



Next Stop ... Productivity

5 Ways Software Can Dramatically Improve
Transportation Program Performance



Heavy Cargo... The Situation Today

The transportation industry is burdened with complexity. Even in attempting to speak about the industry itself, the definition of transportation spans from highways to rail to airports (and countless others) each with varying needs and priorities. Public agencies exist at all level of government which require local, regional, state and federal coordination. Construction and technology programs then require careful planning and coordination with the contractors and service firms that aid in their development and execution. The stakeholder landscape is large. And throughout, whether an agency or contractor or public-private partnerships or joint venture, there is constant demand for transparency and accountability.

And of course, there's the actual complexity of the projects themselves – often ambitious in their vision, spanning multiple years, impacting constituencies on a daily basis and costing enormous sums. Navigating the complex ecosystem repeatedly leads to projects running long and overbudget. McKinsey & Co. research shows that 85% of major projects experience cost overruns averaging 20% to 45%.¹ And the larger the program, the worse the performance.

The current world environment only serves to introduce more uncertainty. Once reliable revenue streams from tolls, fees and tax collection are now in upheaval. Once certain priorities are now in question. At the same time, however, global demand for infrastructure investment remains enormous. Some estimate that the world needs to invest US\$3.7 trillion annually through 2035 in order to keep up with projected growth.² Many expect government spending on transportation infrastructure to be a foundation to help restart global economies. If so, how do those responsible for delivering these programs overcome the years of low productivity? What's the road to more reliably, more predictably, delivering expected returns while continually scrutinized by the ever-watchful public eye?

¹ McKinsey & Company, "[Improving the Delivery of Road Infrastructure Across the World](#)"

² McKinsey & Company, "[Bridging infrastructure gaps: Has the world made progress?](#)"



“ 85% of major projects experience cost overruns averaging 20% to 45%.”

- McKinsey & Co.

Shifting into Gear ... The Role of Technology

Transportation technologies in recent years are making amazing strides in areas such as geolocation, electric vehicles and artificial intelligence-driven demand forecasting. And yet, the engineering and construction side of the house remains underfunded when it comes to tech. To overcome the productivity gap, software solutions in the area of Enterprise Project Performance (EPP) are already delivering notable gains to transportation agencies and their partners. Here are the top five ways:

01. Capital Planning

The building of a long-term spending plan for transportation agencies is an involved and difficult process. Perhaps the most important part, even beyond the financial resources themselves, is assuring that the correct projects are selected. What are the correct projects? They're the ones that further the agency's mission, achieve critical goals to handle, for example, future growth, environmental sustainability, or regulatory compliance. The definition of what's right will vary by organization, but the need for a standardized process to evaluate each potential infrastructure investment is essential. EPP software, through its capabilities in project portfolio management, will facilitate project selection and benefits analysis by scoring these opportunities on what matters most. Next, a series of "what if" scenarios can be run to compare what project combinations are feasible given constrained resources. Then, progressing through approval stage gates to establish consensus with key stakeholders results in a well-developed, well-supported and strategically aligned capital plan.

You're not finished, however. A well-constructed capital plan, connected to project execution data also managed within the EPP software, allows for visibility into how the capital portfolio is performing. This granular level of knowledge enables an organization to adapt when the world around them changes due to a shock to the system – traditionally economic, environmental, technological or regulatory, but now also the impacts of a global health pandemic. These change priorities and funding very quickly. A detailed but living capital plan tied to actual information from the field allows for better understanding of the current situation, the implication of changes to the project portfolio, and better decision making for changing investment direction.



Example on the Move!

A customer of ours was a program management and project controls consultancy working for a regional transportation planning agency. With the help of EPP software, it constructed the agency's first 10-year capital plan. It was a strong accomplishment unto itself, but because of the level of detail it was able to build in – addressing funding, risk analysis, contingency planning and more – the plan was used to successfully issue two rounds of bonds totaling over US\$200 million (and a justification for nearly \$800 million). The icing on the cake, however, was that the completeness of the capital plan also allowed the agency to achieve bond ratings (AAA, AA+) higher than previously thought possible for these types of transportation projects. This directly resulted in millions of dollars saved in financing costs.



