

# Smartening the System

The path to smarter education

*A Technology Blue white paper on  
Predictive Analytics*



**technologyblue**

*An information technology strategy firm*



## Smartening the System

Education systems across the world are learning to strategically apply information technologies to make use of one of their greatest assets: data.

Predictive Analytics is a key technology that is stretching the capabilities of leaders to make more informed decisions about students, schools and special programs. Gone are the days of gut feel decisions based on the here-and-now.

Predictive Analytics is about providing insight on what will happen in the future, enabling cultures of excellence, student-centricity, providing accelerated opportunities, and heading off disengagement before it happens.

For a few education systems, Predictive Analytics is already paying huge dividends in student, school and program performance. For others, Predictive Analytics adoption is closer than one might think.

### What is Predictive Analytics?

Predictive Analytics is a class of software that facilitates the translation of data to effective and efficient action.

Predictive Analytics combines mathematics, modeling, statistics and probability to draw meaningful conclusions between current conditions and future events.

When applied to education, Predictive Analytics helps organizations create a student-centric perspective that focuses on what students need today as well as tomorrow.

Innovative school systems are leveraging Predictive Analytics to improve student retention, scholastic performance, special program effectiveness and respond to government-mandated compliance and accountability.

### Introduction

Throughout the past 10 years Information Technology has provided countless industries with innovative capabilities to improve operations, increase revenue, track spending and expand competitive advantage.

Most recently the progression of Business Intelligence technologies has enabled organizations to further their insight into day-to-day operations by aggregating historical raw data into meaningful information. However while Business Intelligence capabilities have become more useful, many organizations are looking beyond the aggregation of past data. They are implementing innovative decisioning technologies that translate aggregate data to strategic action.

Decision Management (*Figure 1*) technologies are providing the capability to automate decisions, predict future behaviors and optimize courses of action.

### Innovation through Analytics

Predictive Analytics is a core technology of Decision Management and has quickly become a strategic enabler of success for organizations across many industries.

Unlike many software-based solutions that are owned and maintained by the IT function, Predictive Analytics value is maximized through

### Decision Management Technologies

#### Business Rules

Business Rules apply inferential algorithms to help make faster, more precise and more consistent operational decisions.

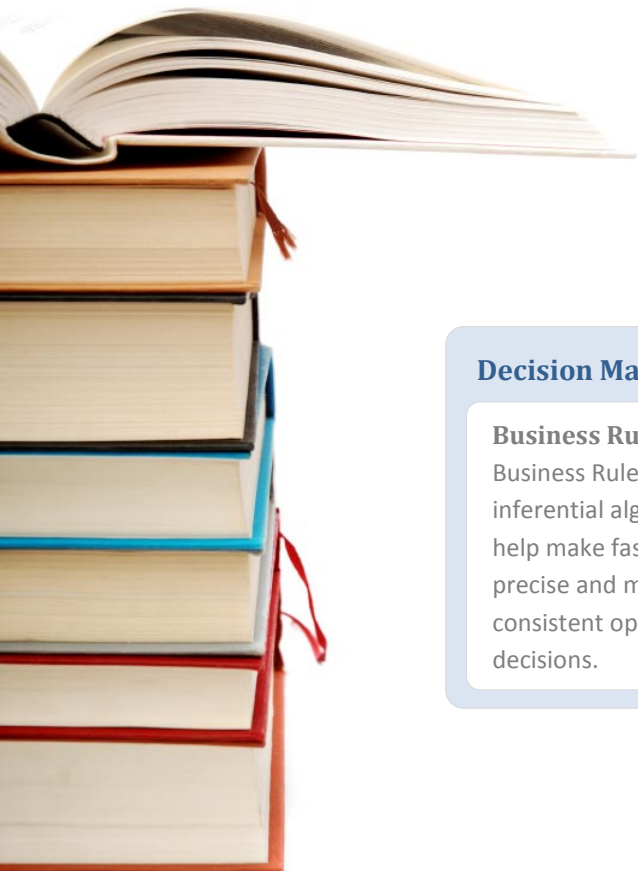
#### Predictive Analytics

Predictive Analytics helps leverage historical data and robust predictive analytical models to make current business decisions.

#### Decision Optimization

Decision Optimization leverages linear programming models to help determine the best course of action for a given scenario.

Figure 1: Decision Management Technologies



mutual collaboration between business and IT. The business function commonly plays both tactical and strategic roles, facilitating composition, maintenance and usage of predictive models by those who know the business best.

Now more than ever, analytics is being leveraged to further advance the benefits of IT systems and applications, and increase the value of student data.

