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Case Study Analysis: Burlington Northern and the ARES System

Burlington Northern Railroad (BN) faces the decision of whether to approve completion and full deployment of the ARES system into their current railroad operations. Burlington Northern Railroad is a transportation organization that uses established railroad lines in the United States Midwest and Pacific Northwest to transport a variety of commodity-level materials. ARES, short for Advanced Railroad Electronics System, is intended to be a fully integrated system allowing BN to accurately track the real-time location of locomotives, current operating conditions of those locomotives, and automatically schedule optimal route and times for both locomotives and Maintenance-of-Way crews. Development of the full ARES system was both lengthy and costly. ARES spent nine years in development including limited live testing, with a to-date cost of approximately $15 million dollars to BN. Full implementation is estimated to cost $350 million. Due to the length of development, almost all BN executives who are now responsible for the full authorization of ARES were not involved with its design, development, and testing. Some executives are questioning if ARES would really result in the promised increases in profit or service levels and do it at a comparable cost to other options.

Given the facts of the business case and arguments both for and against implementation, it is recommended that Burlington Northern uncouple ARES functionality into three separate products: the scheduling component that produces more efficient schedules for Meet and Passes and rail maintenance (Control component), the on-board monitoring system for locomotives

(Vehicle component), and the data collection, communication, and analysis of operations activities (Data component). Uncoupling and implementing each component separately has four main benefits. First, components are more easily integrated into their relevant business unit within BN's operational structure. Second, components are more easily tailorable to that business unit's specific constraints which increases local throughput. Third, components that require additional development time can be allotted this time without affecting other components. Fourth, the total ARES cost can be spread out over time and across the budgets of the various business units involved.

Burlington Northern pursues a generic strategy of cost leadership. Since BN's profit comes from low-cost transport of commodities, increased profits must come from improvements to the transportation process such as better efficiencies in capacity, cycle time, and supply chain costs. Cost savings from achieving higher efficiency increases BN's profits. These improvements also allow BN to increase service levels and open the opportunity to charge more for the higher level of service. Maintaining a cost leadership strategy "requires a continuous search for cost reductions in all aspects of the business" (Tanwar 12). ARES's biggest advantage comes in the form of increasing efficiency of operation for BN. The Control component will produce efficient route schedules, the Vehicle component will measure the effect of those schedules on-board the locomotives, and the Data component will collect and analyze performance to find constraints where more efficiency can be had. A system like ARES is necessary to be a cost leader in the transportation industry by accurately identifying further sources of operations efficiency to increase cost leadership.

To synthesize the adoption of ARES and pursuit of a generic strategy of cost leadership, BN must ensure ARES implementation is as low-cost as possible. A full implementation of

ARES as-is will cost BN around $350 million. This is a steep price tag considering BN's current debt leverage: a 76 percent debt-to-capital ratio. Shareholders are uncomfortable with that high level of debt, and BN has been aggressively paying down current debt in response to concerns. The efficiency gains towards cost leadership from ARES is too great to ignore, so a strategy must be adopted to lower the cost both short term and long term.

The solution is to uncouple the functionality of ARES into different segments. Each segment will be integrated into the appropriate business unit, and costs will be assigned to that business unit as well. Planning and control of information resources "need to be in the hands of those directly responsible for their profitable use" (Fried 13). All parts of ARES still require development, but some are closer to completion than others. By splitting the ARES system into three parts, Control, Data, and Vehicle, the components closest to completion can be implemented sooner, and the benefits can be reaped sooner. The business unit benefiting from the ARES component takes the burden of paying for that component. This relieves burden from other business units that are still developing their component of ARES. Since varying levels of needed development means each component comes online at different times, the full cost of this version of ARES can be spread out over an extended time, instead of all together.

Burlington Northern faces competitive rivalry from both other railroads as well as alternate transportation methods such as trucking. BN's main rival in its two largest commodity segments, coal and grain, is Union Pacific. UP is estimated to have excess capacity for coal transportation while BN is almost at full capacity. For BN to stay competitive in these two segments against UP, BN must achieve a comparatively high service level. Improving service levels "offers a significant opportunity to gain or retain market share" (*Free* 16). BN's sole development of ARES components allows for the increase of service levels in a way that cannot be matched by competitors for years down the road. BN will be first to market with a high-tech solution to increase throughput on its current bottlenecks.

The power of consumers over BN is similarly high. Customers have choice in both mode and provider when it comes to transport, especially in BN's five commodity segments outside of coal and grain. These five segments are highly service sensitive and more susceptible to transport by trucks instead of rail. To foster repeat purchases from customers and reduce the likelihood of switching providers, ARES system components should be used to increase service levels against their competitors.

