Working Draft

What's New in Analytics in Higher Education?

Insights on the Leading Edge from Interviews with Vendors, Practitioners, and Thought Leaders

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Introduction

Analytics is in demand by decision makers and in the higher education news, on the exhibit floor and in presentations at EDUCAUSE 2010, online at *Inside Higher Education* and *The Chronicle of Higher Education,* and in numerous blogs, books, and The Public Forum on Action Analytics. Analytics was also a key issue at the recent National Productivity Conference.

This White Paper has been built around a series of interviews with industry and vendor leaders, seasoned practitioners, and thought leaders. These interviews started at EDUCAUSE 2010 and have continued afterward, tapping resources from *Inside Higher Education* and *The Chronicle of Higher Education* to draw a comprehensive view of what's new in analytics practice.

Over the next months, this analysis and descriptions of best practices and vendor products and services will be refined and extended further. Additional vendors and practitioners will be interviewed. Comments and reactions from vendors and practitioners will be sought. References to particular vendors, practitioners, and thought leaders will link to more detailed resources on the Public Forum on Action Analytics. The conversation will likely continue through to our Third National Symposium on Action Analytics. There, we will showcase this topic and convene conversations with vendors, practitioners and thought leaders about how to advance the perspectives, tools, practices, and policies needed to deepen and accelerate the effective use of analytics in higher education.

Throughout this paper we refer and link to vendor interviews, white papers, and other articles.

The focus of this White Paper is on "What's New" and best practices. We are not assessing what the average institution is doing to deploy and leverage analytics, although we are highlighting affordable analytics and best practices in a wide range of different types and sizes of institutions. Surveying the population to determine typical practice has proven minimally helpful in identifying potential breakthrough practices.

Instead, we have emphasized the best practices, new products and services, and fresh and affordable approaches that are defining the leading edge of analytics in higher education. We have also included insights on best practices from other sectors. These have the potential to be widely deployed and taken up by other institutions. These are developments that will make a difference in advancing the practice of "Action Analytics."

What Is Action Analytics?

Action Analytics are business intelligence, reports and analytics that provoke appropriate action in pursuit of optimizing performance – of students, faculty, staff, and organizations. Action Analytics provide ***actionable intelligence*** in the context of the imperative to improve performance and deliver value. To fulfill this promise, Action Analytics require substantial enhancement in organizational capacity plus changes in culture and behavior at the faculty, institutional, state, and national levels. Action analytics is much more about change management than tools, techniques, and data sets. It is about establishing a serious performance improvement and optimization culture.

In our paper Action Analytics: Measuring and Improving Performance that Matters in Higher Education, which appeared in the Jan/Feb 2008 edition of the *EDUCAUSE Review,* my co-authors Linda Baer, Joan Leonard, Lou Pugliese, Paul Lefrere and I articulated the characteristics of the new practice we styled "Action Analytics." The principles of Action Analytics have been reflected in creation of the Public Forum for Action Analytics. In addition to gathering insights on successful analytics practice in higher education, we are showcasing the following insights from a global survey on the dramatic rise in analytics.

Recommendations from the Report, "Analytics: The New Path to Value." The *MIT Sloan Management Review* and the IBM Institute for Business Value have collaborated on a global executive study and research project focusing on the use of analytics.

The tag line for their report – "How the Smartest Organizations Are Embedding Analytics to Transform Insights into Action" – could have been written by the Public Forum on Action Analytics. However, their findings suggest that other industries are several years ahead of higher education in deploying advanced analytics for strategic purposes. We can learn from them, adapting their insights to our distinctive settings, yet understanding how we must change the higher education culture in order to systemically enhance performance and productivity.

A Five-Point Methodology for Advancing Analytics. The Report highlighted the importance of building vision, capacity, and management practices for analytics. The authors suggested the following five-point methodology for successfully implementing analytics-driven management and rapidly creating value. With minor modifications, it fits the needs of analytics in higher education.

- **Focus on the biggest opportunities first.** Attack a big important problem that can demonstrate value and catalyze/mobilize the organization to action.

  For higher education, student access, affordability, and success is our "killer app" that can be used to demonstrate value and mobilize the energies of leadership, faculty, staff, and policy makers.

- **Start with questions, not data.** Understand the problem – and the insights needed to solve it – before working on the data that will yield the insights.

  For years higher education institutions have been working on improving student access, affordability, and success, in response the strong accountability pressures. Many of the data needs for that purpose are well defined. However, today's fresh insight is that this must be

achieved in the uncomfortable context of a "New Normal" that requires reimagined performance, productivity, and financial sustainability.

- **Embed insights to drive action.** Analytics practices must be embedded in processes and brought to life in a way that they are understood, embraced and acted upon by non-experts.

  In higher education, this translates into "analytics for the masses," which involves the clear communication of insights on "what works" to improve student success and institutional performance. These insights, analytics applications, and intervention mechanisms must be embedded over time in academic and administrative processes. This creates a new imperative and capacity to act at the front-line level.

- **Keep existing capabilities while adding new ones.** Most analytics started with localized pilot capabilities. As centralized, enterprise-wide analytics capabilities and oversight grew, enterprises have found it is shrewd to keep distributed, localized capabilities in place.

  In higher education, many of the initial uses of advanced analytics began as pilot programs, enrollment management operations, or demonstration projects of predictive analytics. They are spreading as predictive analytics have been embedded in processes and applied at the enterprise level.

- **Build the analytics foundation according to an information agenda.** While opportunistic applications of analytics can rapidly create value, the true power of analytics will be realized through enterprise-wide applications. This requires enterprise-wide plans for data, information, and analytics applications and how they align with institutional strategies.

