Evolving Business Intelligence and Data Analytics in Higher Education

Brent M. Drake, Ph.D.
Vice Provost, Decision Support
University of Nevada, Las Vegas

Aaron Walz
Director, Business Intelligence
Competency Center
Purdue University
Business Intelligence (BI)

• A set of concepts and methods utilized by organizations to improve decision-making by using fact-based support systems (Trieu, 2017)
  • Front end interfaces (reports, dashboards, analysis)
  • Back end infrastructure (warehouse, federated data marts, spreadsheets, data lake)
  • Methodology and practices around access and use

• History
  • 1865 – Deven’s first use of the term
  • 1938 – Luhn describes a BI system
  • 1979 – Oracle introduces first SQL database (Hayes, 2002)
  • 1991 – Inmon publishes Building the Data Warehouse
  • 2000 – Kimball and Metz publish The Data Warehouse Toolkit
Current State of BI

• Most but not all institutions utilize some type of extract-transform-load (ETL) process to build some level of modeled data warehouse

• Many institutions have at least one enterprise level BI tool for front end display

• Wide range of structure between heavily centralized control to widely distributed
  • Includes wide range of relationship between BI functions and IR
Current State of BI

- Educause (2017) survey of landscape on six dimensions: data efficacy, decision-making culture, investment/resources, policies, infrastructure and IR involvement
  - 5 of 6 dimensions rated at developing stage
  - Lowest is investment/resources
  - Highest was IR involvement

- HEDW (Childers & Walz, 2017) survey of landscape on nine dimensions: BI team, scope, role of source business units, data products, user coverage, users’ engagement, data management, business value, and strategic support
  - Similar findings to Educause low middle rating on dimensions
  - Lowest data management
  - Highest scope of BI program
Existing Challenges in BI

• Challenges that have been there since the beginning
  • Governance – worse case senior leadership receiving conflicting numbers from different sources
  • Quality of underlying source data
  • Limited adoption of reporting and data solutions
  • Trying to shift culture to a more data-driven mindset

• Newer Challenge
  • Explosion of self-service BI tools

• Opportunity/Challenge
  • New technologies allowing access to non-traditional unstructured data
New Opportunities to Interact with Data

• Expanded structured environments
  • Create accessible templates and queries to have institutional governance “baked in”
  • Controlled Exploration

• Institutionally sanctioned data sets
  • Instances of both institutionally available and completely open sets

• Expanded visualization tools
  • Create interactive dashboards for easier exploration of data
  • In some instances completely public access to tools
Future State of BI

• Unstructured and personalized data i.e. BIG DATA (Inmon, 2014; Wishon & Rome, 2016)
  • LMS click stream, Wireless access points (geofencing), social media, personalized learning analytics

• Artificial Intelligence learning assistants (Bryant, 2017)

• Blockchain portable ledgers of student credential (Bryant, 2017)
New Tools to Handle Big Data Environment

• Hadoop (Apache) (Wang, Goldstone, Yu & Wang, 2014)
  • Distributed file environment (HDFS)
  • Breaks data in large blocks across server node clusters
  • Use package code to run nodes in parallel fashion

• HANA (SAP) (Knuese, 2016)
  • In-memory column-oriented combines OLAP and OLTP functions in single system
  • Stores column orientation of data in sequential blocks in memory
  • Allows for compression and faster read/write access, allows easier parallel processing
Additional Questions?

Brent Drake
brent.drake@unlv.edu

Aaron Walz
awalz@purdue.edu