While the challenges facing education systems are being addressed by many technologies, Predictive Analytics is providing exponential value to those who wish to reach beyond the capabilities of Business Intelligence.

Through Predictive Analytics they are not only gaining insight into their system, they are translating their data into actionable knowledge that drives productivity, value and effectiveness.

The end result is an institution capable of mitigating the plethora of factors that impact the education of our youth, and reversing the downward progression of student engagement (*Figure 3*).

### **The education challenge**

The education industry shares many challenges with other industries around the world. Fewer resources, reduced budgets, more standards, higher expectations and greater accountability dominate executive and leadership agendas. In response, leading organizations are turning to information technology to increase operational performance and achieve success in their respective mission.

All industries around the world, no matter what their mission, are all faced with one common



## Strategic appliance of analytics can help reverse the downward progression of student engagement. \*

7,000 students drop out of high school every school day.

1.3 million students drop out every year

50% of incoming ninth graders in urban, high-poverty schools read three or more years below grade level.

39% of high school students reported spending one hour or less per week reading or studying for class in 2009.

23% of new American teachers come from the top third of their graduating class.

14% of new American teachers in high-poverty schools come from the top third of their college class.

100% of teachers in Singapore, South Korea and Finland come from the top third of their college class.

Figure 2: Downward progression of student engagement

challenge: reducing risk. Banks want to reduce lending risk, insurance companies want to reduce the risk of fraud and healthcare organizations want to reduce the risk of errors.

Likewise, one the most critical challenges for education institutions is reducing the risk of student disengagement. While other industries have challenges with similar characteristics, stemming the tide of student disengagement requires addressing issues that are arguably more complex.

The complexity originates from the fact that each student is unique. Within the classroom each student learns differently and requires different instructional sets, approaches and methods. However the complexity does not end with in-classroom challenges. Students face unprecedented influences outside of the classroom as well. Social disadvantages, home-life factors, media distractions and peer pressures can cause students to disengage from learning despite having an aptitude to flourish as productive members of society.

Another contributor to the complexity of education challenges is the ongoing struggle of meeting

greater expectations with less budget and fewer resources. “Doing more with less” is a factor that continually opposes successful fulfillment of student needs, and results in a recurrent downward progression of student engagement.

Now more than ever, ensuring student success requires an education system that embraces best practices, policies and innovative solutions that create insight, understanding, and most importantly, action. However the solution is not as simple as implementing new technologies. Successfully overcoming education challenges requires a strategic adoption of technologies, processes and approaches that over time help the system transform to become more student-centric.

A student-centric education system suggests a more proactive than reactive intervention with students. Special programs can increase effectiveness and efficiency while operating on reduced budgets and resources. Student information can be leveraged from elementary school through secondary education to ensure logical and meaningful career choices.

Many education institutions are on the path to meaningful transformation, and for some,

\* Sources: Alliance for Excellent Education, High School Survey of Student Engagement, McKinsey & Co.

Predictive Analytics is a core component of their success strategy. For others, through self-perception, Predictive Analytics appears beyond the current state of readiness. The truth is, many education institutions have already laid the groundwork for leveraging analytics and becoming more student-centric, and analytics tools are now more accessible than ever to the business community. Proactive student intervention, increased effectiveness, reduced student disengagement and other benefits are within reach today. All that are needed is a strategy, a path and a commitment to meaningful transformation.

### **It all starts with data**

As with any industry, enterprise data is the foundation for meaningful transformation, innovation and success. Aggregate data represents the cumulative experience of an organization and can provide powerful insight into past successes and failures. Yet leveraging organizational data requires strategic and technological transformation, thus many organizations struggle

to create enough momentum to successfully adopt a data-centric way of business.

Many education systems store data, but not in ways that can benefit the overall mission. Data sources are often disparate between tiers, departments and even districts. Hence the first step to meaningful transformation is adopting technologies and approaches that facilitate data-centricity and better alignment across the enterprise.

