Session Rules of Etiquette

Please turn off your cell phone/pager
If you must leave the session early, please do so as discreetly as possible
Please avoid side conversation during the session

Thank you for your cooperation!
Introduction
About Me…

Henry DeVries

• Management Consultant, Principal
  Targeted services for Business Analytics

• Ph.D. Cornell University
  40 years in higher education

• Faculty member, administrator, researcher
  o 16 years as CIO at Calvin College in Grand Rapids, MI
  o 13 years (concurrently) as CFO
  o Active in NACUBO, CACUBO, EDUCAUSE, CCCU
“BIG Data” is a hot topic these days, but just what does it mean for higher education?

We’ll explore just what big data is in the context of higher education and learn how business analytics tools can help address the challenges of big data.
Agenda

1. Challenges of Big Data
2. Challenges Facing Higher Ed
3. Challenge’s to Reaching Business Analytics Maturity
4. Challenges to Big Data Projects
Definitions

Is it Business Intelligence?
• “BI is any activity, tool, or process used to obtain the best information to support the process of making decisions.”
  -- *BI for Dummies*
• Purpose is to produce timely, accurate, high-value, actionable information.

Is it Business Analytics?
• “The discovery and communication of meaningful patterns in data”
  1) descriptive and predictive models to gain knowledge from data (data analysis).
  2) using this insight to recommend action or guide decision-making (communications)
“Analytics is used in a higher education environment to analyze various collected data points to gain insight and make informed decisions about complex issues.

Specific areas include academic analytics, business intelligence, and learning analytics”

- Academic analytics: key institutional goals
- Business Intelligence: business performance
- Learning analytics: teaching/learning transaction
Challenges of BIG Data
Definition of Big Data

In 2012, Gartner updated its “3V’s” definition – “Big data are high volume, high velocity, and/or high variety.

Big data is a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications.
What Happens in a Internet Minute?

And Future Growth is Staggering
Just One Example…

1 engine, in one hour, 20 Terabytes

1 Boeing 737, NYC to LAX, 240 Terabytes
The Internet of Things
**“The Industrial Internet”**

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
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<tbody>
<tr>
<td><strong>Intelligent Machines</strong></td>
<td><strong>Advanced Analytics</strong></td>
<td><strong>People at Work</strong></td>
</tr>
<tr>
<td>Connect the world’s machines, facilities, fleets and networks with advanced sensors, controls and software applications</td>
<td>Combines the power of physics-based analytics, predictive algorithms, automation and deep domain expertise</td>
<td>Connecting people at work or on the move, any time to support more intelligent design, operations, maintenance and higher service quality and safety</td>
</tr>
</tbody>
</table>

*Industrial Internet: Pushing the Boundaries of Minds and Machines*, Evans and Annunziata, Nov 26, 2012
# Powerful Motivation

## Table 1: Industrial Internet: The Power of 1 Percent

<table>
<thead>
<tr>
<th>Industry</th>
<th>Segment</th>
<th>Type of Savings</th>
<th>Estimated Value Over 15 Years (Billion nominal US dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aviation</td>
<td>Commercial</td>
<td>1% Fuel Savings</td>
<td>$30B</td>
</tr>
<tr>
<td>Power</td>
<td>Gas-fired Generation</td>
<td>1% Fuel Savings</td>
<td>$66B</td>
</tr>
<tr>
<td>Healthcare</td>
<td>System-wide</td>
<td>1% Reduction in System Inefficiency</td>
<td>$63B</td>
</tr>
<tr>
<td>Rail</td>
<td>Freight</td>
<td>1% Reduction in System Inefficiency</td>
<td>$27B</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>Exploration &amp; Development</td>
<td>1% Reduction in Capital Expenditures</td>
<td>$90B</td>
</tr>
</tbody>
</table>

*Note: Illustrative examples based on potential one percent savings applied across specific global industry sectors. Source: GE estimates*
Challenges facing Higher Ed
“Our big data challenge”
Macro Trends in Education