  In higher education, some market-driven (for-profit) institutions have developed such enterprise-wide analytics applications and plans, but most institutions are behind. All the more reason to focus attention on Action Analytics as an enterprise-level issue for strategic visioning, planning, and capacity development.

This Report is a useful guide and leading indicator of where higher education could be in a few years. Later on, we adapt this five-point methodology to the challenge of building organization capacity for Action Analytics in higher education.

What's New in Action Analytics in Higher Education?

This new White Paper describes the latest advances in perspectives, technology, applications, practices and policies. We have organized the narrative into eight critical elements of Action Analytics:

1. Begin with a Clear Focus on What It Will Take to Improve Student Access, Affordability, and Success – Then Raise the Stakes Even Higher.

Improving student access, affordability and success is the "killer app" of analytics in higher education. Thoughtful investments in student success typically yield substantial and rapid returns on investment. Institutions across the country are demonstrating this daily and have the ROI to prove it.

Accountability for Access, Affordability and Success. Improving student access, affordability and success has been the initial focal point of many national, state, and institutional initiatives. These have been funded by institutions, governments, and foundations/associations such as the White House, the Bill & Melinda Gates Foundation, The Lumina Foundation, The Education Trust, and The National Association of System Heads. Accountability analytics (student outcomes, success rates, employment rates) have been a key focus of these initiatives from the start. They are also used extensively by state higher education agencies providing incentives through "performance funding" and other inducements.

Embedded, Formative Analytics. To truly optimize student success, Action Analytics reaches beyond "summative," accountability statistics about student access, affordability, and success. We need real-time, "formative" analytics that are embedded in institutional processes – administrative and academic – and widely used by front-line success makers. This is critical element of institutional tools, application, and capacity.

Improving Performance, Productivity and Financial Sustainability in the New Normal. Such analytics also enable institutions to address faculty performance (impact of the actions of individual faculty on student success), the effectiveness of institutional practices and processes that produce student outcomes, and academic and administrative productivity. Moreover, a new context for student success initiatives has emerged: rediscovering financial sustainability in the "New Normal." Many of the state and national initiatives on student success are expanding their scope to include faculty and process performance and academic and administrative productivity. Leading institutions are also taking this broader and deeper view.

Action Analytics can be a way to improve results on all these dimensions at once.

EDUCAUSE 2010 Showcased the Next Generation Learning Initiative. Through the efforts of the Bill & Melinda Gates Foundation this initiative's focus includes learning analytics and the funding of individual institutions that have the potential to develop breakthrough practices in improving student success and institutional performance. Improving and scaling data analytics is just one priority; others include advancing blended learning programs, novel forms of interactive learning (such as gaming), and promoting high-quality open courses online.

To be ultimately successful, however, the Next Gen Learning Initiative will need to extend successful pilots to department, college and enterprise scale. Moreover, individual institutions and systems of institutions will need to leverage these successes to build organizational cultures and behaviors that support performance and productivity improvement. These sorts of capacity building efforts are a primary focus of Action Analytics and this White Paper.

2. Open Up Access to Data to All and Broaden the Scope of Data Used in Analytics.

This requires breaking down existing data silos, achieving better data governance and management, and developing the capacity to extract and use data from a broader range of data sources.

Data, Data Everywhere. Most institutions are awash in data, but the data are often isolated in separate data silos, sometimes trapped by proprietary restrictions or simply a lack of adequate data mapping. Moreover, mainstream enterprise resource planning systems (ERP) have proven disappointing from an analytics perspective. Their primary orientation has proven to be operational and transactional; they have been more oriented to back office operations than student success. Similarly, first-generation learning management systems (LMS) were architected to focus on course content (often imprisoned within the structure of individual courses) rather than context, community and student success.

Opening Minds and Architectures. The new generations of enterprise systems and analytics applications are striving to overcome these limitations by creating new architectures and approaches that leverage open architecture and open source. Institutions are re-establishing better data governance and management practices, while vendors are enhancing data mapping and building new analytics tools/applications. Together, these efforts will help liberate and leverage data resources and achieve Action Analytics. Leading institutions are enhancing their capacities in these areas.

The full spectrum of data sources needed for Action Analytics include:

- administrative enterprise resource planning (ERP) systems (Student, Finance, Financial Aid, Human Resources, Advancement; and Grants Management, CRM and Procurement);
- learning management systems (LMS) and other academic systems (library, assessment tools, content management, mobile and social solutions, as well as academic support services);
- third-party administrative systems (parking, residence halls, food services, auxiliary enterprises);
- alignment systems (aligning strategies, actions and measures) and internal evaluations/surveys, and external data sources(comparative data on other institutions, NSSE and CCSSE).

Progressively, institutions are extracting and making sense of broader collections of these data in data warehouse-based applications. Many of the new analytic applications advance data governance and management practices, as well and encourage institutions to invest more energy in these activities.

At EDUCAUSE 2010, The Future of LMS Was on Everyone's Mind. There was considerable emphasis on and interest in the "opening up of LMS" to analytics. Virtually all of the LMS providers emphasized providing easier access to their data resources and gains in the use of analytics (Blackboard, Desire2Learn, eCollege/Pearson, Sakai/Kuali).

