

Evolving Business Intelligence and Data Analytics in Higher Education



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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?

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