**Executive Summary**

**Designing and Deploying Data and Analytics-Enabled Business Capabilities**

Stanford University, April 23, 2015
By Blake Johnson

The Department of Management Science & Engineering at Stanford University hosted a one-day forum on "Designing and Deploying Data and Analytics-Enabled Business Capabilities" on April 23. The event was led by Blake Johnson, a consulting professor in the Department of Management Science & Engineering, in collaboration with Teradata Corporation. This seventh annual event at Stanford on creating business value with enterprise data and analytics was attended by approximately 100 executives from business, analytics and IT from across a range of industries, as well as Stanford faculty and students.

**Setting the Stage**

With necessary technology and analytics capabilities increasingly available, competitive differentiation now depends on the ability of business executives to develop high impact analytics-enabled business capabilities and successfully address the technical and organizational challenges of integrating them into core business processes – capabilities actively sought in boardrooms across industries.

The day's agenda focused on best practices for engaging senior business executives and helping them 1) prioritize target opportunities, and 2) effectively manage the development and deployment of data and analytics-enabled business capabilities. Blake Johnson began by describing common challenges and emerging best practices identified in a Stanford study on this topic. Senior business executives followed with key insights from leading initiatives at major companies across a range of industries, and interactive group discussion.

**Stanford Study on Best Practices for Designing and Deploying Data and Analytics-Enabled Business Capabilities**

In an initial study Blake conducted interviews with over 20 companies, and found that to date data and analytics initiatives at nearly all companies have been led by technology and analytics teams. While able to successfully develop and validate technical capabilities, the teams struggled to prioritize initiatives and drive organizational adoption and business process integration – activities that require business engagement and leadership.

In response, Blake led an in-depth follow-on study that "road-tested" best practices for engaging business executives and enabling them to manage the design and deployment of data and analytics-enabled business activities effectively.  Senior business executives at Applied Materials, Cummins, Nationwide and Nike participated, three of which presented later in the day.  The study had three main findings:

1. ***"Work backward" from target business capabilities to data and analytics requirements:***
   *To date the overwhelming focus of descriptions of how data and analytics can enable business value has been the acquisition of data and generation of insights with it (steps 1 and 2 in Figure 1). Business value is only created, however, when insights produced enable better actions, and a company is able to execute those actions at scale (steps 3 and 4 in the figure).  Clarifying the critical role of these third and fourth steps was an "aha" moment for both business and technology and analytics leaders; business executives gained confidence in their ability to select and deploy data and analytics capabilities, and technology and analytics leaders gained an appreciation for the complexity of integrating data and analytics capabilities into core business processes.  Of equal importance, while steps 1 through 4 capture the "logical flow" from data and analytics to business value, data and analytics-enabled business capabilities are most effectively designed and deployed by "working backward" from target organizational capabilities (step 4) to the data and analytics capabilities (steps 1 and 2) required to enable them (see Figure 2).*
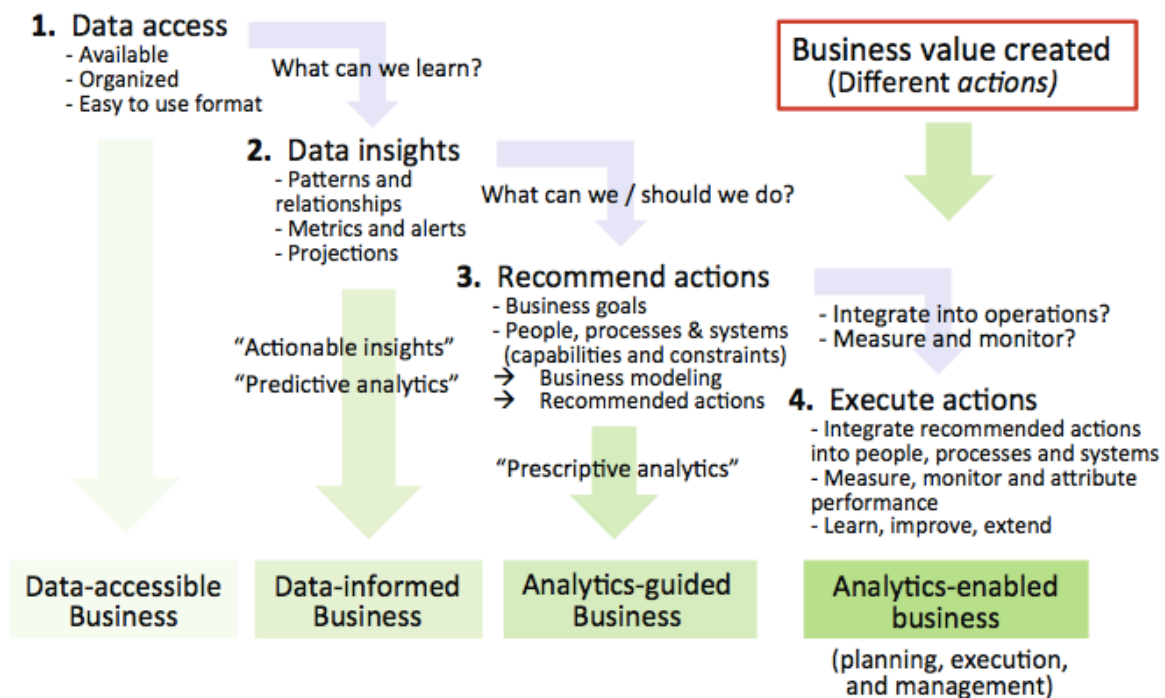