02. Fund Management

More complexity here! Whereas the sources of funding in the private sector are relatively straightforward, transportation agencies can have a huge number of funding sources stemming from all levels of government, grants and multiple tax mechanisms. Consider the following list:

Traditional Tax- and Fee-Based Transit Funding Sources	Common Business, Activity and Related Funding Sources	Revenue Streams from Projects (Transportation and Others)	New “User” or “Market-Based” Funding Sources
General revenues	Employer/payroll taxes	Transit-oriented development/ joint development	Tolling (fixed, variable and dynamic; bridge and roadway)
Sales taxes (variable base of goods and services, motor fuels)	Vehicle rental and lease fees	Value capture/beneficiary charges	Congestion pricing
Property taxes (real property, includes vehicles)	Parking fess	Special assessment districts	Emissions fees
Contract or purchase-of-service revenues (by public agencies and private organizations, etc.)	Realty transfer tax and mortgage recording fees	Community improvement districts/community facilities districts	Vehicle miles traveled (VMT) fees
Lease revenues	Corporate franchise taxes	Impact fees	
Vehicle fees (title, registration, tags, inspection)	Room/occupancy taxes	Tax-increment financing districts	
Advertising revenues	Business license fees	Right-of-way leasing	
Concessions revenues	Utility fees/taxes		
	Income taxes		
	Donations		
	Other business taxes		

Figure 1: Source: [Transit Cooperative Research Program \(TCRP\) Report](#) via Victoria Transport Policy Institute



The EPP system is built to manage and optimize all aspects of project costs. This often revolves around estimating, budgeting and forecasting as projects are executed. With the integrated nature of an EPP spanning the entire project/program lifecycle, this also includes fund management. Part of the chaos with funding is the distinct business rules that come attached to each source. For example, restrictions exist regarding when funds become available, when they must be spent, or what kinds of projects or initiatives are acceptable uses. It's also quite difficult (especially manually) to track how much of each fund has been spent to date and chronicling which projects have received funding from each source.

EPP software will model the business rules so you cannot allocate highway funds to a rail project, while also providing automated reminders and warnings so that the windows of opportunity are not missed. Relatedly, you can be sure that sufficient funds have been allocated to projects to maintain appropriate cash flow. Finally, you can drill into any funding type to see available balance, amounts still to be received, commitments by project and many other relevant measures. You can pivot to see similar data by project or portfolio.

Taking a broader perspective, the visibility gained into fund management can be applied to resources overall – financial, human or equipment. Many leverage the EPP to balance resource supplies with project demands, identify shortfalls or overcommitments early and then adjust the plan to reduce delays or idle resources.



Example on the Move!

A County Transportation Authority customer leveraged our EPP solution to manage its 200+ funding sources. Revenues were coming from multiple federal programs including the Surface Transportation Program (STP), state funding like the State Transportation Improvement Program (STIP), and other local programs including a sales-tax initiative. Funding was also scrutinized by an independent Taxpayer Oversight Committee. One customer admitted fear of breaking funding rules: losing desperately-needed funds; unwittingly committing violations due to so many moving pieces. Instead, peace of mind became a reality when the fund management moved from spreadsheets to an enterprise software system with the controls in place that automated much of the work involved and provided ease of reporting and governance.



Leveraging the integration capabilities of an Enterprise Project Performance system, conversely, eliminates the manual processes of double data entry, aligning code structures, collating reports, etc. The resultant automation eliminates countless inadvertent errors, delivers critical insights so much earlier in every reporting cycle and frees trained professionals to spend their newfound time on improving project outcomes rather than hacking away at spreadsheets. You can practically feel the wind flowing through their hair!

03. Single Source of Truth

Project managing transportation projects is a complex undertaking, not simply because of the diverse project types. While one state department of transportation customer was dealing with port authorities and airports and other programs with structural differences between them, the work was occurring across nearly 10 different business units, each with different legacy project systems and ERP/finance systems. Importantly, all the data had to ultimately roll up to provide an agency-wide view of performance.

The time and effort required to assemble diverse datasets for reporting and tracking can be so demanding that often programs have difficulty getting a comprehensive view of overall progress, potential issues or opportunities for corrective action.

Even with programs whose value extends to multiple billions of U.S. dollars, the need to collate and organize actual costs, commitments, schedules, timesheets, engineering and document management and other data ultimately boils down to relying on Excel. It's the project management equivalent to bumper-to-bumper traffic, and the road rage is just as common!



Example on the Move!

A local agency was about to bring the EPP system online. We'd gone through careful configuration together, data integration had been validated (we all thought) and the first reports were being automatically generated. Then tragedy struck! All of the new reports were wrong. The project costs didn't match. Everything halted. While the customer tried to remain calm, we began an audit to see what could possibly be the problem. In the end, it was true. The reports were all wrong. But not the new ones. The ones that had been used by the agency for managing and making decisions about their multi-billion dollar capital program had errors in the totals and errors in the formulas. How long had it been that way? No one could say.



