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An Interview with Lester Hightower, CTO of 10East Corp. On the Topic of Railroad Configuration Management

James: I'm James Pease for Take 5, Progressive Railroading's podcasts on topics of interest to rail and transit decision makers.

The terms configuration management and configuration control are pretty much used interchangeably. In general, they both describe the management of safety and security features of automated systems, by controlling changes made to things like hardware, software, firmware and documentation, throughout the development and operational life cycle of those systems, with the goal of insuring that the systems always operate as designed. With recent updates to FRA rules governing configuration management, the need to know "what is where" and "what should be where" is more critical than ever.

Our guest today is Lester Hightower, Chief Technology Officer of 10East Corp., a Software-as-a-Service provider to the North American railroad industry.

Lester, exactly what does configuration management mean in the context of railroad signaling?

Lester: In 2005, new FRA regulations went into effect related to configuration control of certain signal-related railroad assets. The FRA describes these rules as intended to, quote, "promote the safe operation of processor-based signal and train control systems, subsystems, and components that are safety-critical." The new rules are part of the Code of Federal Regulations, under Title 49, Part 236, Subpart H, and are commonly referred to simply as the configuration management regulations.

James: What changed in the new Federal regulations?

Lester: Historically, vital signal systems were built around the design and operating characteristics of vital relays, and while using electronics in place of vital relays has been commonplace for years, regulations, and accepted best practices, for maintaining the operational integrity of these complex, electronic systems have only recently emerged.

Electronics being used in railroad signaling systems brings with it new issues that were not present in decades past, when vital-relays, alone, formed the foundation for signal systems. Where, in the past, manufacturer service bulletins would typically focus on certain ranges of serial numbers, say in the case of a bad manufacturing batch of relays, today, those alerts are often much more complex, applying to certain combinations of pluggable cards, or card revisions, or even to certain software revisions on those pluggable cards. And with railroads also creating software to "apply" electronic boxes to fit their unique needs, these customer-created software applications also often become a safety critical component of the overall electronic system.

This added complexity makes it imperative that railroads work smarter, and constantly monitor their in-service configurations for compliance with established standards. The

need to know "what is where" and "what should be where," and then monitoring to insure agreement between those two, is the basis for 10East's configuration management system.

James: How can 10East help railroads with their configuration management requirements?

Lester: 10East provides railroad-focused information services under the brand names of RailDOCS and RailDOCS Mobile. RailDOCS's Preventive Maintenance Management System lets our customers manage, schedule, and document all of their testing and inspection activities, and to do so on mobile computing devices. We began providing this service in 2002, and RailDOCS now handles several million test and inspection events each year.

Our Configuration Management System is part of our Preventive Maintenance Management System, and it works alongside, and is tightly integrated with, our Test and Inspection Management System. Test and Inspection and Configuration Management activities are both performed on similar assets, at the same physical locations along the railroad right of way, and by the same group of people.

This integrated approach allows 10East customers to efficiently accomplish their "end game," which, as you and I both stated earlier, is knowing "what is where" and "what should be where" and then making sure that everything is as it should be.

James: And how does 10East's configuration management system accomplish that goal, of making sure everything is where and how it should be?

Lester: 10East's Configuration Management System is comprised of three major components, and each one is critically important. I'll start with the most frequently used component, the Data Collector. Data Collector documents exactly which electronic chassis are installed where in the field, and maintains detailed data about how those chassis are arranged, what cards are in which slots, the part numbers and revisions numbers of each, and any other important attributes.

To do its work well, Data Collector depends on the second Configuration Management component that I'll talk about, the Metadata Builder. Metadata Builder allows electronics manufacturers to teach RailDOCS's Configuration Management System about all of the different hardware components that they have ever manufactured. Typical items would be things like pluggable cards or modules, EEPROMs, software on those boards or EEPROMs, etc. Included also are specifications about what data should be collected for each component, pick lists for use in that data collection effort, and stipulations on how these components can come together, inside of different chassis, to form complete and functional systems.

The data in Metadata Builder allows Data Collector to provide users with very intuitive software interfaces for data collection, where the questions asked correspond exactly to the equipment being audited, where pick-lists for things like part numbers and revision numbers are heavily used, and, as a result, the data collected is most accurate.

The Standards Guardian is the third and last major component to discuss. Using data from both Metadata Builder and Data Collector, Standards Guardian's job is to document and enforce the "what should be where" standards. Standards Guardian's work is based upon rules that it enforces on the collected configuration data. These rules will most

often originate from one of two sources: either a manufacturer's service bulletin or a railroad itself. In the latter case, those rules will most often target site-specific application software, or perhaps some system-wide standard that the railroad wishes to enforce -- like keeping an unapproved revision of a product off of the railroad's property.

Standards Guardian constantly compares all of its rules to all of the configuration data being collected and updated in the field. All anomalies are dispatched to the appropriate staff, including the field workers responsible for maintaining the equipment, so that they can remediate those issues quickly. Standards Guardian "closes the gap," if you will, on the configuration control process.

James: I see. So, that assures compliance with the new Federal regulations. Are there other benefits in implementing your configuration management system?

Lester: Implementing a quality configuration management system provides a giant leap forward in establishing control over a railroad's infrastructure. A huge return on investment is likely to be realized the very first time that a customer remediates a complex service bulletin. It also helps signalmen carry the tradition of impeccable safety forward to future generations of railroaders, as we continue our long tradition of innovation.

James: Thank you, Lester. ... Our guest today has been Lester Hightower, Chief Technology Officer for 10 East Corp. I'm James Pease, and this has been Take 5.