Figure 1.

2. ***Use "direct access" technologies to enable effective data and analytics "product development"***
   *To efficiently design and deploy data and analytics capabilities, business, analytics and IT must be able to collaboratively prototype, validate and refine those capabilities with a cross-functional "product development process" for data and analytics-based capabilities.  Historically, business and*

*IT have used "business requirements documents" to plan and manage joint projects. Using a physical product development analogy, this is equivalent to attempting to go directly from a product sketch to scale production. Not surprisingly, the business requirement document approach has a reputation for being expensive, risky, and delivering mixed results. In its place, companies are moving to rapidly maturing "self-service" data and analytics technologies that enable business and analytics teams to prototype, validate and refine capabilities themselves. Under this model, IT provides access to a user-friendly "data platform" and analytics infrastructure, and then supports the scaling and production deployment of capabilities that prove valuable.*

3.  **_Match investments in data and technology to the requirements of business capabilities deployed_**
    *The study identified the cost and time required to access and organize data as the primary budget elements and schedule constraints of data and analytics initiatives. Attempts to access and organize data before the specific data requirements of target business capabilities are known ("build it and they will come") generally resulted in high cost and data and technology resources that later often proved poorly matched to actual future needs. Instead, companies achieved the best results by "working backward" from the needs of the business capabilities being deployed to specific data and technology requirements. This approach allowed companies to build data and technology resources optimized to their requirements over time, at substantially lower cost and reduced lead time.*
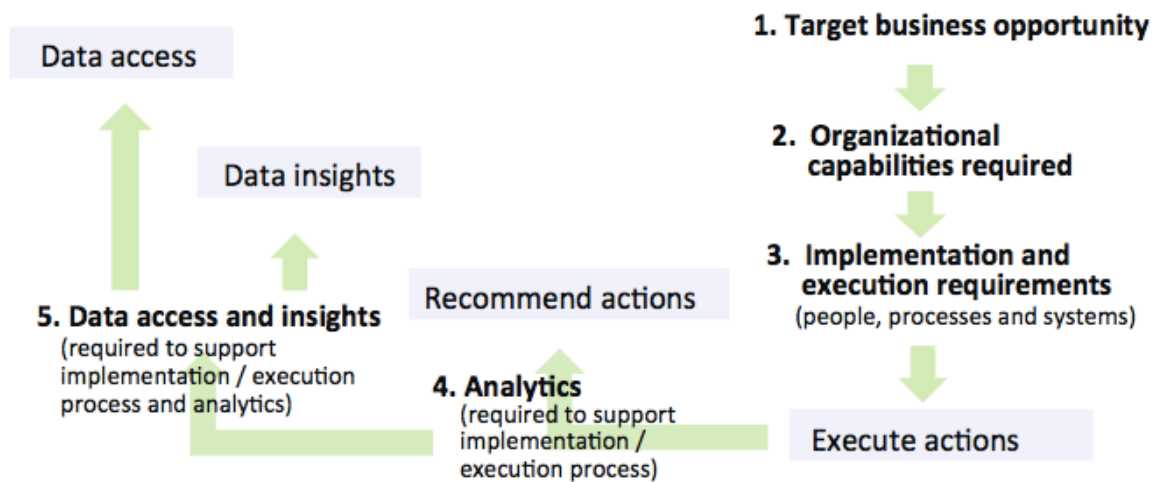


Figure 2.

