



## Data Analytics Drive Real-Time Capital Project Management

*Collaborating with internal audit to minimize cost overruns and maximize value*

### Introduction

Data analytics has proven to create significant benefits across most industries and organizational functions, including internal audit. In fact, nearly two-thirds of internal audit functions now use data analytics as part of the audit process, according to Protiviti's 2017 Internal Audit Capabilities and Needs Survey. The vast majority of internal audit departments also report that their business partners' appetite for audit analytics is escalating.<sup>1</sup>

Although capital project management remains mostly an exception in regard to the use of data analytics, demand is starting to grow, particularly as capital projects of all sizes and across all industries become increasingly complex. As more contractors, subcontractors and vendors become involved in capital projects, it becomes commensurately more difficult to manage the swelling volumes of paper and cost data generated by this complexity.

By using data analytics, and audit analytics in particular, capital project costs can be monitored, analyzed

and audited on a real-time basis. The data these analytics generate can provide valuable insights into cost performance, schedule performance and other project trends of interest to capital project management teams and stakeholders. Furthermore, audit analytics can be used across an entire portfolio of projects. Even if an organization does not have a large capital project in process, this methodology can be applied to a wide array of capital expenditures, including but not limited to maintenance, engineering and facilities upgrades.

For various reasons, most capital project management teams have yet to optimize their use of analytics. A large majority of vendors and construction companies are hesitant to share real-time data across a range of performance areas. Paper-based invoicing, legacy mindsets and traditional audit approaches (i.e., cost-recovery audits) also pervade. In some organizations, the relationship between capital project management teams and internal audit is more contentious than collaborative.

<sup>1</sup> 2017 Internal Audit Capabilities and Needs Survey Report, Protiviti, 2017: [www.protiviti.com/IASurvey](http://www.protiviti.com/IASurvey).

Despite the complex algorithmic engines that drive data analytics, the nature of the challenges preventing capital project management teams from leveraging analytics are predominantly human and procedural in nature.

In this paper, we assess the valuable role audit analytics can play in capital project management. We also examine the challenges and share key steps capital project management teams can take to enable real-time project management, avoid surprises, and identify new opportunities to enhance organizational value via the use of audit analytics.

### Comparing Sampling and Audit Analytics: Two Approaches

While there are some capital project management teams today that leverage audit analytics to monitor key performance measures in real time, a majority currently do not. Most capital project management teams that have undergone audits have participated in manual, paper-based sampling.

When conducted correctly, paper-based sampling can help capital project management teams identify errors and other issues that warrant re-evaluation. Integrating analytics into traditional sampling-based audits delivers significant additional benefits.

Sampling-based audits begin with auditors requesting project managers to share a set of monthly invoices. Auditors then comb through these lengthy invoices to identify instances of cost overruns that should be recovered from vendors. Once these discrepancies are identified, negotiations to recover those costs commence. In some cases, organizations may elect to outsource cost-recovery audits to a third party.

The findings within samples of the overall data set can be trusted to reflect similar issues within the entire data set. That said, internal auditors and capital

project management teams should avoid certain issues that sometimes arise in these traditional audits. For example, project managers should keep in mind that the sample set of invoices that auditors review will reflect costs incurred up to the date of those invoices. However, projects continue to progress and positive auditing results should not confer a false sense of security to capital project management teams about subsequent work and billing.

Capital project management teams should also be aware that major cost overruns detected by auditing conducted late in the project's lifecycle may be difficult to correct prior to the project's completion. In these cases, formal cost-recovery proceedings may be required.

Additionally, the way some vendors conduct external cost-recovery audits can lead to unintended side effects. When the majority of a cost-recovery vendor's fee is based on the volume of cost-recovery issues it identifies, that vendor is naturally motivated to call attention to as many potential issues as possible. This scenario results in a higher number of false positives that require capital project management teams to invest valuable time reviewing and correcting. Project managers tend to become frustrated, understandably, when their work is disrupted by overbilling issues that end up not qualifying as issues at all.

Unlike sampling-based audits, analytics-enabled audits can be deployed continuously, throughout the project's lifecycle. Once audit professionals (internal colleagues or third parties) establish the necessary data exchange between the company and its vendors, auditors no longer need to submit document requests to capital project management teams for sampling activity. Through the continuous monitoring that audit analytics enables, these teams and auditors alike gain real-time insights into cost and schedule performance.

## • • • The Evolution of Capital Project Auditing

Current State	Future State
<ul style="list-style-type: none"> <li>• Manual data collection</li> <li>• Heavy reliance on project teams to audit paper-based invoices</li> <li>• Sample-based audit testing</li> <li>• Inability to leverage data to support decision-making</li> <li>• Large number of hours and resources needed to complete audit activities</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient collection of useable data</li> <li>• Standardized processes and analytics</li> <li>• The ability to review 100 percent of project costs</li> <li>• Continuous monitoring of vendor performance by project managers</li> <li>• Reduced time and project team interruptions to complete audit activities</li> </ul>

## Human and Procedural Challenges

Obtaining reliable cost and schedule data on a real-time basis requires some up-front work. Although data access represents a pervasive challenge, the implementation of audit analytics usually is a straightforward exercise, at least from a technological perspective.