Especially provocative were the new embedded reporting and analytics offerings that were showcased in joule, a Moodle-based learning management platform offered by Moodlerooms. Features embedded in joule are user-friendly reporting and analytics tools that are a part of the enterprise wrapper around open-source Moodle. These analytics draw from LMS, assessment, and ERP data sources, allowing the institution to explore, analyze, and report on a variety of student success, faculty performance, and academic productivity indicators. These analytics will be available to authorized administrators, faculty, staff, and the student, in real-time.

Post-EDUCAUSE, The Conversation Continued. The focus on learning management systems received a boost from the *Inside Higher Ed* column on "The For-Profit LMS Market," which contrasted the comparative benefits of Blackboard and eCollege. Much of eCollege's early growth was due to its

deployment by for-profit learning enterprises, where its "top-down" approach aligned with the operational needs of the for-profit (market-driven) providers.

3. Create the Next Generation of Analytics Applications: Enterprise-wide, Affordable and User Friendly.

This requires moving beyond business intelligence tools/analytics tools to robust analytics applications. These must include affordable analytics for every type and size of institution. Rather than analytics for power users, we need analytics for the masses, empowering authorized faculty, administrators and staff to become active analytics participants. **Moreover, students need analytics on their performance in comparison with students who have been successful.**

Report Writers and Business Intelligence Tools. Just a few years ago, analytics in higher education meant purchasing report writers and/or business intelligence (BI) tools. These tools were expensive and required expert power users who would develop reports that were then "pushed" to passive end users.

Acquisition and Consolidation. In the last three years, the major BI companies were acquired by technology or ERP companies and their tools integrated into the ERP stack (IBM acquired Cognos then SPSS, Oracle acquired Hyperion, SAP acquired Business Objects, other ERP providers made BI tools available to their customers, such as Datatel offering Business Objects). Over time, these vendors have increased the sophistication of the analytical applications deploying the BI tools.

User-Friendly Advanced Analytics Applications. Today, BI tools for power users are being supplemented and/or succeeded by advanced analytics applications that are more user friendly. Many of these applications incorporate Microsoft products (Office and SQLServer) which have advanced analytics capabilities embedded in them and are sufficiently inexpensive at scale to the extent that they have greatly reduced the price of analytics applications. These applications are user friendly; they enable the personalization and contextualization of data that can be "pulled" by active end users. These robust analytics applications combine a broader range of components than earlier BI tools:

- extract transfer and load (ETL),
- data warehouse (DW),
- Online Analytic processing (OLAP),
- Business intelligence (BI) elements,
- Predictive modeling and data mining,
- Accessed by powerful visualization and presentation tools.

The components in this array are illustrated by "Open-Architecture Enabled Action Analytics." The total cost of ownership of these analytics applications are coming down in total cost of ownership and becoming embedded in institutional enterprise infrastructures.

At EDUCAUSE 2010, The Attention on Analytics Applications Was Spread Among a Variety of Vendors. These included: companies specializing in analytics, LMS vendors, and ERP providers. All had an analytics story to tell. Among analytics companies, iStrategy Solutions has been an early pioneer in providing a pre-packaged analytics application that can be rapidly implemented in ERP environments where the data mapping to ERP data sources pre-exists. iStrategy reported at EDUCAUSE 2010 that it had completed its data mapping to Peoplesoft, SunGard, and Datatel and was turning its attention to data mappings to major LMS vendors. iStrategy is one of the options offered by Datatel to its customers as an integrated analytics solution.

Another analytics company, eThority, announced big news at EDUCAUSE 2010. eThority has taken its solutions (analytics, dashboarding and reporting for higher education) and made them available under the

sobriquet "DataTalent" through a so-called Zero Cost License. They took this approach after a six-month analysis of the marketplace and collaboration with industry analysts to find an "over-the-top" strategy. They concluded that in the consumer data market, users were deploying Google, Wikipedia, and others to achieve open and free access, so eThority took its platform and made it available at zero cost. This is a 500-user license of eThority's basic, fully functional analytics offering, not a stripped down version; there are premium services available as well. eThority is also providing a user-friendly predictive analytics capability as part of its product offering (as opposed to a power-user version available through standard BI tools).

Mainline ERP Providers. At EDUCAUSE 2010, all of the ERP vendors showcased their deployment of BI tools and analytics applications embedded in the ERP stack (SunGard, Oracle, Datatel, Campus Management, Jenzabar, SAP). In virtually all cases, analytics occupied a more prominent position than last year. Earlier this fall, SAP sponsored a symposium on business intelligence at Northern Kentucky University. SunGard attracted considerable attention with its acquisition of Purdue University's Campus Signals application and its performance management suites in admissions, and soon-to-follow advancement and retention. Campus Management announced it was now offering the eThority platform to its customers to address analytics needs. Datatel deploys Business Objects on the operational side and iStrategy on the integrated analytics application side.

ERP for Lifelong Learning. Another interesting development on the ERP front is the emergence of vendors like Destiny Solutions that offer an ERP-like solution for continuing education and lifelong learning offerings. Stimulated by the pressing demand for universities to discover new sources of revenues, post recession, such solutions provide a means for maintaining a lifelong relationship with learners, embedding analytics and customer relationship management capabilities to track and enhance learners' success.

Five Insights from the Vendors. From conversations with the ERP, LMS, and Analytics Application vendors at EDUCAIUSE 2010, five characteristics emerged as the bottom line on the new generation of analytics applications:

- **First, greater affordability and substantial pressure for continuing cost reductions was a pervasive theme.** Institutions are demanding this and the vendors are responding. Vendors expressed the desire to provide analytics solutions for any type of institution, and touted examples of community colleges, small professional schools, and mid-sized universities that had deployed affordable analytics applications. The financial crisis will accelerate the affordability imperative.

