of OmniTRAX railroads (OmniTRAX, Inc. 2020)

## Future Opportunities

According to Schwab, we are embarking in the Fourth Revolution. “It is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human” (World Economic Forum 2020). What does that mean for us? This new revolution is “fundamentally changing the way we live, work and relate to one another” (World Economic Forum 2020).

The real question lies in what impact will this have on the rail industry? We should be exploring the capabilities of each new technology as it develops and testing methods of implementation and integration with existing solutions for the purposes of adopting a “better way of doing business or delivering services” (Stagl and Sneider 2016).

This does not imply that all field operations will be performed by robots or locomotives to be operated by remote engineers in an operation center or even automatically. What this does imply is that as technology advances in its accessibility, ability to operate in various integrations, and overall capabilities increase, we are on the edge of a future where each new day is monumental in how services are rendered and goods and data are moved across our physical and digital networks.

## References

Belhadj, Josh. 2020. "A Former "Ghostbuster" Combines Drones, IoT, GIS in Real Time for CSX." Esri's WhereNext Magazine. March 10. Accessed March 10, 2020. [https://www.esri.com/about/newsroom/publications/wherenext/erik-henderson-csx-profile/?\\_lrsc=d107bfd3-3651-469c-a9a3-60c3b6d8e234&adumkts=social&aduc=social&adum=external&aduSF=linkedin&adut=ea](https://www.esri.com/about/newsroom/publications/wherenext/erik-henderson-csx-profile/?_lrsc=d107bfd3-3651-469c-a9a3-60c3b6d8e234&adumkts=social&aduc=social&adum=external&aduSF=linkedin&adut=ea).

CSX. 2020. About Us. Accessed March 1, 2020. <https://www.csx.com/index.cfm/about-us/>.

Dell Technologies and Intel. 2018. "This technology is changing the American railway industry." Business Insider. November 5. Accessed March 1, 2020. <https://www.businessinsider.com/sc/this-technology-is-changing-the-american-railway-industry-2018-11>.

OmniTRAX, Inc. 2020. Our Railroads. Accessed March 1, 2020. <http://omnitrax.com/our-company/our-railroads/>.

—. 2020. Shipping by Rail Made Easy. Accessed March 1, 2020. <http://omnitrax.com/shipping-by-rail-made-easy/>.

Operation Lifesaver, Inc. 2020. Track Statistics: Collisions & Casualties by Year. Accessed March 1, 2020. <https://oli.org/track-statistics/collisions-casualties-year>.

Stagl, Jeff, and Julie Schneider. 2016. "The next wave of technological wonders in rail country." Progressive Railroading. September. Accessed March 1, 2020. [https://www.progressiverailroading.com/rail\\_industry\\_trends/article/The-next-wave-of-technological-wonders-in-rail-country--49381](https://www.progressiverailroading.com/rail_industry_trends/article/The-next-wave-of-technological-wonders-in-rail-country--49381).

Trailhead. 2020. Meet the Three Industrial Revolutions. Accessed March 1, 2020. <https://trailhead.salesforce.com/en/content/learn/modules/learn-about-the-fourth-industrial-revolution/meet-the-three-industrial-revolutions>.

World Economic Forum. 2020. The Fourth Industrial Revolution, by Klaus Schwab. Accessed March 1, 2020. <https://www.weforum.org/about/the-fourth-industrial-revolution-by-klaus-schwab>.