From a people and process perspective, however, there are a number of challenges that routinely hamper the integration of audit analytics into capital project management. Before working through the steps necessary to implement audit analytics, internal auditors and capital project management teams should understand and address the common roadblocks:

- **Traditional paper-based processes:** In recent years, capital project management teams have expressed a growing desire to look at cost data. This need often goes unmet because ingrained invoicing habits are difficult to break, especially among general contractors and vendors who remain stubbornly attached to paper-based invoices. When vendors agree to begin submitting electronic documents, many elect to shift to PDF files, which are poorly suited for data-sharing. Rather than requiring vendors to move to electronic invoicing with shareable data files, it is often easier for capital project management teams to stick to the status quo and accept the fact that they will need to recover costs prior to the issuance of final payment and project closeout. However, by committing to weaning vendors off of paper-based invoices and securing the executive support necessary to sway some vendors, capital project management teams can lay the groundwork for introducing analytics.
- **Project management's problem-solving mindset:** Project managers thrive at problem-solving, a talent that delivers great value when addressing the vast number of issues that crop up on a daily basis. Given this skill and the fact that capital project management teams are tasked with a complex and dynamic set of responsibilities, many capital project management teams remain understandably skeptical of outside help: *Let us do what we do best. If and when problems arise, we've got them covered.* While project management teams certainly are adept at troubleshooting, this mindset can hamper the level of collaboration with internal audit functions needed to optimize the use of audit analytics.
- **Internal auditing inexperience:** Capital project management teams also may resist overtures from internal auditors regarding the application of audit analytics because of their unfamiliarity with the auditing process. Capital project management teams often react defensively when internal auditors come calling: *We're not doing anything wrong, why are you auditing us?* Internal auditors should recognize the source of discomfort and address it by clearly establishing general contractors and vendors as the focus of their assessments. Further, internal auditors should frame data analytics as an opportunity for project managers to gain sharper and timelier visibility into vendor and overall project performance.
- **Internal audit's reputation and expertise:** Internal audit's reputation can significantly help, or hinder, its collaboration with the capital project management function. Internal audit functions that are known throughout the organization for their consultative, collaborative approach are more likely to sell project managers quickly on the benefits of deploying audit analytics to take work off their plates. Rather than spending precious hours reviewing monthly invoices, capital project management teams can focus more time and expertise on their core work. It is also helpful for internal audit teams to have experience with capital project management and construction. For example, an internal auditor who has spent time on job sites is likely to have more familiarity with the nuances of capital projects — and more credibility with their project management colleagues. While internal audit cannot revamp its reputation overnight, it should be aware of its “brand's” influence on collaborations with project managers.

---

*Through the continuous monitoring that audit analytics enables, capital project management teams and auditors alike gain real-time insights into cost and schedule performance.*

### The Way Forward: How to Implement Audit Analytics

From a technology standpoint, data collection is the most common challenge — and a hurdle that must be cleared if the audit analytics effort is to succeed. That said, in most situations this challenge can be managed fairly easily. Nearly all general contractors and vendors use cost-tracking systems, which gives them access to all necessary data in a workable format. As long as internal auditors and capital project management teams clearly define their data requirements (the second step of the roadmap described later in this section), most vendors will be able to fulfill these requests.

Before starting the analytics implementation in earnest, it is beneficial to prepare by identifying which contracts are most suitable for analytics, ensuring that executive support is in place, and fostering a collaborative relationship between internal audit and capital project management teams.

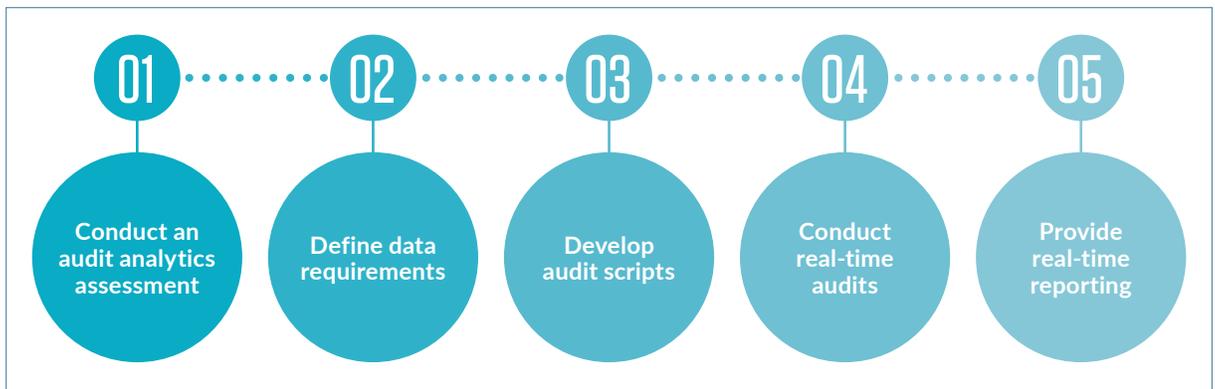
Audit analytics can be used for capital projects of all sizes. In fact, rather than the project's size and scope, the type of contract used to govern a project

is a more important determinant. For example, audit analytics and real-time monitoring may offer relatively minor benefits to a single project governed by a fixed-price contract.