- **Second, the need is widely recognized for analytics that are designed and delivered for the masses and are user friendly and widely available**. While some power-user-based reports will continue to be "pushed" out to users, over time analytics increasingly will be "pulled" by ever more sophisticated end users using applications crafted for the masses.

- **Third, multi-vendor analytics environments on many campuses will continue to be the norm.** Many leading-edge institutions are hedging their bets against a single vendor solution. Indeed, no single vendor solution exists for the multitude of analytics needs and opportunities necessary to achieve the ultimate solution – Action Analytics.

- **Fourth, the conversation about new analytics capabilities is closely linked to the emergence of the enterprise technology that will succeed LMS 1.0.** On the exhibit floor and in the hallways at EDUCAUSE 2010, a favorite topic of conversation centered on "What is your next LMS decision going to be?" Institutional leaders are exploring many options, including no formal LMS at all. These conversations inevitably included enhancing the analytics that existing

LMSs have been unable to provide or support adequately.

- **Fifth, there is greater sophistication in talking about the future uses of affordable analytics among vendors and campus executives: presidents, provosts, CFOs, CIOs, and campus planners.** Over the past several years, the ERP, LMS, and Analytics vendors have been educating the marketplace – and one another – on how to move beyond the limitations of the existing ERP and LMS stacks. What new analytics needs will be required to deal with emerging institutional needs. Likewise, campus leaders have been facing greater pressure to provide accountability statistics and to improve performance, which requires embedded, formative analytics.

Enterprise-wide, Embedded Analytics Will Be Required. Part of the greater sophistication as it relates to analytics is the realization that enterprise-wide, embedded analytics capabilities need to be strengthened even if some immediate needs must continue to be addressed by specialized, targeted analytics applications (for retention, for example). Over time, the continuing development of enterprise analytics capabilities remains mission critical.

Prospects for the Third National Symposium. Our Third National Symposium on Action Analytics will bring vendors, practitioners and thought leaders together to discuss the challenges of developing and enhancing the enterprise capacity (technologies, processes, practices, policies, and skills) necessary to support Action Analytics and accelerating their penetration into the higher education marketplace. The collaboration between and among the higher education technology industry, institutional practitioners and thought leaders is essential to the success of Action Analytics.

4. *Deploy New Modes for Users to Engage and Visualize Data and New Means of Alerting, Intervening, and "Nudging" Learners Toward Success.*

Reporting and analytics practices have evolved from standard reports and power-user-provided queries and drill downs. The new gold standard is real-time, dynamically generated views that are available not just to institutional leaders, but to authorized faculty, advisers, counselors, residence hall and student life advisors, and other staff who are front-lend users who are expected to intervene to enhance student success.

A Variety of Visualization Modes Are Utilized. These views are expressed in a variety of forms: portals, dashboards, executive information systems, data books, and special alerts, with drill downs to cohorts and individuals. Visualization techniques are improving. Dashboards are evolving from traditional speedometer and traffic light icons to more sophisticated physical representations, made available to decision makers and front line action takers. Many institutions are developing multi-faceted advisement and engagement capabilities that enable them to engage learners – and faculty and staff – with important alerts or actions through a variety of means.

At EDUCAUSE 2010, Visualization Was an Important Feature. Presentation and dashboarding were key elements of the representations of all the ERP, LMS, and Analytics vendors. In addition, firms like iDashboard announced its new X Platform, which extends iDashboard's dashboard software into a comprehensive business intelligence platform which includes alerts, analytics and reports. With these features, the user can be notified immediately if a threshold is exceeded on a particular measure, performing what-if analysis in real-time and drill down from a dashboard to a report.

Institutional Examples of Best Practice. A number of institution examples illustrate the importance of engaging campus executives, faculty, advisors, other staff, and learners with actionable intelligence.

University of Maryland Baltimore County has achieved a great deal of attention for its use of iStrategy's dynamic views of real-time data to create an executive information view for President Freeman Hrabowski and his executive team, as well as front-line data users.

University of Central Florida is generally regarded as one of the top institutional practitioners of online, blended and e-learning. In addition, it utilizes extensive data mining and analytics to advance the success of its students and to compare and contrast student assessment of faculty performance in online, blended and e-learning environments.

Purdue University's Signals Program has received a great deal of favorable publicity and is being offered commercially by SunGard. It focuses on course-level success, providing a very early warning in Weeks 2, 3, 4, which predict students most likely to fail. It does this through engagement with LMS, grade book, and student system data and provides communication tools to reach out with faculty-composed emails specific to the course. The system also provides a signal posted to a student's home page. Students are offered a variety of meeting options – faculty office hours or meet at the center. Course Signals scrapes and analyzes data from grade book, activity log files, focusing on effort, academic prep and grades from other courses, and demographics. All of this enables a combination of at-risk characteristics and behavior, compared with those of successful students in the past.

South Orange County Community College District has developed (in-house) Sherpa, a recommendation engine that will guide students to make informed decisions regarding courses, services and information. Sherpa is an enterprise architecture with embedded analytics. Sherpa was conceived and shaped by the realization that today's students are accustomed to receiving recommendations in things they are considering doing or buying – movies, books, restaurants, music, and directions. So why not build recommendations, "nudges", and lifelines into the online academic experience? And why not use computational power to provide learners with options and alternatives that students like them have used to be successful? Sherpa has been constructed as part of the Student Services side of the college, not the academic. This has made it easier to develop the architecture and frameworks, which can be used in administrative and academic support functions, then expanded to include purely academic functions. To start off, Sherpa was applied to the "low-hanging" fruit of student course selection, aiding students in registering for courses and providing intelligence tools to immediately identify and select alternatives if their desired course selections are not available.

