

It Takes an Eco-System: A Review of the Research Administration Technology Landscape

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ABSTRACT

Deloitte Consulting LLP conducted a review of publicly available data sources with the goal of identifying the pre- and post-award systems used in higher education. The number and type of pre- and post-award systems identified not only show that higher education institutions (HEIs) use a variety of methods to facilitate research activities, but also suggest that HEIs and ERP vendors may think differently about the role of research administration technologies. We provide some hypotheses for why this may be the case. These hypotheses focus on: institutional priorities, market maturity, and the “vision thing.” We also provide high-level considerations to help HEIs think through their research administration technology decisions.

INTRODUCTION

Why is it so challenging for research administrators to achieve their goals, given the multitude of technology options available to support their work?

Higher Education Institutions (HEIs) must make efficient use of their technology assets to derive maximum value from the limited funds available to support the research mission. Although research

administrators have historically focused on improving operational efficiency to better serve faculty and facilitate compliance, increasingly, these administrators are also called upon for strategic insights to help guide broader institutional strategy.

Data make up a key source of strategic insights related to technology. Data on accounting, budgeting, students, research administration, human resources (HR), and other factors are often collected but infrequently used to their fullest potential. In practice, data have been used to meet credentialing requirements as opposed to driving strategic insights (Bichsel, 2012). This makes it not only difficult to provide efficient and effective faculty-centric services, but also nearly impossible to consolidate data needed to provide on-demand analyses to senior HEI leadership without significant manual effort.

To manage their operations and provide decision support, research administrators look for creative opportunities to leverage existing technology assets and, as a result, often deploy point solutions (defined below) and integrate a diverse array of analytical tools with Enterprise Resource Planning (ERP) solutions to achieve their goals. Indeed, there is evidence of significant growth in “data shops” across campuses to support the development of

strategic insights, in part due to the proliferation of analytical tools (Swing & Ewing Ross, 2016).

The purpose of this forum is to review the systems that HEIs are using to support research administration functions, identify reasons why those systems do not appear to fully meet the needs of research administrators, and offer recommendations for ameliorating the situation in the years ahead.

METHODOLOGY

The National Science Foundation releases its Higher Education Research and Development (HERD) Survey each year. HERD ranks U.S. colleges and universities by total research and development (R&D) expenditures. Using the Fiscal Year 2014 HERD ($N = 634$), we selected 159 institutions to include in this review. Except for 10 institutions for which public websites were not useful, we started at the top of the HERD list and worked our way down. Eighty-five percent of the 159 selected institutions spent more than \$100 million on research and development in FY 2014. Twenty-nine percent of the institutions in the sample were private; the rest were public. The range of R&D expenditures represented in this sample was between \$24 million and \$2.2 billion. We used institutional websites, popular search

engines, and firsthand knowledge/outreach to identify the pre- and post-award administrative systems and other major systems used by each HEI. When vendor names were not readily available, we drilled further into the Internet and identified HEI resources such as online training materials and website URLs to attempt to isolate vendor names. We then filtered this listing through an experienced group of our ERP practitioners who may be currently, or had been recently, engaged with these HEIs. This methodology resulted in a “best efforts” or directionally correct listing of HEI research administration systems, and other major systems, used by the HEIs in our sample.

FINDINGS

In addition to homegrown and legacy mainframe systems, we identified nearly 20 commercial software products and services being used to support research administration functions among the colleges and universities in our sample. Figures 1 and 2, collectively, present the list of software systems or Cloud services identified. These products are classified into two major categories: point solutions and ERP solutions. Point solutions focus specifically on research administration activities, which may include pre-award,

post-award, contracts management, forms management, and business process workflow automation. ERP solutions include integrated, enterprise-wide systems for finance, HR, and student-related functions. Some ERP vendors also provide pre- and post-award functionality.

Research administration encompasses a broad range of activities throughout the award lifecycle, beginning with grant funding identification and ending with post-award financial management. The pre-award systems identified typically support proposal development, electronic transmission of grant applications to sponsoring agencies, and internal routing of approvals. In some cases, these systems also include compliance modules for use of human and animal subjects and for avoiding conflicts of interest. Although other features are available, such as proposal tracking and document retention, these features are not commonly integrated with other HEI systems. While the general ledger is the system of record on the post-award side, a number of alternate post-award solutions are also available to facilitate budget-to-actuals reporting and close-out management activities. Table 1 highlights sample pre- and post-award system functionalities.

