Digital Checklists in Transportation: Driving Communication, Verifying Corrective Action

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From Aircraft Cockpits to Locomotive cabs

Rail transportation is an ever-changing operating environment, where the consequence of failure is high and momentary lapses in Situational Awareness (SA) and decision making lead to unforgiving results. Predictable outcomes are the one constant required in order to adapt and succeed. Standardization of, and adherence to timely and accurate communication between crew members is a proven driver of desired predictable outcomes. In military and aviation parlance, we refer to this as “Man-in-the-Loop” (MITL). A break down in MITL is often where the accident investigation determines contributing or causal factors of the human factors component.

Check-6 was brought in to drive systemic changes in behaviors and culture in order to dramatically improve safe operations through Digital Checklists at one of the country’s largest railways. Together, we successfully bridged the gap between the aircraft cockpit and the locomotive cab. The similarities between the two environments are remarkable. At its core, a crew is working together in concert with their equipment to accomplish the task of getting safely from point A to point B. Be it in the air, or on rail: the challenge to operating complex machines in dynamic situations is critical and demanding.

Unless this trend magically reverses, the industry will experience record rates of accidents due to Human Factors causes. Additionally, economic forces in 2016 have resulted in significant decreases in rail activity.

Therefore, by comparison, from a pure statistical standpoint, rate of accidents is much worse.

Decertification Events - the Precursor to an Accident?

Check-6’s client was looking for a way to reduce the number of decertifications. A decertification can occur for both engineers and conductors for errors such as signal violations, speeding, and authority/regulatory compliance to name a few. In a very similar sense - think of it as the rules that govern how we drive cars on the road. The railroad is also mandated to follow the rules of the rail, and there are lots of them. Designed to keep the man-in-the-loop and reduce human error, the FRA places strict governance and guidelines on the railroads in this country in order to protect lives and property. Check-6’s mandate was to deliver measurable and sustainable reductions of decertifications.

Crew Resource Management (CRM) – the Key to Communication

When Check-6 analyzed the primary root cause of decertifications, we found that poor communication was at the top of the list. Subsequently, this poor communication often led to confusion and complacency between engineers and conductors. Check-6 understands that this is not unique to railroad crews and is pervasive in any system involving human beings.

In times of stress, confusion or boredom, we are all susceptible to becoming distracted or complacent. Errors happen. Performance excellence needs a systematic way to check ourselves and our co-workers. From the cockpit, to the operating table, to the cab of a locomotive; any setting where people interact with each other, their equipment, and their surroundings, communication is a very powerful determinant towards positive outcomes of perfect execution.

The very purpose of Standard Operating Procedures (SOPs) and checklists is to remove the human variable for improvisation and reduce the opportunity for human traits and emotions to introduce themselves into what should otherwise be a very systematic and methodical approach to achieve flawless execution. **The proven modern day counter-balance to human error is the digital checklist.** It is the continuous improvement warriors weapon of choice... or at least it should be.
Digital Checklists - Verifiable Compliance

Working with an outstanding team of safety coordinators, engineers, conductors and trainmasters, Check-6 took on the challenge to create a series of checklists aimed at reducing decertification events for conductors and engineers. Check-6 determined that the best path to success was to improve inter-crew communications to help them better identify, communicate, and appropriately respond to situations that could lead to a decertification event or accident. The client’s current process did not “close the loop” to absolutely ensure crews were taking appropriate measures.

The primary benefit of a digital checklist is the ability to require that the steps and actions of a given procedure are completed according to the approved standard - on time, and in the appropriate sequence.

In this case, we drove the required communications that ensured the engineer and conductor worked together to accomplish the tasks on the checklist. That being said, a paper checklist is only as effective as the person using it.

Digital checklists have a proven performance record and built-in features that ensure compliance and prevent the proverbial “pencil whipping” that often occurs with paper checklists.

Of course, digital checklists offer many other benefits that build situational awareness and reduce confusion; such as the ability to insert reference materials, pictures and videos, decision trees, and the ability to capture operational data in near real time.

“This is the future and it is going to be great. We will use checklists on tasks we don’t do very often, our confidence and proficiency to complete them remain high.” - Railroad Conductor
A key component to consider is the availability of information in contrast to the timely usefulness of the information. Currently the locomotive cab is a very paper intensive environment. A crew may have access to the information, however, the accuracy of the documentation is dependent on the crew’s willingness and ability to keep current on the ever-changing reference materials.

The second variable is the familiarity and ease with which the desired information is searchable and accessible. This becomes very important if faced with a time-critical task or situation. This problem is exacerbated when facing a rare or seldom encountered situation. It’s also worth pointing out that the likelihood of “winging it” or guessing the correct step is greatly increased if the ability to track down the right process is not readily at hand. If the task of digging through a manual to find the right answer or response is buried within the pages of documentation in front of you, the stress of being overwhelmed, or overloaded might induce one to take action without referencing important information. Features such as: hyperlinks, keyword search and filters via digital format greatly enhance the user’s ability to find the right information in a timely manner. Coupling that with embedding the information appropriately with each step or task we have just-in-time information that is not cumbersome or clumsy to access. The ability to have instant, intuitive access to relevant information vice having to dig through large reference documents is critical to the adoption of the digital checklist.

Conclusion

Digital checklist operations have been widely and successfully used by industries requiring perfect execution: the commercial airline industry, NASA, military aviation, and Nuclear Power. Adapted correctly, a Digital Checklist culture will have a real and immediate impact in the railroad industry. With a strong commitment from leadership, considerable value can be realized by companies adopting the methodology and embedding these systems as part of their organizational culture. The standardizing and subsequent digitizing of the craft will yield a safer, more predictable and consistent operation.

“This feels like we are on the verge of fundamentally changing the way we operate trains around the country. And, it’s all starting in this room. This is exciting and I’m excited to be a part of this. We will look back at this a year from now and remember it all started here.” - Railroad Engineer & BAPP Facilitator

“This will drive communication and teamwork between conductors and engineers.” - Railroad Conductor and Engineer