Ball State University worked with the assessment firm EBI to turn the University's years-long experience with its Making Achievement Possible (MAP) program into a technology-based platform that could become a marketable software product. MAP-Works is an online system that acts as an early-warning indicator of student success and retention. Most institutions are concerned with first-year retention, as well as helping students connect to their major in the sophomore year. MAP-Works helps many colleges and universities gather data about their first- and second-year students, providing appropriate feedback to students, faculty, and staff members so as to enhance student success and/or intervene with those students deemed at risk. Survey reports within the first-year experience, sophomore transition, and transfer sections mentioned above are produced by using MAP-Works. The MAP-Works application has also been installed at a number of other institutions.

Signals, Sherpa and MAP-Works also feature the use of embedded predictive analytics, to varying degrees. These predictive analytics can be useful in identifying when students are deviating from pathways to success, based on past experience. These are important elements of the next stage of Action Analytics – using embedded analytics to drive optimization of future outcomes.

5. Use Embedded, Predictive Analytics to Optimize Performance.

In the recent past, much of institutional analytics was historic. Backward facing analyses, using longitudinal data to understand student performance and identify "at-risk students" (after the fact) and develop policies and practices to deal with future "at risk." Today, the focus is extending to include analysis of real-time activities and levels of engagement of students, enabling identification of "at-risk behavior" using predictive analytics that examine past performance of student cohorts.

These predictive analytics are being embedded in institutional processes. Leading-edge institutional users of analytics are using embedded analytics to optimize the performance of individual processes. Ultimately, they will address optimizing institutional performance.

Competing on Analytics. Thomas Davenport and Jeanne Harris have developed a widely used typology in their book *Competing on Analytics*, which illustrates the cumulative use of reporting and analytics to achieve optimization of enterprise performance. As institutions move beyond "accountability" analytics to "formative" analytics, they are finding they must embed analytics in academic and administrative processes, as demonstrated in the following institutional examples.

Rio Salado College is one of the campuses of the Maricopa Community College District. Rio Salado, Capella University, Ball State University, and Purdue University were recently featured as exemplary practitioners in the AASCU/SCUP-sponsored Webinar on Predictive Analytics: Building a Crystal Ball on Student Success. Rio Salado has progressively developed a strong action analytics capability, based on their "homegrown legacy" systems. They have assembled the capacity to measure both actual academic performance and the levels of engaged behavior of individual students, and then match that against past patterns of success in a manner that has strong predictive power. Data mining and predictive analytics meet current student activity. So rather than dealing predictively with "at-risk students" based on demographic and personal characteristics and past behaviors, they deal with "at-risk behaviors" based on current, real-time activities. The facts on the ground (or online, if you will), yield 70% predictive accuracy. Leveraging this capability has become a fundamental part of Rio Salado's academic management practice. This capability is not an add-on to existing systems; it is fundamentally embedded. It yields systematic interventions to improve success, log-in behavior, and site engagement. This is a new set of unobtrusive metrics for the logged-in student.

Capella University has embedded these predictive applications and practices into their enterprise platforms based on the same analytics tools used by the credit card companies to determine when patterns of purchasing behavior change, suggesting that a card may have been stolen and is in the hands of someone other than its owner. Within days of a course starting, they can determine which students are in jeopardy, what their likely grades will be based on continuation of that behavior, and the likelihood of their registering for the next semester. Like many of the online universities in the market-driven (for-profit) sector, Capella has embedded predictive analytics as a fundamental component of its academic processes. A more detailed case study describes Capella's strategic use of analytics.

American Public University System is a highly regarded practitioner in the field of embedded predictive analytics. In the APUS business culture, performance is taken seriously every day – perpetually. They have the capacity to look at data any time. As it is, their current practice is to take a comprehensive look every week at all 77,000 currently enrolled students, who are ranked in order based on their likelihood of not being retained. APUS has the capacity to drill down to examine and intervene with individuals, using a variety of scenarios and tailored interventions. They examine every aspect of the student to determine their broad profile characteristics and their precise transactional information revealing student interaction with content, other students, and faculty. All this is done in quantifiable ways so APUS can understand the precise nature of the problem and its cause(s).

These practices enable achieving substantial consistency across the enterprise and enhance the practice of continuous quality improvement. What makes their approach even more exciting is that their approach to statistical analysis doesn't just use garden-variety statistical regression, but dynamic models that actually learn from themselves.

At EDUCAUSE 2010, New Learning Environments Were a Hot Topic. One of the most interesting sessions involved Adam Honea and Angie McQuaig discussing the University of Phoenix's plans for its new technology environment, which they describe as a "cloud-based EaaS (education as a service) platform, a learning platform that learns." The University of Phoenix is investing heavily in this so- called "Learning Genome Project," which is deploying Facebook-like capabilities in a product that aims to reimagine the LMS. Rather than rely on surveys to determine how students think they want to learn, the new platform – as conceived – would infer from student behavior how they actually learn best and respond accordingly. The inference is that online, personalized education, supported by embedded analytics, will mark the standard curriculum for extinction. The power of this vision will need to wait for confirmation until the new system is developed and operational.