Table 1
Sample Functionality of Pre- and Post-Award Systems

Pre-Award	Post-Award
Workflow Routing	Financial and Accounting Data
Electronic Submission	Data Attribute Tagging, such as reporting dates
Proposal Tracking	Cost-Share Tracking
Compliance Approvals	Invoicing and Receivables

The systems in Figure 1 (see below) were identified as being used by HEIs to

facilitate pre-award research administration activities.

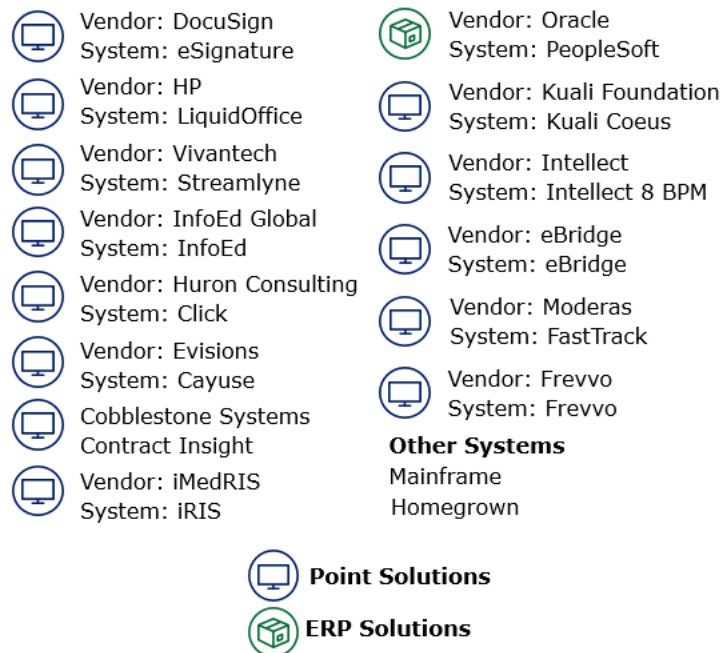


Figure 1. Pre-Award Research Systems

Although the listing of pre-award systems in Figure 1 is quite extensive ($n=14$, excluding legacy mainframe and homegrown systems), our review indicated that 61% of HEIs in the HERD-based sample use just five of the options available in the market: Kual's Coeus (20%), eVision's

Cayuse (19%), InfoEd (11%), Oracle's PeopleSoft (6%), and Huron's Click (5%). The remaining institutions have either built their own systems (8%) or still rely on manual processes (13%). In some cases, we found HEIs to be using multiple pre-award systems. We did not examine whether

different compliance point solutions or sub-modules, such as those focused on conflicts of interest, were used within the pre-award systems identified, due to limitations inherent in our web-based methodology.

The pre-award systems in use by HEIs in the sample showed a wide range in their functionality. Some HEIs use point solutions with integrated modules, such as

Click and Coeus that provide comparatively greater functionality. Others use electronic workflow systems, such as DocuSign and Contract Insight.

The systems in Figure 2 were identified as being used by HEIs to facilitate post-award research administration activities, including financial management.



Figure 2. Post-Award Research Administration Systems

The concentration of post-award systems within HEIs is similarly fragmented, with Oracle’s PeopleSoft (26%), Ellucian’s Banner (19%), Kualiti’s Coeus (14%), Workday (4%), Oracle EBS (4%), SAP (3%), and homegrown systems (3%), representing 73% of the sample’s post-award systems. ERP vendors Oracle and Ellucian own most of the market share. In addition, approximately 64% of HEIs in the sample use the same system for their post-award management activities as they do for

their general ledger activities. This suggests that the institutions in the sample have placed the highest priority for investment on post-award financial management, encouraging ERP vendors to develop those functions. In stark contrast, only 8% of HEIs took the same approach for pre-award activities, relying instead on point solutions.

In addition to HR systems—which HEIs commonly use to facilitate the application of Principal Investigator (PI) effort against grant accounts internally—accounting,

budgeting, and student systems (i.e., SIS) help to further define the broader HEI technology ecosystem. A total of 15 finance and HR systems were identified, 11 SIS, and 21 budgeting systems. As noted in Table 2, the results from our review indicate that Oracle’s PeopleSoft and Ellucian’s Banner

are the most commonly used ERP solutions in our sample. This analysis represents a single point in time and does not reflect trends that may impact market share among vendors going forward such as migration to Cloud-based solutions.

Table 2
ERP Systems Highlights

System	Finance	SIS	HR	Budget
PeopleSoft	33%	42%	40%	22%
Banner	22%	40%	21%	21%
Workday	7%	2%	10%	1%
Kuali	8%	2%	2%	5%
Mainframe	5%	8%	3%	2%
Hyperion	N/A	N/A	N/A	11%

CONCLUSION

Because pre- and post-award systems generally are not integrated with ERP systems, it is challenging for the research administrator to identify options that meet most of their needs for operational excellence and decision support. As a result, they rely on a variety of point solutions, integrating with ERP where feasible to meet their objectives.

