

Positive Train Control Implementation on the Fast Track

**Rail companies face intense pressure to meet
government-mandated deadlines**



What is Positive Train Control (PTC)?

Positive train control refers to technologies that collectively help prevent train collisions, enforce speed limits and protect track maintenance workers. The concept is not a new one: Railroads started to develop various flavors of PTC systems in the 1920's and given that safety is a primary concern of American railroads, the industry has continued to spend considerable sums of money and effort on research, development and testing of technology related to PTC.

The development and installation of PTC technology as a preventive measure gained increased attention after September 12, 2008, when a passenger train in Chatsworth, California, ran a red signal, colliding with a freight train coming from the other direction on the same track. Twenty-five people were killed. Human error was seen as a contributing factor to the tragedy. A month later, the Rail Safety Improvement Act (RSIA) was passed by Congress and signed into law, mandating that certain railroad territories must install interoperable PTC systems by the end of 2015.

Challenges of PTC

Despite the collective industry view that it is desirable from a safety perspective to have PTC-compliant systems in place, railroads tend to see the RSIA mandates and deadlines as problematic for several reasons, among them:

- **Massive scope** – Tens of thousands of track-miles and locomotives, plus telecommunications, signal, and back office support systems must be made compliant by the 2015 deadline, so there is a massive volume of work to be planned and executed by the railroads.

- **Lack of funding** - There is no provision in the RSIA for federal government funding as to the development or implementation of PTC systems, in an economy that has recently seen dropping revenues for freight carriers. The industry expects to spend roughly \$12 billion to implement PTC through 2015.
- **Untested interoperable technologies** - The interoperability mandate within the RSIA results in the industry having to invest significant resources to enhance or develop new, unproven interoperable technologies and undertake significant industry integration planning. Interoperability impacts are seen in back office systems, communications and signaling infrastructures, and multiple locomotive components.

What Must Railroads Do?

Affected freight, passenger and commuter railroads should already be mobilized toward defining their approaches to implementing PTC and aggressively moving to undertake multiple FRA compliance activities in support of that goal:

Define and submit PTC

Implementation Plan (PTCIP): The FRA established a deadline of April 16, 2010 for railroads to submit their plans to deploy PTC technologies on their rail networks. The Implementation Plan involves a great





deal of analysis and planning, and will require railroads to project their PTC implementation efforts through 2015.

Define and submit PTC

Development Plan (PTCDP): In order for a railroad to receive the FRA's approval for its PTC system, it is required to submit a PTCDP. That development plan describes a railroad's PTC system, including such information as system components, operational practices, target safety levels, etc. At this time, many proposed PTC components and processes are in development, so this document will also need to be maintained and amended by the RFA process.

Define and submit PTC Safety Plan

(PTCSP): Before a given PTC technology can be placed into service, it must be approved by the FRA and a PTC System Certification must be granted. The PTCSP will require a railroad to attest the system has been built in accordance to the PTCDP. The railroad will be required to completely describe its PTC system addressing (at a high level) all functionality, verification and validation processes, maintenance processes, and enforcement processes. Railroads should plan on this document being extremely large and on dedicating a great deal of time and resources to its creation.

Agree on interoperable standards:

The industry should agree in 2010 on a wide array of interoperable standards and specifications for PTC components, systems, and processes in order to enable development of those items in a timely manner.

Interoperability is a key component of PTC, and beyond the heavy work of defining requirements and interoperable specifications, substantial work remains to actually develop and test the new technologies before they can be deployed. With

timelines for the development and testing measured in years, it is imperative that interoperability questions be settled in the near-term.

Set up internal program

management: In order to address the challenges of designing, developing, testing, and implementing PTC, railroads must be purposefully organized and mobilized toward getting the work done. By establishing a PTC Program Management Office (PMO) with the necessary human and physical infrastructures to plan and oversee potentially dozens of individual projects, railroads can reduce the risks associated with massive efforts affecting multiple business units. For a given railroad, a PTC implementation will involve hundreds of individual stakeholders, dozens of projects, and perhaps nine- or ten-digit budgets. With such broad impacts and scope – and with a prohibitive cost of failure – a strong, centralized oversight mechanism is essential for creating and maintaining a master plan, identifying and managing risks, identifying issues and driving them to resolution, and keeping budgets under control.