The Market-Driven Institutions Share Their Tradecraft. A key factor in the advance of Action Analytics has been the new found willingness of the market-driven institutions to share information on their analytics practices. For years, most of the for-profits have been secretive about their analytics tradecraft, and rightly so since it was regarded as a source of competitive advantage. However, many of the for-profits are participating in the Transparency by Design initiative and institutions like Capella University and American Public University System have been recognized with awards for their approaches to student success. Capella University is one of the participating partners in the Action Analytics initiative and is working with the Minnesota State Colleges and Universities, University of Minnesota, and the College of Saint Scholastica in a project called Minnesota Action Analytics. This project aims to illustrate the dividends from multi-institutional, cross-sector collaborations on analytics.

The Need for Research on "What Works in Embedded Analytics," Married with Intervention and Communications Systems. In an insightful post to the Public Forum, **John Hammang of AASCU** suggested that our conversations need a probing discussion and research on what kind of analytics seem to be working to help achieve access and success outcomes. We need even more openness to sharing analytics tradecraft. We are increasingly learning that currently observed student behaviors (sign-ons, downloads, task completions, etc.) are ***much more valuable predictive elements*** of successful outcomes than demographics or even past performance. University of Maryland Baltimore County, University of Central Florida, and others are building sizeable data-based outcome analyses that are beginning to identify correlates of success. Also, we need to marry such research with communication systems. The Sherpa approach has great potential to facilitate the messaging but at this stage in its development it lacks the analytical sophistication of what to communicate about. That said, the Sherpa arsenal of messaging tools and presentation capabilities is first rate and easily customizable by users. There is tremendous potential for rapid progress and continuous improvement if we can craft research on what works, share and compare results and the tradecraft for application, and marry research and tradecraft with the systems for engagement and communication that can be embedded in institutional life.

Embedded Analytics in the Sloan/IBM Research. As already mentions, the Sloan/IBM research reiterated the fundamental importance of embedded analytics and the needs to clearly articulate and share the insights on the value of analytics-guided interventions through effective communication/engagement systems.

6. Create a Culture of Performance Measurement, Improvement, and Optimization.

Throughout the conversations with vendors, practitioners and thought leaders, a consistent theme emerged: developing analytics is as much about changing culture and behaviors as it is about data, information, and analytics. To successfully confront the challenges facing higher education in the coming decade, institutions must evolve and embrace a culture of performance measurement, improvement, and optimization.

Cultures of Performance Measurement and Improvement. It is not surprising that the leading-edge, market-driven institutions are winning awards for their best practices in analytics. Many practitioners in traditional institutions have been highly impressed with the sophistication and institutional commitment to analytics practices and the manner in which they are aligned with enterprise strategy.

These institutions have also achieved highly performance-oriented cultures. Their cultures are characterized by top-down, business-and-results-oriented practices. Traditional institutions have a different culture. While there is much to be admired and learned from these thought leaders in their use of analytics, traditional colleges and universities will have to chart their own paths to address the challenges of the times.

Evolving Cultures in Traditional Institutions. Most not-for profit institutions are moving from a culture of reporting to a culture of evidence. In many cases, institutions are on the way to a culture of performance. Even the most advanced have room for improvement since most are still based on a decentralized, individualized, faculty-centric culture that makes teaching and learner performance improvements challenging.

While almost all not-for-profit universities have retrenched in various ways over the past several years (market-driven institutions and community colleges have grown, but many community colleges have done so in the face of declining resources), few traditional universities have fundamentally enhanced productivity and performance. The challenges of the next 10 years will likely require most institutions to do so.

Insights on Analytics from other Sectors. As already mentioned, the MIT Sloan Management Review has launched the New Intelligent Enterprise Initiative to explore the future of analytics. Erik Brynjolfsson, director of the MIT Center for Digital Business, has made the following observation:

> "What we're going to see in the coming decade are enterprises whose whole culture is based on continuous improvement and experimentation – not just of specific processes, but of the entire way the company runs. I think this revolution can be fairly compared to the scientific revolution that happened centuries ago. Great revolutions in science have almost always been preceded by great revolutions in measurement."

If Brynjolfsson is correct the future belongs to analytics-savvy organizations that can create new levels of performance and value. Higher education enterprises that are not able to achieve to this level of performance will lose ground to those that do meet the rising expectations of consumers who will encounter the new standards of performance in their dealing with enterprises from other sectors and in analytics-savvy organizations in higher education. They will also face eroding support from state and national policy makers pushing for more adaptive, higher performance approaches. New providers that provide lower-cost, good-value learning options will likely thrive.

Turning Analytics into an Enterprise Planning and Development Activity. Across the broad expanse of American higher education, analytics are being supported by a broad and effective coalition of practitioners, policy makers, foundation funders, and advocates. Their efforts are accelerating the uptake of existing pilots and practices, introducing new approaches, and focusing on scaling analytics practices. But the greatest challenges lie ahead, in building the capacity of individual institutions and networks or systems of institutions by:

- pairing accountability-based summative analytics with embedded formative analytics that are part of the institutional fabric and aligned with institutional strategies, initiatives, and processes;
- making analytics an integral ingredient in enterprise planning and capacity development, with the clearly articulated intent of enhancing performance and productivity to achieve financial sustainability; and
- progressively creating a culture of performance measurement and enhancement.

As part of the Pubic Forum on Action Analytics we will be showcasing the efforts of institutions and systems/networks of institutions that are achieving these best practices. We will also be developing a body of knowledge of planning and organizational capacity development insights that can be turned into developmental experiences for institutional and system leaderships interesting in building their capacity to follow these paths.