Data-centric education institutions can readily access a complete data representation of student performance, attendance, special programs and documented issues. Many schools are exposing this information through dashboards, reports and portals that are accessible by faculty, administrators and parents. Yet despite the availability of student-centric data, there are still significant limitations to the value such views can create. Most importantly, accessible data is historical in nature, and thus relegates decision-making based on events that have already occurred. By the time enough data is consumed



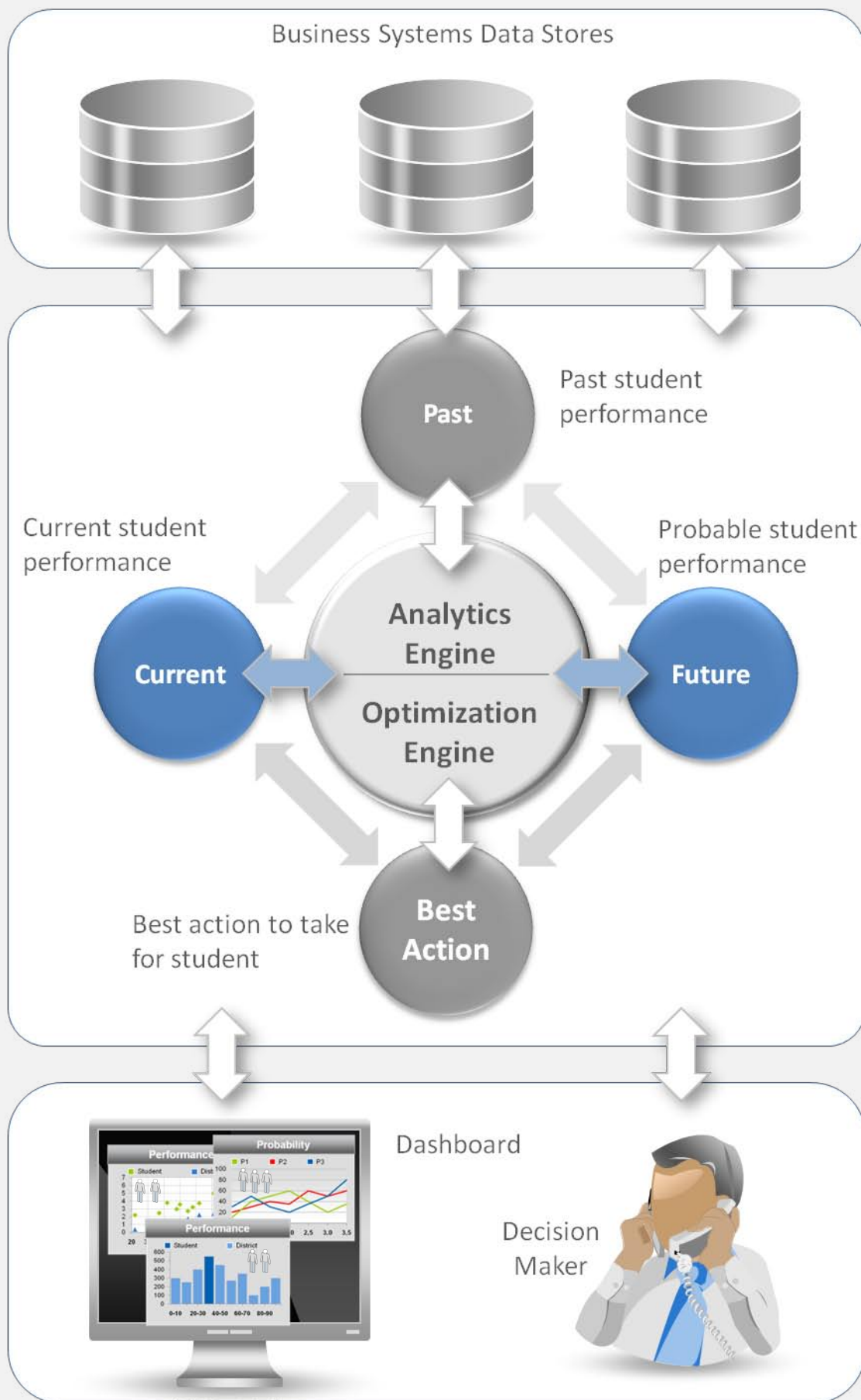


Figure 3: Predictive Analytics in Action

and understood, student disengagement may have already moved beyond a point of positive intervention.

### From information to insight

Business Intelligence leverages enterprise data to present information in meaningful ways that help leaders make informed decisions. Yet many implementers are finding that, when it comes to understanding the business, Business Intelligence solutions only tell part of the possible story.

By accessing student information through reporting and alerting capabilities, decision makers can easily assess what happened in the past, what is happening now, and through relative extrapolation, estimate what will happen next. While education and industry leaders are fully capable of making decisions on extrapolations, the accuracy, efficiency and effectiveness of “gut-feel” decisions will diminish as the amount of generated data exceeds human ability to consume it. Hence, in response, Predictive Analytics is becoming more

prevalent as a strategic decision support tool ensuring the best decisions about students and programs are identified, executed and measured with optimal speed and accuracy. (Figure 2)

Education leaders that rely on Analytics are able to understand what happened, how it happened, and why it happened. They are able to determine the next best course of action for a student and assess the most likely outcomes from different scenarios. Information becomes *insight*.