Funding Pressures

Academic Outcomes

Accountability

Doing More with Less

Institutional Effectiveness

Consumerization of Education

Lifelong Learning

Obama 2020 Challenge
## Resulting Higher Ed Challenges

**Revenue Management**
- Optimizing Recruitment, Retention and Fundraising
- Increasing Online Course Capacity to Drive New Enrollment
- Improving Grant Writing Expertise, Industry Partnerships

**Operational Efficiency**
- Maximizing Use of Fixed Assets While Containing Cost
- Targeting Consolidation, Process Improvements, Metrics
- Financial visibility, discipline, controls

**Student Success**
- Reducing the Friction Associated with Pursuing Degree
- Applying Technology to Tailor Learning Process to Student
- Matching Interests, Aptitudes and Opportunities

**Accountability**
- Pressure to Demonstrate Institutional Effectiveness
- Focus on Retention, Graduation Rates, Learning Outcomes
- Many Constituencies to Serve

**Technology**
- Evaluating Effectiveness of Investments
- Using Technology to Gain Operational Efficiencies
- Still Want to Meet Expectations of “YouTube” Generation
Drowning in Data?
Institutions Have Data but Lack Useful Insights

Volume of Data Steadily Increasing...

- Administrative Data: 4.04
- Research Data: 3.74
- Learning Management Systems Data: 4.22
- Institutional Web Content: 4.06
- Library Data and Content: 3.95

Neutral

...But Value of Data Lags Considerably

- "We get maximum business value from institutional data": 2.67
- "We get maximum academic value from institutional data": 2.72

Neutral

Institutions’ Response to Change in Volume of Data in Past 12 Months
1 = greatly decreased; 5 = greatly increased

Lots of Data, But No Information

“I have tons of data, but it’s all in incomprehensible Excel spreadsheets. It is almost impossible to decipher.”

Vice President of Finance and Administration
Mid-Sized Community College
Winning a Battle, but Losing the War
Universities Investing in Data Analytics are Reporting Progress

Universities’ Reporting and Analytical Capability
N = 350

- Level 1: Reports from Transaction Systems
  - 46%
- Level 2: Operational Data Stores with Limited Reporting Tools
  - 34%
- Level 3: Enterprise Warehouse with Reporting Tools
  - 20%

Universities’ Mean Satisfaction with Reporting and Analytical Capability
N = 371

- Level 1
  - Users have timely access to information: 3.33
  - Information is easily accessible: 3.06
  - Tools are easy to use: 2.25
- Level 2
  - Users have timely access to information: 3.56
  - Information is easily accessible: 3.32
  - Tools are easy to use: 2.82
- Level 3
  - Users have timely access to information: 4.04
  - Information is easily accessible: 3.87
  - Tools are easy to use: 3.17

Source: EDUCAUSE, “Academic Analytics: The Uses of Management Information and Technology in Higher Education,” Volume 8, 2005, p. 13 and 51; Education Advisory Board interviews and analysis.
With Friends Like These

Universities’ Reporting Capacity Crowded Out by External Reporting Burden

Increasing Regulatory Burden...
Number of Federal Reporting Requirements
Before and After Higher Education Act of 2008

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
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</thead>
<tbody>
<tr>
<td>200</td>
<td>352</td>
</tr>
</tbody>
</table>

...Puts Strain on IR’s Reporting Capacity
Distribution of IR Reporting Capacity

- External Accountability Reporting: 75%
- Internal Assessment Reporting: 25%

Source: Education Advisory Board interviews and analysis.

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Challenges to Reaching Business Analytics Maturity
A (Simplified) Overview of the Academic Analytics Environment

Source Systems
- HR
- Facilities
- Finance
- Grants
- SIS

Data Warehouse

Academic Analytics
- Executive Dashboards
- Standard and Ad-Hoc Reports
- Analytical and Query Tools

Source: Education Advisory Board interviews and analysis

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Visibility, Insight, and Foresight: Equipping People with the Information They Need to Be Successful

Data Needs

Performance Data

Trend, Summary Data

Detailed Data

Audience

EXECUTIVES
Dashboards & Scorecards for Performance Management
“Am I achieving my goals?”

MANAGEMENT
Dashboards, Reports and Analytics to Monitor Progress
“How am I doing?”