EXPLANATORY HYPOTHESES

Why is it so challenging for research administrators to achieve their goals, given the panoply of available technology options? Below, we offer hypotheses to explain the findings observed in our review.

To arrive at these hypotheses, we applied the principle of Ockham’s razor. Named for the philosopher William of Ockham, this is a problem-solving heuristic which states that the simplest answer is probably the right one. For example, if you find your car windshield broken, you might propose three possible explanations: (a) lightning hit the windshield, (b) a rock from the car ahead hit the windshield, or (c) the windshield developed a crack because it is old. Ockham’s razor would select (b) because it is the simplest and most plausible answer.

We believe there are three basic reasons for the current situation:

1. Institutional Priorities
2. Market Maturity
3. The “Vision Thing”

The “Institutional Priorities” Hypothesis

In our experience, faced with relatively flat federal funding for research and rising operating costs, HEIs naturally restrict their major technology investments to features and functions they consider “essential.” These include, for example, the post-award financial management functions needed to report on research expenditures to sponsors and obtain full reimbursement, and to comply with federal regulations, terms, and conditions. The data suggest that institutional priorities have favored core functions needed to fulfill critical administrative obligations in post-award, rather than pre-award.

As our review indicates, when HEIs have invested in administrative systems over the past 25 years, they have focused mainly on the three pillars defined by the major ERP vendors: Finance, Human Capital Management (HCM), and Student Information Systems (SIS). These ERP systems are highly complex and difficult to implement, particularly in institutions of higher education, which are often decentralized and in the habit of operating within silos rather than across administrative and academic units.

In addition to being complex, these ERP systems are expensive to implement and operate. They require a significant up-front investment. Also, until the advent of Cloud services, these systems required HEIs to hire and train many IT personnel to maintain and operate them in expensive “on premise” data centers. These costs are impossible to fully recover. While not representative of all types of HEIs, a recent study by the Association of American Medical Colleges found that “the average medical school investment applied to externally sponsored research was an additional \$0.53 for each dollar of sponsored research received” (AAMC, 2015). Similarly, in 2014, \$4.8 billion (44%) of institutionally funded R&D expenditures consisted of unrecovered facilities and administrative (F&A) costs (National Science Foundation, 2015). These incremental costs impact HEIs in ways that affect the how they prioritize investments in technology assets.

Market “Maturity” Hypothesis

A basic premise of market economies is that actors respond to perceived demand and compete to win customers. Vendors will not invest in specific functions for their systems unless there is a significant demand for those functions. The data suggest that the dominant software vendors in the

market, namely the larger ERP vendors, have responded to institutional priorities with options that emphasize post-award financial management functions. The data also suggest that smaller niche players have entered the market with “point solutions” to fill the vacuum left by the dominant ERP vendors in the pre-award space. These vendors also answer needs in the post-award “non-financial compliance” space, which includes, for example, solutions for complying with rules regarding use of human and animal subjects, and rules

regarding conflicts of interest. Figures 3 and 4 demonstrate that point solutions dominate the pre-award ecosystem, while ERP solutions dominate the post-award ecosystem. According to the sample data, 13 point systems were used to support pre-award activities. These 13 systems represent 96 individual institutions. Likewise, eight ERP systems were used to support post-award activities. These eight systems represent 95 institutions.

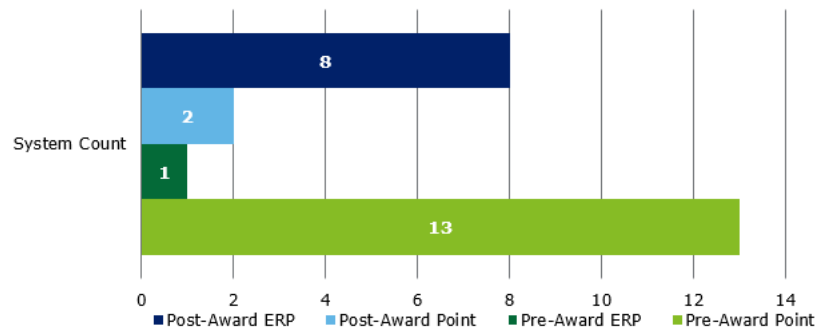


Figure 3. Number of Unique Pre- and Post-Award Systems Being Used, By Type of System