With the study findings providing a framework for successfully engaging with and delivering on the top business objectives of senior executives, leaders of initiatives at three companies that participated in the study shared their experiences.

**Case Example -- Building the "Connectivity Business" at Cummins**

As the world's leading supplier of large-scale diesel engines, Cummins believes data and analytics offer a strategic opportunity to better serve its customers by optimizing the performance and improving the reliability of its engines. Like other industrial firms developing "internet of things" based offerings, Cummins is making key decisions on which services to offer, how to price and deliver those services, and

how to manage partner relationships and customer data access. John Malina, Executive Director of Connected Solutions at Cummins, described four of its key learnings to date:

1. Cummins already has enough expertise in its engineering and service teams to support an extensive roadmap of offerings
*Access to additional data on engine performance and customer use is valuable and will augment Cummins' knowledge base, but the company's wealth of existing, well-validated expertise is the natural place to start. John believes the same is true for many established industrial companies.*

2. Data and analytics-enabled capabilities can be delivered with minimal (or no) real-time engine connectivity
*While large data sets are useful for the research and development stage of analytics-driven capabilities, once developed capabilities such as real-time diagnostics and context-specific performance tuning can be deployed in and function autonomously on engine control modules located on engines themselves, eliminating the need for costly real time connectivity and access customer operating data.*

3. Business requirements must drive data investments and technology decisions
*A clear understanding of the types of products and services that will be offered and their data and analytics requirements should come before data investments and technology decisions are made. Doing so dramatically reduces technology cost and investment risk.*

4. Focus on creating value for the customer and being easy to partner with
*This ensures a "seat at the right tables" and broad access to the discussions, product and service offerings, and partnerships that will drive future success.*

**Case Example -- Building Analytics into Service and Support at Applied Materials**

Chris Moran, Corporate Vice President at Applied Materials, described his key insights from leading the development of analytics-enabled service and support offerings for the world's leading supplier of the complex equipment used to manufacture semiconductors.

Applied Materials has long been aware that service and support of its complex equipment is a high value-add, knowledge-driven activity, but historically has not actively organized, managed and attempted to productize its collective knowledge in this area. Chris described five activities that have proved valuable in the successful development of this capability:

1. Create a compelling vision of how data and analytics can enable growth and profitability
*A company's most senior executives are focused on products and services that will enable the company's future growth, success, and strategic evolution.*

2. Use a recent problem or failure to illustrate the need for better analysis
*The "glass half empty" complement to #1. Recent experience is fresh in people's minds, and fear of failure is a strong motivator.*

3. Build a list of valuable problems you can solve now and solve one
*Near term successes are essential, and must be possible with data that is available now.*

4. <u>Understand the data and data infrastructure you already have, and begin planning how to simplify and scale it</u>
   *Expect that your data infrastructure can and should change dramatically to meet new needs and leverage new technologies.*
5. <u>Communicate, communicate, communicate</u>
   *Long term vision, near term successes, evolving capabilities, what they offer, and how they can contribute to the goals of stakeholders across the company.*

**Case Example – Executing Analytics at Scale at Nationwide**

Nationwide is an established leader in enterprise data and analytics, and has extensive experience in successful collaboration between business and analytics teams to deliver value. Its analytics capabilities are centralized in its Customer Analytics organization, which has direct access to enterprise data resources, substantial control over its technology infrastructure, and the ability to deploy capabilities directly into production systems ranging from enterprise software to call center scripts. Mike Kozub, Senior Vice President of Customer Analytics, described his goals for the future of the organization as 1) continuing to expand the scale and scope of its impact, and 2) optimizing the efficiency of its delivery and capacity management processes. To achieve these goals, in addition to its core analytics team Mike has established teams responsible for marketing analytics and technology (a key focus area), and a practice management team that manages the organization's relationships with its internal customers across Nationwide to ensure resources are focused on the highest impact opportunities, and knowledge generated is effectively captured and re-used.