KNOWLEDGE WORKERS
Ad-hoc analysis tools to identify and understand trends
“Why is this happening?”

STAFF
Production reports and ad-hoc access for daily operations
“What do I need to do?”
Logical Progression to the Questions that BA addresses

What happened?  
Why did it happen?  
What’s happening/trending now?  
What do we think will happen?  
What do we want to happen?

Descriptive analytics  
Diagnostic analytics  
Trend Analytics  
Predictive Analytics  
Prescriptive Analytics
BA Maturity in Higher Education

Data Sophistication & Institutional Value

- **MONITORING**
  - **WHAT is trending NOW?**
  - Ability to model, manage, and adapt

- **EDW**
  - **PREDICTING**
    - **WHAT do we THINK will happen?**
  - Data-driven planning and forecasting

- **EDW + Statistical**
  - **OPTIMIZING**
    - **What do we WANT to happen?**
  - Managed Reporting
  - Ad Hoc Reporting & Queries
  - Operational Dashboards
  - Scorecards, KPIs & Benchmarking
  - Predictive Analytics

- **ODS**
  - **ANALYZING**
    - **WHY did it happen?**
  - Increase in ad hoc reporting and information on demand
  - Dashboards for managers and analysts

- **ERP**
  - **INFORMING**
    - **WHAT happened?**
  - Primarily batch and some ad hoc reports

**Business Analytics Maturity**
What Else Happens with Evolving Business Analytics?

Data **volume** grows
Number of **users** grows
Depth of **analysis** grows
Query **complexity** grows
Need to **visualize** grows
Expectations grow

We hope that:
Data-driven decision-making grows
Challenges to Big Data Projects
Top Barriers to Effective BI (From Ellucian 2011 BI Research)

Lack of analytical drill-down capabilities

Lack of integrated data sets

Lack of departmental access to data

Slow turnaround time, IR/IT bottleneck

Lack of analytical staff
Current tools: tracking KPIs/reporting data (Ellucian/AIR 2014 Research)

60% - MS Excel
16% - Crystal Reports
16% - MS SharePoint
14% - IBM Cognos
11% - Evisions Argos
What are current tool barriers? (Ellucian/AIR 2014 Research)

39% - need more training
38% - cost
33% - the right data aren’t available
30% - inability to engage all institutional departments
29% - user friendliness
28% - lack of historical data and decision capture
24% - no ERP integration
The ideal analytical tool (Ellucian/AIR 2014 Research)

- 74% - access to all required data
- 69% - ability to capture all historical data and decisions
- 59% - ability to engage all major departments electronically
- 50% - out-of-box integration with ERP
- 48% - built-in KPIs and metrics for tracking performance
Why 55% of Big Data projects fail – and what IT can do about it

February 13, 2013 By Sam Narisi
Cultural Issues “Lack of Cooperation…”

Engage IT and IR early, and often
Data must be reliable
Data must be shared, not held
Data must be trusted
Data definitions must be uniform across the institution
Data, and reporting, must be secure
“Single source of the truth”
Resource Issues

Make sure you understand the scope of the project

• Time
• People
• Dollars

Be prepared to make the investment in staff to use these tools

• At all levels, appropriate to the task
Human Capital Issues

Be prepared to train your people
It’s a hot market for qualified BI analysts; “brain drain”
Consider options for shared services
Leverage the culture of collaboration that is common in higher education
Sustainability Issues

It will require additional resources over time
• IT/technical staff for central operations
• IT/IA/Reporting analysts to support departmental users with the new tools

Knowledge transfer to institutional employees
• Effective use of the new tools
• Understanding new policies and procedures
• How to leverage the new information environment

Change management will be an important aspect of the effort to build this sustainability
Closing
Summary

Big data is coming, but higher ed has access to the tools to deal with the challenges

Higher ed analytics, 3 domains (EDUCAUSE)

- Academic analytics: strategic
- Business intelligence: operational
- Learning analytics: student-focused

A mature business analytics deployment can help you manage the big data challenge(s) in higher ed

Understand what you are getting yourself into
Questions & Answers
Thank you!

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