The benefits are far-reaching beyond student engagement. In addition to ensuring student intervention occurs more timely and effectively, education leaders can streamline costs of programs, schools and districts by evaluating desired service outcomes against student performance. Through analytic insight, resources and funding can be adjusted for under-performing or over-performing programs to better meet desired outcomes.

While understanding the benefits of Predictive Analytics for education institutions can be more

## Ten benefits Technology Blue helps Education Institutions realize with Predictive Analytics:

1. Evolution from data-centric to student-centric culture.
2. Increased efficiency and effectiveness of programs, departments and employees.
3. Reduced student attrition and other critical risk factors.
4. Increased compliance with government regulations and expectations.
5. Improved use of enterprise data to foster more meaningful outcomes.
6. Foster excellence as opposed to meeting minimum standards.
7. Maintain long-term focus on the growth of the learner.
8. Ensure balanced, equitable and unique opportunities for students.
9. Increased collaboration and alignment between education system tiers.
10. Encourage innovation, participation, and engagement.

Figure 4: Technology Blue and Predictive Analytics



easily presented and understood, identifying a plausible roadmap for making analytics a central component of decision-making is much more difficult to independently ascertain.

### The path to smarter education

Similar to other Decision Management technologies, Predictive Analytics adoption is more than just an installation and training classes. Creating a meaningful analytics culture requires strategic and tactical adoption, and requires focus on three critical business assets: resources, business processes and data.

#### Resources

Successful adoption and application of analytics requires unwavering commitment from senior leadership. However the commitment does not end there. Every level of the business must embrace the value and benefit of analytics, and continually seek out opportunities to apply analytics to improve performance and competitiveness. Each resource must become analytical in nature, and allow analytics to define the prioritization and execution of day-to-day tasks.

#### Business Processes

Companies rarely have few business processes that drive day-to-day activities. Hence identifying the most plausible business process candidates for investing in analytics is a common challenge. While there are many factors that influence investment decisions, certain business processes are historically known to produce higher Return on Investment (ROI) through analytics. Processes that are labor intensive, dependent on efficiency and consistency, underperforming or susceptible to higher risk are often targeted for analytics support.



#### Data

It has been said that the value of a decision is wholly-dependent on the data that supports it, and nothing could be more true for analytics. Understanding the importance of data is perhaps the most critical step in analytics adoption.

A fortunate side effect of the many process re-engineering, data-centricity and modernization efforts over the past 10 years has been the generation and storage of data. Education institutions have access to more data than ever before, and hidden in that data is the insight to make positive, meaningful and lasting changes for our students.

### Smartening the system

The adoption of analytics in the Education System will undoubtedly continue to make an immeasurable impact on the performance of students, schools, teachers and systems. What remains to be seen is the depth at which analytics will permeate education at a fundamentally strategic level.

Mounting pressure to overhaul education to create more parity and deliver a higher quality of education remains at the forefront of leadership agendas. As analytics becomes more ingrained in the culture of education, every aspect, from students to entire systems will benefit from the efficiency and effectiveness of a smarter education system.

## How to get started today

### Request a Business Value Analysis

Our Business Value Analysis helps define an Analytics adoption roadmap. We help assess value opportunities, readiness and suitable entry points.

### See quick ROI with a FastStart pilot

Prove value and ROI within 10 weeks by starting with a small, focused and fully functional analytics implementation.

### Contact us

Talk to our experts to being exploring Technology Blue analytics solutions.  
+1.412.255.3799 or [analytics@technologyblue.com](mailto:analytics@technologyblue.com)

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**Technology Blue** helps bring about meaningful change and lasting success through a broad range of outsourcing services covering:

- Strategy
- Application
- Infrastructure
- Management

Why outsource to Technology Blue?

- Enhance core capabilities in key areas
- Leverage expertise to increase innovation
- Liberate resources to focus on core competencies
- Improve service quality
- Reduce costs
- Speed time to market
- Increase business performance
- Maximize profitability
- Solidify competitive advantage

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### **About Technology Blue**

Technology Blue is an information technology strategy firm based in Pittsburgh, Pennsylvania.

With a strong commitment to deliver value through innovative approaches, tools and technologies, Technology Blue partners with its clients to help them transform and modernize to achieve greater competitive advantage. Its home page is [www.technologyblue.com](http://www.technologyblue.com).