As is the case with other important organizational initiatives, executive support is a key enabler of success. In this case, executive support can be crucial to backing up project managers who require longtime vendors to transition from paper-based invoices to electronic submissions. Vendors that stubbornly resist this change need to know that the executive team is not budging in its support of the move to electronic invoicing.

Finally, internal auditors should make it clear to capital project management teams that the analytics are designed to support, rather than police, their activities. In some cases, capital project management teams take ownership of certain analytics and customize reports to meet stakeholder needs.

With these enablers in place, organizations can embark on a relatively uncomplicated roadmap, one that normally covers the following five steps:



**1. Conduct an audit analytics assessment:** This phase includes examining the capital projects environment to determine how and where audit analytics will deliver the most value, analyzing the existing technology infrastructure to determine if any changes are needed, and developing a more specific implementation roadmap based

on these findings. This phase also provides the opportunity to develop relationships with project management colleagues — this sets the foundation for building a collaborative relationship from the beginning of the audit analytics development and implementation.

---

*Audit analytics can be used for capital projects of all sizes. In fact, rather than the project's size and scope, the type of contract used to govern a project is a more important determinant.*

- 2. Define data requirements:** During this phase, project teams establish the data-sharing requirements with vendors, set up the data warehouse and identify how data needs to be prepared to make it audit-ready.
- 3. Develop audit scripts:** Once the audit applications are selected and in place, the audit requirements are defined during this phase. Many internal audit functions already use software designed for audit analytics, continuous auditing and/or real-time monitoring. These tools generally are convenient to set up and easy to use right away. Spreadsheets can also be used. Internal audit functions with more advanced data analytics capabilities also tend to use data visualization applications that bolster reporting by making key information easier to understand via easy-to-read dashboard interfaces. After teams identify the data to be audited and monitored within specific contracts, relevant audit scripts are developed and deployed.
- 4. Conduct real-time audits:** This phase includes defining the audit schedule in coordination with the project management team, laying out how issues identified in the audit findings will be addressed, executing the analytics according to the schedule (weekly, biweekly or monthly), and reviewing audit findings.
- 5. Provide real-time reporting:** This phase includes the ongoing reporting of audit findings as well as reporting on the project's overall progress. Additionally, project teams should look continuously for opportunities to enhance auditing and progress-reporting cycles.

## In Closing: Early Analytics Efforts Will Generate Real-Time Returns

Each of the steps detailed herein are clear-cut to execute. It is important to keep in mind that the second phase, which covers data requirements, typically involves the greatest effort — due to the communication required between project managers and vendors to reach agreement on what data needs to be shared and how it will be shared.

Once those data requirements are identified, conveyed and accepted, organizations can progress quickly to monthly reports that contain key cost and schedule data as well as related trends. Within some project management teams, data collected for audit analytics can also be used to support earned value management (EVM) techniques.

No matter how difficult it may be to convince vendors to leave behind legacy invoicing approaches, the effort is worth it. Audit analytics can help capital project management teams identify cost overages and other potential challenges early in the project lifecycle, when problems can be more easily addressed. These audit analytics capabilities also help capital project teams audit 100 percent of monthly billings while monitoring compliance with all contract terms and conditions on a real-time basis. These benefits leave project managers with more time and confidence to do what they do best, without interruptions from their internal audit partners.

## Contacts

**Randall Coxworth**  
Managing Director  
Leader – Business Performance Improvement  
+1.312.476.6957  
[randall.coxworth@protiviti.com](mailto:randall.coxworth@protiviti.com)

**Jon Critelli**  
Director  
Capital Projects Consulting  
+1.404.443.8218  
[jon.critelli@protiviti.com](mailto:jon.critelli@protiviti.com)

**Eric Portlock**  
Director  
Capital Projects Consulting  
+1.720.264.2940  
[eric.portlock@protiviti.com](mailto:eric.portlock@protiviti.com)

---

Protiviti is a global consulting firm that delivers deep expertise, objective insights, a tailored approach and unparalleled collaboration to help leaders confidently face the future. Protiviti and our independently owned Member Firms provide consulting solutions in finance, technology, operations, data, analytics, governance, risk and internal audit to our clients through our network of more than 70 offices in over 20 countries.

We have served more than 60 percent of *Fortune* 1000® and 35 percent of *Fortune* Global 500® companies. We also work with smaller, growing companies, including those looking to go public, as well as with government agencies. Protiviti is a wholly owned subsidiary of Robert Half (NYSE: RHI). Founded in 1948, Robert Half is a member of the S&P 500 index.