Adapting The Sloan/IBM Five-Step Methodology. A starting point in this development is to suggest how the Sloan/IBM Five-Point Methodology can be adapted to building enterprise capacity in higher education. This methodology recommends a constant combination of action and thought. For an institution looking to make analytics strategic and build its organizational capacity to enhance productivity and performance, we suggest the following actions. These are ways of accelerating the development of analytics and aligning theme with enterprise-wide strategy:

- **Focus on the biggest opportunities first – improving student access, affordability and success.** Start with your institution's existing initiatives, projects, and pilots in this area, plus a synthesis of the insights from the many other projects and pilots currently underway across American higher education. Understand your existing enterprise capacity in data, information, and analytics. Act, study, learn, think, and challenge, concurrently.
- **Start with questions, including what will enhanced student success need to look like in the context of the "New Normal" that requires reimagined performance, productivity, and financial sustainability for institutions.** The notion that higher education needs to be "reimagined" and that analytics will play an important part in achieving high planes of performance and productivity is inescapable. Moving existing initiatives to a higher plane of accomplishment should recognize that the performance bar will be higher – and will be raised continuously over time. Existing initiatives should be adjusted to this emerging reality.
- **Expand "analytics for the masses" and embed predictive analytics into academic and administrative process.** This point is consistent with our key findings about the leading edge of analytics practice in higher education: open, affordable, user-friendly analytics, accessed through new communication and engagement vehicles, and embedded in academic and administrative processes.

  Such dynamic, end-user-focused applications and capabilities communicate the utility of analytics and the value derived from using them in real-time to enhance performance. Progressively, these capabilities need to be embedded in institutional processes. As staff, faculty, and students

dynamically utilize analytics to intervene and shape student success and increase institutional performance, they will model the new behavior that is part of a culture of performance improvement.

- **Keep existing capabilities while adding new ones and building an enterprise analytics capability.** In higher education, many of the initial uses of advanced analytics began as pilot programs, enrollment management operations, or demonstration projects of predictive analytics. As an enterprise perspective develops and as new, dynamic analytics are acquired/developed and embedded in processes, many institutions are evolving existing applications. Many institutions are taking multi-vendor approaches to meeting their analytics needs.

- **Build an enterprise-wide information agenda and use that to shape the analytics foundation.** In higher education, some market-driven (for-profit) institutions have developed such enterprise-wide analytics applications and plans, but most institutions have not. This is all the more reason to focus attention on Action Analytics as an enterprise-level issue for strategic visioning, planning, and capacity development. The analytics capacity should be aligned with institutional strategy, plans for capacity building, and the enterprise-wide agenda for data, information and analytics.

How does one change the organizational culture of a college or university to focus on measuring and enhancing performance?

Experience in higher education and other industries has demonstrated that the best way to achieve cultural change is to select an activity or process that everyone agrees is important, then deploy new analytics capabilities (like the embedded analytics descried above) to improve outcomes, demonstrate value, and change the behavior of faculty and staff – modeling the new behavior in a performance-focused environment. Evaluate and articulate the outcomes and why they are important. Then expand deployment to other processes and practices. This approach is embedded in the five-step methodology described above.

7. Expand Institutional Analytics to Include K-20 and Workforce Analytics.

One of the important elements of Action Analytics is that the focus has expanded beyond traditional higher education in two important directions: 1) the scope of comparative analytics has expanded to consider the full pre-K-20 continuum and 2) analytics that illustrate the linkage between learning and work and employability are increasingly sought after.

K-20 Analytics. Virtually every state is pursuing a serious K-16 or K-20 initiative to improve the linkages between K-12 and postsecondary education. These state-wide programs are pursuing the intent of improving student readiness for college, reducing remediation, and "tuning" to improve comparability of credits. Many community colleges and universities have charting pathways/bridging programs to get students on a college path while in high school and guarantee three-year baccalaureate degrees for students who get on the right pathway and follow the roadmap. The University of Massachusetts just announced three-year degree tracks, building on advanced placement programs in high school.

To support these initiatives, states are developing model K-12 and postsecondary data systems and developing longitudinal data systems to enable K-20 tracking. The NCHEMS/SHEEO document "The Ideal State Postsecondary Data System: 15 Essential Characteristics and Required Functionality, by Peter Ewell and Hans L'Orange, argues that certain characteristics and the resulting functionality are essential in an effective longitudinal data system. Like the "Ten Essential Elements" of state K-12 longitudinal data systems proposed by the Data Quality Campaign (DQC), these characteristics are

intended to promote educational progress and alignment among and between each state's K-12 and postsecondary data resources.

Over time, these data systems will link K-20 and perhaps extend to the workforce, as well.

The Linkage Between Learning and Employability. The workforce linkage is spawning efforts at institutions, employers, and commercial and employment agencies, often working in concert. Individual institutions are positioned to use data mining to understand the success paths followed by their students. Many institutions are increasing their efforts to collaborate directly with employers to align offerings with employment competence needs. State and federal workforce agencies are redoubling their efforts to provide useful data that map competency and skills needs to career opportunities. And large employment services, temp agencies, and workforce agencies are mining their vast data resources to illuminate employability trends, patterns, and opportunities, often using real-time data. We interviewed Monster.com to determine what the market leader is doing.

Monster Government Solutions is focusing on providing data and analytic services to public sector and education clients that enable employers, government, education and job seekers to align their efforts and make sense of the learning/employment connection. Their theme is "Creating the High Performance Workforce" which is reflected in a series of White Papers and other resources. Their strategic intent is to create "real-time labor intelligence" that is actionable.