Assess systems and component

development needs: Each railroad needs to settle its approach to developing PTC technologies. This involves the aforementioned industry-wide effort to define interoperable standards and product specifications, but also vendor selection, assessment of internal development and testing capabilities, and planning for ongoing support.

Define testing strategies and

approaches: In advance of deploying PTC, railroads will have to develop PTC testing strategies to address individual components and systems,

integration test planning, full system testing, interoperable testing with other railroads (including commuter and passenger railroads), and probably a pilot test phase on select territories. Given that PTC-enabled components and systems do not exist today, testing must be viewed as a long-term effort with an expectation of very challenging defects. With strategies defined, more detailed testing approaches will have to follow; this will foster detailed test planning, complete with the need to create complex and voluminous test cases.

Begin deployment planning: Beyond the development of FRA-required documents, planning the physical deployment of PTC through 2015 will involve extensive cross-organizational planning, possibly beyond a given railroad's experience and potentially in contravention of long-standing corporate cultures. Railroads will have to conduct detailed surveys of their signal and telecom infrastructures, create or update detailed maps of their rail networks, and determine how best to deploy components on their locomotive fleets. In all these efforts, railroads will be dealing with tens-of-thousands of devices to be deployed...and with finding the human talent to do the work in a safe manner.

How Capgemini Can Help

We at Capgemini believe we have the right combination of people, processes, and technology to help railroads meet some of the challenges posed by the PTC mandate.

To successfully build, deploy, and sustain a PTC solution requires railroads not only to plan, organize, and execute in the traditional project management sense, but to transform certain parts of their organizations.

Based upon Capgemini's experience and research with third parties like The Economist, we believe PTC should be treated as a major 'Business Transformation Program'. When we asked, only 30% of executives felt their organizations excelled at business transformation, with respondents having the least **confidence about implementation**, which is seen as the **riskiest stage** of a project.



What does this mean for PTC? It means PTC cannot be approached just as another project initiative. In order for a program with the size and complexity of PTC to achieve its required results, management needs to consider:

- Traditional project management skills may not be enough – the ability to lead transformation and manage large-scale change is more important.
- Having executives who champion business transformation is a key factor toward success - managers and staff alike must know they have the backing of senior management.
- Programs that perform well in early stages can still run into serious trouble if they move directly to implementation without a clear Transformation Strategy.

Capgemini's Business Transformation approach for building and delivering complex programs incorporates certain principles to support the transformation changes:

- Besides the rational side, the political and emotional dimensions must also be managed
- Time-boxed implementation steps and releases
- Demonstrate acceleration through tailored events and interventions as part of an overall program master plan (e.g., create momentum, sense of urgency, rejuvenation points, departure / take-off, etc.)
- Have significant change management elements embedded in the design
- Have a business case element embedded in the design; financial and non-financial aspects

Complementing our transformational approach, Capgemini can bring proven methodologies and frameworks as well as end-to-end delivery and execution to bear in your organization to logically structure the efforts and address the risks posed by such a massive undertaking as a PTC program:

PTC Health Check: Capgemini's process starts with a "health check", in which Capgemini works with your PTC stakeholders, determining exactly what is going on inside the company. We examine: Does your company have a clear view as to the impact of PTC? Where do you stand in terms of staffing, resources, cost considerations? Do you have a program in place to manage PTC? Do you have established and well-managed relationships with vendors, other railroads and government agencies? What are your real criteria for success?

It's an exhaustive, intensive, and enlightening process and it paves the way for some strategic thinking specific to the scope of PTC.