Trucking is both a strong substitute for railroad transportation as well as a new entrant to transport for some commodity segments. Both industries were deregulated in 1980. Trucking deregulation allowed trucks to carry more weight per truck as well as allow tractor-trailers to be longer. Trucks were now closer to being a viable substitute for heavy commodities normally carried by rail. To thwart off this new entrant, BN needs to capitalize on capacity and service levels capable through rail. BN can use ARES to increase their internal economies of scale or Minimum Efficient Scale. The MES "is a commonly known figure for many industries. The higher the MES figure the greater the deterrent it is to entering a market." (*Free* 19). A system like ARES for trucks would be much more complicated due to their unconnected and off-rail nature. Set rail routes and predictable, schedulable traffic allows rail to reach better efficiency levels than trucks. Smart ARES deployment can increase those efficiencies further.

There are two main stakeholder groups concerned with the implementation of ARES: the project and development team headed by Ed Butt and Don Henderson who argue for the benefits of ARES, and executives such as Jack Bell and Bill Greenwood who are not convinced about ARES's benefits compared to costs. Additionally, the customers of Burlington Northern have a stake in possible increased service levels provided by the company through ARES. Both the "For" and "Against" camp within BN have valid concerns with ARES, and the concept of uncoupling components before deployment addresses concerns from both sides. ARES is likely to increase service levels as proven by real-world tests in the Iron Range. Some form of ARES is necessary to stay competitive with service levels in the current market. BN customers are strongly interested in increased service levels as well.

Breaking ARES down into components addresses the concern of stakeholders about the high price tag. The cost will be spread over time and localized to the appropriate business unit. Each business unit can more closely tailor the ARES component to that unit's specific bottlenecks. According to Eliyahu Goldratt, creator of the Theory of Constraints in *The Goal*, "'Utilizing' a resource means making use of the resource in a way that moves the system toward the goal. 'Activating' a resource is like pressing the ON switch of a machine; it runs whether or not there is any benefit to be derived from the work it's doing" (Goldratt 217). A business unit owning its relevant ARES component gives more flexibility for that unit to apply ARES to its true constraints, preventing ARES from working on non-bottleneck processes that don't contribute to throughput.

Uncoupling and deploying ARES in three components offers better return than alternative courses of action. The first alternate course is to proceed with implementation of ARES as-is, with the full cost of $350 million. BN will surely benefit from increased efficiency but will also struggle to pay this full cost while being overleveraged. Shareholders have already shown skittishness at BN's current level of debt, and ARES's price tag will not improve their outlook on BN's financial health. Additionally, it is less likely that ARES will be appropriately applied to true bottleneck processes. ARES was in development for a long time, and most current executives were not involved in the process. It is likely that critical operational processes have shifted since development started. A less convoluted, more nimble ARES deployment will increase throughput more than a more complicated system.

A second alternative is to pause ARES until the Advanced Train Control System being developed by Association of American Railroads is mature and can be compared to the capabilities of ARES. With this course of action, BN misses out on years of efficiency and increased service levels for customers. The ATCS will take upwards of five years until development is ready for application. BN would save substantial money but remain stagnant in its competitive rivalry with other railroads and trucks. Since ATCS is an open technology developed by an association, once BN deploys, BN's competitors will also be reaping the benefits. BN cannot stay competitive by waiting years for a different system.

Lastly, BN can choose to not deploy any sort of high-tech tracking system and search for efficiencies elsewhere. There are executives who think proper analysis of current data could improve schedules enough to increase service levels. The benefits for cost leadership with ARES are too great to ignore. A cost leadership firm "finds and exploits all sources of cost advantage and aims at becoming a lot cost producer in the industry" (Tanwar 11). BN passing on the adoption of a system like ARES leaves so much gain of efficiency on the table that their cost leadership strategy is seriously harmed.

The best course of action for Burlington Northern Railroad is to break ARES down into Control, Vehicle, and Data components and deploy each separately. The ARES components contribute directly to the BN's cost leadership generic strategy and gives BN significant advantages in the five market forces. This course of action addresses the concerns of all stakeholders, has the best likelihood of increasing throughput on bottlenecks, and will save Burlington Northern substantial amounts of money.

Works Cited

Free Management Ebooks. Porter's Five Forces. http://www.free-management ebooks.com/dldebk/dlst-porter.htm

Fried, Louis. *Managing Information Technology in Turbulent Times*. Wiley, 1995.

Goldratt, Eliyahu M., and Jeff Cox. The Goal: A Process of Ongoing Improvement. North River Press, 2004.

Tanwar, Ritika. "Porter's Generic Competitive Strategies." IOSR Journal of Business and Management, vol. 6, no. 5, 2013, pp. 11–17., https://doi.org/10.9790/487x-065.