**Big Data Analytics: Why and how it should be Business-Led**

Of the many types of analytics, big data analytics are often the least accessible, due to both their newness and the type and scale of data involved. In a joint session, Blake Johnson and Randy Lea, Vice President of Americas Big Data Practice for Teradata, argued there is no reason they should be. In fact, big data's scale and lack of structure make the domain expertise of non-technologists particularly valuable.

Blake provided a high-level overview of the major types of big data analytics, including graphs (used to analyze both groups and "paths", or sequences of events), text analytics, statistical analysis, and "learning" methods that apply to all three. His key message was that with the exception of statistical analysis, each of these major categories focuses on finding basic structure, such as patterns and relationships, in large data sets. While "unguided" data scientists can search for patterns and relationships with no "leads" to start with, domain experts who can suggest promising directions and filter out relationships likely to be coincidental ("correlation vs. causality") can significantly improve efficiency and performance.

Randy Lea described insights gained from working jointly with business and data science teams on a wide range of problems. Keys to success include: 1) broad knowledge across the range of big data methods to ensure the best approach is selected for a specific problem (which may require combination of several methods), 2) efficient processes for managing and preparing the underlying data, and 3)

effective, and ideally visual, presentation of results that make key insights and opportunities for further refinement clear.  Once #1 and #2 are in place for a particular problem area, business stakeholders and analytics teams are often able to do much of the on-going work and refinement of #3 themselves.

**Technology and Analytics Partnerships and Leadership**

The agenda also included a panel discussion among technology and analytics executives on key insights about partnering with business and effective leadership of data and analytics initiatives.

Steve Phillpott, CIO of Hitachi Global Storage Technology, described his organization's role as ensuring the best available technologies and analytic methodologies are readily accessible to business stakeholders, and helping those stakeholders identify the best match for specific needs.  Michael Lucido, Director of Enterprise Information Management at Monsanto described the central role analytics has played in the scientific research and innovation that has driven Monsanto's success to date, and in the "operationalization" of analytics currently underway to enable Monsanto's customers to tailor their planting and cultivation methods to highly localized soil and weather conditions.  Sanjay Baskaran, Vice President North America Analytics for VISA, described the central role data and analytics plays in VISA's products and services, and how this has led to a close working relationship between and joint responsibility for product development and delivery across business, analytics, and IT.  Christine Buesnel, Global Integrated Drug Development Environment Business Leader at Roche, described a fundamental change in drug development now underway, in which access to actual, large-scale patient experience with a drug after its approval is being used both to drive new research findings and to enable more comprehensive drug performance monitoring and analysis.  Steve Eglash, Executive Director of Stanford's Data Science Initiative, noted that in addition their research role, universities can also bring valuable cross-industry, cross-technology perspective to industry-academia relationships.

**Key Take-aways and Next Steps**

Blake concluded with key take-aways for the successful design and deployment of data and analytics-enabled business capabilities:

- *The process of creating business value with data and analytics can be made accessible and intuitive to business executives by clearly identifying its four key steps, with particular emphasis on the critical and often overlooked steps 3 and 4:*
  1. *Access data*
  2. *Use it to generate insights*
  3. *Recommend improved actions based on the insights*
  4. *Develop the ability to execute the recommended actions at scale*

- *The right way to prioritize, design, and deploy data and analytics-enabled business capabilities is to "work backward" from high-impact target business capabilities to the organizational capabilities they require (4 and 3), and then to enabling data and analytic capabilities (2 and 1).*
- *Data and analytics capabilities can only be successfully developed if the traditional "business requirements document" based approach to joint business/analytics/IT product development is*

replaced by "self-service" data and analytics technologies business and analytics teams can use to prototype, validate and refine capabilities themselves, allowing IT to focus on production scaling and support and management of a company's data infrastructure.

▪ *Data and technology investments should be tailored to the requirements of specific business capabilities deployed, rather than to estimates of potential future requirements.*

The speakers demonstrated that large-scale business impact can be achieved rapidly and cost effectively when senior business executives employ these approaches. The group agreed this represents an important inflection point in realizing the business value of data and analytics that will fundamentally alter the trajectory of business engagement and impact going forward.