Program Management: Once the right mix of projects is determined we then move into the project management phase. We have proven project and program management methodology offerings, including our DELIVER framework and our Unified Program Management (UPM) methodology; we blend your best practices with our own to make a stronger whole. In our view, a critical success factor for a program the size and importance of PTC would be a strong Program Management Office (PMO). A PMO provides integrated planning and support services across all projects, releases and work streams. The result is proper planning and estimation, project prioritization, delivery methods, deployment

strategy and resource management. It helps optimize business values and results, leverages infrastructure, resources and investments, and offers controls via governance and structure. It also reduces the risk of delivery failure, inadequate up-front scope definition, and poor cross-project and release communication.

Testing: Capgemini's community of more than 5,000 quality management professionals have set the international standard for test management and process improvement, and our international team of quality experts continues to provide thought leadership in this domain. Capgemini is a recognized leader in systems and application testing, offering a deep and world-class testing regime that offers significant benefits toward the development of PTC technologies. In fact, Capgemini has been involved for nearly a year with various railroads in the development of functional and technical use cases – tying these back to business requirements in order to foster traceability – as well as the development of test scenarios for various PTC components. Capgemini's testing services are built to tackle the scale and complexity of efforts like PTC, and whether it is our managed testing services, test maturity assessments, or our integrated requirements management approach, we believe we can provide the thought leadership the railroad industry needs.

Architecture, Application Development, and Integration:

When organizations approach a technology upgrade or change, their existing applications must adapt to achieve cost savings, improve performance, and ensure continuity. At Capgemini, we work with leading companies every day to understand the value of legacy applications and to determine the best path forward, one

that minimizes total costs and produces enhanced performance. With respect to PTC, railroads are grappling with how to leverage existing safety- and mission-critical systems and integrate them with new (or enhanced) systems that will enable PTC functionality while maintaining the railroad industry's rigorous safety standards. Our Integration Health Check and Integration Competency Centers are geared toward helping you position your applications within an overall architecture and putting the appropriate architectural governance in place.

Organizational Change Management (OCM): A PTC program will affect many functional areas within a railroad by forcing changes to long-standing operational procedures, so communication with and training of your people is a critical success factor. On large programs like the PTC effort, the likelihood of success increases with a measured and deliberate communications approach that keeps people informed and up to date, enabling better decision-making. Similarly, given that process changes are inevitable with PTC and with the understanding that the PTC is driven by a safety mandate, rigorous and timely training as to the new ways of doing business is essential. Capgemini offers a full range of OCM services to help you manage the change yielded by a transformational event like this.

Accelerators and Tools: We would recommend taking advantage of our transformational environments, like the Accelerated Solutions Environment® (ASE), Rapid Innovation (RAIN), or Rapid Design and Visualization (RDV) systems. They deliver sustainable new business models much more rapidly than traditional methods. They are all part of our Business Transformation Program, which is designed to support and encourage transformational change.

The Capgemini Experience

Capgemini has over 40 years experience managing large, complex projects. We offer a complete package that includes:

- A proven One Team model which supports successful global delivery from onsite, offsite and offshore
- Experienced professionals who have established, optimized and managed global transformation programs
- On-going training and certification for our project management professionals
- Toolkits to address program and project management components including organization and governance, process, technology and business intelligence
- Comprehensive services that are delivered collaboratively with our clients.
- End-to-end capabilities, from vision through design and development to delivery







About Capgemini and the Collaborative Business Experience™

Capgemini, one of the world's foremost providers of consulting, technology and outsourcing services, enables its clients to transform and perform through technologies. Capgemini provides its clients with insights and capabilities that boost their freedom to achieve superior results through a unique way of working, the Collaborative Business Experience™. The Group relies on its

global delivery model called Rightshore®, which aims to get the right balance of the best talent from multiple locations, working as one team to create and deliver the optimum solution for clients. Present in more than 30 countries, Capgemini reported 2009 global revenues of EUR 8.4 billion and employs 90,000 people worldwide.

More information is available at www.capgemini.com

For more information about Positive Train Control, please contact:

Danny Pitts

danny.pitts@capgemini.com
+1 972 556 7456

Michael A. Davis

michael.davis@capgemini.com
+1 972 603 8324

Bob Wegener

robert.wegener@capgemini.com
+1 630 880 3935