04. Digital Progress

As much as we have focused thus far on the steps needed to markedly improve the performance of transportation programs, the fundamental question that must be answered before any proactive or prescriptive measures can be implemented is this: Where are we today? Deceiving in its simplicity, this question often proves difficult to answer accurately.

In the last section we talked about establishing a single source of the truth through data integration. Here we look at a narrower yet vital part of program management ... [progress measurement](#).

Too often, progress management is seen as a subjective measure – holding your finger up to the wind and calling out, “28% done.” Instead, an EPP supports a structure of objective measures for progress measurement with pre-defined milestones, weights, rules of credit (e.g. 50/50 credit when a specific task begins and when it is complete) or installed quantities (2 of 8 miles of road resurfaced). By defining how each individual task of a work breakdown structure (WBS) will

be measured, the entirety of a project can be rolled up for an overall progress measure. This is significant as measuring progress is a key input to determining project productivity and forecasting cost and schedule. The better the input, the more accurate the output.

So what makes this digital progress? Truly, it's the interface between the EPP and other technologies so progress data can be reported more quickly and more precisely than ever before.

This gets exciting when contractors are providing inputs from the field on their mobile devices. Or even more exciting as the information evolves from document-centric (the drawings are approved!) to data-centric (the switches have been validated in the design!). Then more progress updates are consumed when the procurement system reports materials have arrived on site. Installation progress is now reported through data collected by laser scanners. While many of these elements are technology developments outside the EPP, the EPP serves as that integration point and definitive source for reporting progress and informing forecasts.



05. Predictability

As surely as the 7:48 a.m. commuter rail should pull up at 7:48 a.m., projects should be completed on time and on budget. So when we refer to predictability, we are talking about timeliness, i.e., how early in the project you accurately know the final project cost. Early knowledge of when a project is going off the rails maximizes the ability to course correct. Yet, for all the improvements we've noted thus far, there are human elements that impede predictability and therefore hinder improvements to program outcomes.

In its report on improving project outcomes and predictability, the Construction Industry Institute (CII) identified the human factor as the most significant component of project success. The human factor means not only the people working on a project but also the organizational culture and the incentive structure built around projects.

If not properly managed and aligned with organizational strategy, the human factor can have a negative effect on projects. Some of the causes of low predictability and project ineffectiveness are directly attributable to the human factor:

- Insufficient effort or attention
- Inadequate experience and expertise
- Optimism bias
- Poor transparency and accountability³

Realizing the human factor is critical to project success is a first step, but how can you ensure the human factor is improving project predictability and performance rather than hindering? An EPP platform provides the statistical framework to [incentivize transparency over secrecy](#). With the introduction of CII's Predictability Index, agencies and contractors can measure (and reward) project teams based on early disclosures and forecast updates rather than the reliance on the hope that it can be fixed later. The index then becomes one of the benchmarked key performance indicators that highlight strongly performing projects within the transportation program. Correlation between high predictability and lower variances could change how agencies hold contractors accountable or how high-performing contractors differentiate themselves from others in the industry.

“Early knowledge of when a project is going off the rails maximizes the ability to course correct.”

³ Construction Industry Institute, “[Improving the Predictability of Accurate Project Outcomes](#)”

All Aboard ... the Road Ahead

Mixed metaphors aside, investments in software for transportation infrastructure programs show outsized returns relative to their costs. We've shown how positive impacts arise throughout the entire program lifecycle – from the earliest of stages of capital planning, through better data management in project execution.

Overall, the benefits from an Enterprise Project Performance software platform stem from greater management efficiency, while increasing predictability and control of all projects. This approach has the potential to increase the likelihood that organizational goals are met through greater strategic alignment of projects and their expected returns.

Ultimately, at Hexagon's PPM division, we help our customers to transform unstructured information into a smart digital asset to visualize, build and manage structures and programs of all complexities, ensuring safe and efficient operation throughout the entire lifecycle.

We hope you'll **contact us** to discuss the challenges you're working to overcome and how we might be able to help with our Enterprise Project Performance platform, EcoSys™.



About Hexagon

Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Hexagon's PPM division empowers its clients to transform unstructured information into a smart digital asset to visualize, build and manage structures and facilities of all complexities, ensuring safe and efficient operation throughout the entire lifecycle.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 21,000 employees in 50 countries and net sales of approximately 3.9bn EUR. Learn more at hexagon.com and follow us @HexagonAB.

© 2020 Hexagon AB and/or its subsidiaries and affiliates. All rights reserved. 05/20 PPM-US-0808A-ENG

Learn more about our **Transportation Infrastructure** solutions.

hexagonppm.com | ecosys.net