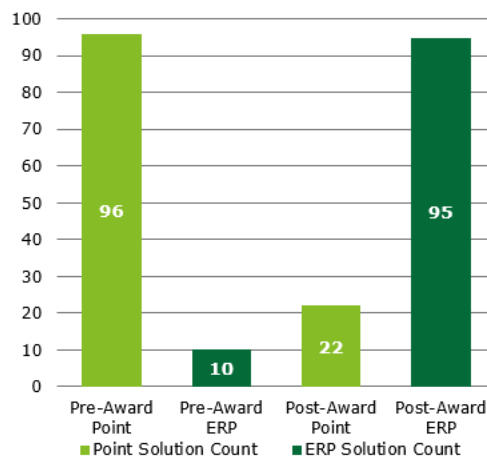


Figure 4. Count of Observations, By Type of System

The “Vision Thing” Hypothesis

A third, albeit highly speculative, hypothesis is that few players in the software market understand the business of research administration well enough to develop a robust, fully integrated suite of pre- and post-award tools that meet the needs of HEIs. Hence, we see a plethora of point solutions across most of the HEIs in our sample.

As research administrators know, our business is highly complex. While our colleagues in Finance and HR also face complexity in their vertical cost centers, they share many of their challenges with other industries. They can apply the lessons learned in those industries to producing financial statements, procuring goods and services, and administering benefits plans and payroll processes. Software vendors can easily transfer knowledge and leading functionality from other industries into the higher education sector. But research administration cuts horizontally across several vertical functions, such as Finance and HR. It is also a highly regulated function; some might argue that the regulations that apply to research are more arcane than those that apply to Finance and HR more broadly. Because they haven't worked with similar functions in other industries, and they lack firsthand

knowledge of the full research lifecycle, vendors may struggle to develop the vision and supporting functionality needed in a robust, integrated research administration solution.

IMPLICATIONS

Consider just a few of the common questions put to the research administrator in the course of managing day-to-day operations and providing decision support:

- Have all your PIs completed their mandatory training requirements? Have they complied with all requirements associated with their proposals?
- How many proposals did your HEI submit last year? To whom? By whom? For how much?
- What was the effective F&A rate on those proposals? How did any waivers granted impact the finances of departments, schools, or the institution overall?
- How many of those proposals resulted in awards? What was the success rate? What departments appear to be growing their research revenues at the institution? Which ones are shrinking? Are the faculty in those departments looking for alternate sources of funding? Do

they need more assistance in identifying funding?

- Are there any unusual terms and conditions in awards that have been accepted? Are copies of grants, contracts, and cooperative agreements readily available?
- How many awards are pending set-up? How long have they been pending? What issues need to be resolved to complete account set-up? What is the average cycle time for award processing?
- What is the burn rate on individual grants? Is it reasonable? Is it within budget? If there's an overdraft, are we expecting additional funding? If there is outstanding A/R, how old is it? What's the collection history?
- Have expenditures been reimbursed? Have they been reported? Are there any outstanding financial status reports? What's the detail behind expenditures? If prior approval was required, was it requested?

To answer these questions, research administrators have found creative solutions to support various functions in the research lifecycle. Because few solutions provide all necessary functions in an integrated fashion, research administrators

face a complex portfolio of point solutions. They also face the need to integrate those point solutions with their ERP systems to support processes and extrapolate data needed for decision support. Ironically, this approach doesn't simply reduce efficiency, as IT staff need to create and maintain complex interfaces. This approach also makes it challenging to adapt operations to enhance service levels, as systems become sclerotic over time, or staff turnover deprives the department of expertise. A plethora of systems, each containing different data structures, may also make it hard for the research administrator to extract data for decision-making in the absence of an effective data governance framework.

RECOMMENDATIONS

Vision. The profession should develop a shared vision for what an effective research operation looks like so that vendors can design to it.

Voice. Research administrators should make sure they are involved in key discussions as the HEI selects an ERP system, to ensure that the chosen system provides the requisite functionality and vendors are held accountable for delivering.

Integration. When selecting systems, focus on integration and the automation of critical handoffs, to make it easier to extract

data, engineer efficient processes, and facilitate effective internal control.

Prioritization. If you are able to implement only certain functions now, and must put others on the back burner, make sure you understand the impact of those choices on service levels, operational efficiency, and decision support.

Strategically Align. Work with senior leadership to incorporate research administration into the overall technology roadmap at your HEI. Cloud and SaaS

computing are expected to disrupt the current solution landscape over the coming years. As HEIs begin to transition to Next Generation platforms, make sure your Voice is at the table and your Vision is heard, so that the research mission is a Priority and systems are Integrated to support it. Otherwise, Finance and HR may once again top the list of institutional priorities and influence vendor development efforts in the years ahead, leaving research administration behind.

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