Monster is in a unique position to be a partner in learning/workforce solutions. It recently acquired hotjobs.com, so it now has access to a trove of searchable data resources and analytics capabilities:

- **Supply Side** – over 110 million US resumes, 980K new resumes added monthly, more than 11 million unique job seeker visitors each month, and Monster manages nearly 24 million Job Seeker Accounts nationwide;
- **Demand Side** – One of the world's largest jobs data sources, on average over 200,00 current jobs listings, the ability to access additional posting from hundreds of job boards, plus government, non-profit, and industry association sites; and
- **Research and Analytics Teams –** Dedicated analyst and research team, plus partnerships that extend research capacity into employer surveys, curriculum development, and economic forecasting that can be woven into customized solutions.

Monster Government Solutions' current analytics-based services include a subscription service, custom reports, research briefs and research on demand (aggregated- and detail-level supply and demand data that can supplement the analytics efforts of local, regional and state governments, employers, and institutions to make sense of market conditions and align curricula with strategic skills requirements). Current opportunities focus is on regional analytics with strong economic development applications.

Future possibilities – data mining on student success factors, filling knowledge gaps, and employability. Monster.com and other commercial and government employment agencies are positioned to be participants in more ambitious analytics-based efforts to make sense of the learning and work environment using longitudinal and real-time data, and making predictions. For example, future possibilities could include combinations of the following:

- Data mining to analyze the pathways, competences, and habits of students who achieve successful job placement and career success (through longitudinal analysis);

- Collaborations with institutions, employers, and workforce agencies to create more powerful analyses of successful pathways and working the results into institutional and employer programs and practices;

- Identifying knowledge and competence gaps that impede employment for particular jobs and collaborating with institutions to develop corrective, knowledge gap filler programs that can be used by graduates to rapidly fill gaps and prepare them for employment, independent of the degree program; and

- Providing guidance and ongoing data support to institutions and other learning enterprises that aspire to become *"success makers"* in coaching and positioning their students for ongoing success.

These possibilities could be accelerated with the wider use of learners/worker portfolios, made portable and detached from particular institutions so learners could demonstrate the patterns of their competences and accomplishments lifelong.

At EDUCAUSE 2010, Workforce Analytics Were on the Vendor's Radar Screen. Many of the technology vendors were keen to extend analytics into K-12 and the workforce. This suggested that higher education could be poised on the cusp of a dramatic increase in analytic applications that leverage enterprise analytics and data mining of institutional data; span K-20 and workforce boundaries; and involve collaborations with multiple parties including employers, commercial and government employment agencies, and other sources of data.

8. Utilize Action Analytics to Support Reimagining Higher Education, Post Recession.

In addressing point #6, we have already discussed the importance of a "reimagining" mindset in the deployment of analytics in higher education. The imperative to raise performance through Action Analytics has been given a boost by the Great Recession.

This Time Around It Is Different. For the past three years, institutions have been "staunching the flow" of the resource drain caused by the financial crisis. Given the weakness of the recovery, the expiration of stimulus funding, and the political victories scored by Republicans in the mid-term elections, the situation is likely to be even worse over the next several years. In past recessions, institutions have responded to temporary financial shortfalls by making temporary adjustments, counting on conditions to improve quickly after the recession. This time around, there will be no post recession rebound in state and federal resources for higher education, and family finances will be even more stretched as many institutions continue to raise tuitions to fill budget gaps. The current financial model and levels of performance are unsustainable and unacceptable.

Acting Strategically to Enhance Performance and Productivity, Achieving Financial Sustainability. Rather than "muddling through," institutions should act strategically, setting their sights on a new plane of financial sustainability by 2020, achieved by improving performance, productivity and value. This will require what the Lumina Foundation calls "Navigating the New Normal," in which institutions will need to meet higher expectations with fewer resources and new approaches. Most institutions have not achieved the summative and formative analytics capacity, nor have they universally adopted a performance culture – all of which they will need in order to achieve financial sustainability in the new normal.

In our paper Linking Analytics to Lifting out of Recession, Linda Baer and Donald Norris recommended that institutions can reach a new plane of financial sustainability by leveraging their use of technology-enabled process reinvention and analytics, and focusing on performance, productivity, and value. Using

these approaches, institutions can discover, demonstrate, and deploy operational efficiencies; innovations that improve performance and reduce costs, reimagined processes and practices, and fresh sources of revenue – all at once. This will require Transforming Online Learning and Competence Building, which includes a five-stage model describing the evolution of institutions in turning online learning into an powerful instrument for improving performance, productivity, value, and employability. Substantial summative and formative analytics capabilities, embedded in the practices of every institution, will be critical in achieving these goals and in the process achieving financial sustainability.

In the final analysis, analytics in higher education began with a laser focus on improving student access, affordability, and success, the so-called "killer app" in higher education. In the face of changing times and a New Normal, however, leaders are needed to adapt this focus to embrace substantial improvements in performance and productivity to achieve financial sustainability.

The Five Stages in Analytics

Based on the Insights and conversations that have generated "What's New in Analytics in Higher Education?" we are drafting a companion piece called "The Five Stages in Analytics." It will be posted on the Public Forum on Action Analytics soon.

Engaging in Conversation About "What's New in Analytics?"

This paper is a work in progress. It will be progressively refined and revised, based on input from vendors, practitioners, and thought leaders.

We are inviting vendors, practitioners and thought leaders to comment on this White Paper, post their own views of what's new, and share white papers and case studies. We will use this ongoing conversation to prepare for the Third National Symposium on Action Analytics, which will bring vendors, practitioners, and thought leaders together to address how they can collaborate in advancing analytics capacity in higher education and develop the performance optimization culture on campuses that will be critical to this effort.