IMPLEMENTING A BUSINESS INTELLIGENCE (BI) PROJECT FOR STRATEGIC PLANNING AND DECISION MAKING SUPPORT

Office of Student Data, Analysis, and Evaluation (OSDAE) IUPUI
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Enterprise Business Intelligence
Indiana University Technology Services (UITS) IU
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Overview

- New IR/Assessment office formed to support strategic planning
- Business Intelligence - What is it?
- Purpose of BI/Decision Support Project
- Technical Aspects
- Sharing Student Data Reporting Tools and Dashboards
- Partnership between IR and IT
- Lessons Learned
- Visions of the Future
Office of Student Data, Analysis, and Evaluation (OSDAE)

- OSDAE will provide accurate and timely information to support strategic planning decisions about enrollment management and student success and learning. Using information from this office will allow greater coordination and alignment of activities to achieve maximum impact in regard to IUPUI’s Strategic vision, mission, values, and campus strategies related to the success and learning of our students.
OSDAE Activities and Reports to Support Decision Making

- Strategic Enrollment Management
- Retention and Graduation
- Assessment of Student Development and Learning
- Student Surveys
- Program Evaluation (assessing what works and is cost effective)
- Mixed-Method Investigations (Qualitative and Quantitative Research Methods)
Business Intelligence (BI) in an Institutional Research Context

• Set of technologies and processes that help decision makers use data to understand and analyze institutional performance.
• Use of data-supported management to drive decisions and actions.
• It is getting the right information to the right people at the right time to support decision-making and institutional effectiveness.
• Broad term that encompasses what is referred to as the decision support environment, and including the data warehouse, reporting, and analytics.
• Enables better data storage, management, retrieval, and analysis.
Student Analytics Project Benefits

- Reduce time from questions to answers
- Centralize business logic, moves it upstream
- Information closer to analysts and decision makers
- Analytics across subject areas
Partnership Between IR and UITS

**IR**
- Institutional Context
- Anatomy of Decision Making
- Knowledge of Institutional Data Systems and Definitions
- Research, Program Evaluation, Assessment Expertise

**UITs**
- Project planning and coordination
- Knowledge of Technological Tools
- Dashboard and report development
- OLAP Cube Building MDX, ETL
- Enterprise wide vision

*With help from Chris Rouse at IncisiveAnalytics*
Student Analytics Deliverables

- SQL Server Analysis Cube integrated across multiple subject areas
- Tools for ease of analysis
  - Reports and dashboards
  - Tableau
  - SQL Server Reporting Services
- Metadata
- Knowledge transfer
- Training

A collaboration between IUPUI and UITS
OSDAE Website

Access to all Student Data Reports and More!

http://osdaeiupui.edu/

Map link:

https://tableau.bi.iu.edu/t/prd/views/Enrollment_Maps/EnrollmentMaps#1
Data Flow, Transformation

Oracle
IR Snap shots
Fact Tables
Dimensions
Applications
Business Logic

SQL Server Analysis Services
Reporting Tools

Cube
Joins, Aggregations, Calculations

Excel
Tableau
Reporting Services

Consumers, Decision Makers

Data
Information
Knowledge
Integrated Student Analytics Cube

Primary source: UIRR Snapshots starting ~ 2004
What is a Dimensional Cube?

A Cube is a set of related Measures and Dimensions that is used to analyze data:

• A Measure is fact, which is a transactional value or measurement that a user may want to aggregate

• Dimension is group of attributes and used to analyze measures in the cube

At each intersection of dimensions there are facts
Why build a Cube?

- **Good performance**
  - Aggregates and summarizes data
  - Response time for data retrieval is just a few seconds

- **Reinforces best practices**
  - Models data in the facts and the dimensions
  - Defines business logic

- **Allows multidimensional analysis**
  - Slice, pivot, rollup and drill down

- **Easy accessibility**
  - No extra tools are needed - Excel is sufficient

- **Minimum coding for analysts**
  - Pre-joined data
  - Complex logic built in
## Student-Analytics Cube

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large and complex cube</td>
<td>Keep data design as simple as possible</td>
</tr>
<tr>
<td>• Multiple subject areas joined and data</td>
<td>• Define business process and logic early on</td>
</tr>
<tr>
<td>didn’t always aligned/matched as expected</td>
<td></td>
</tr>
<tr>
<td>• Campus-specific logic</td>
<td></td>
</tr>
<tr>
<td>Updates and maintenance</td>
<td>Gaining in-depth knowledge of data design and cube</td>
</tr>
<tr>
<td>• SSAS database is built of cube, measures</td>
<td>components</td>
</tr>
<tr>
<td>dimensions, data sources, security etc. All</td>
<td>• Documentation</td>
</tr>
<tr>
<td>of these parts are closely connected and</td>
<td></td>
</tr>
<tr>
<td>small change could cause issues</td>
<td></td>
</tr>
<tr>
<td>Data validation</td>
<td>Pre-spin cube data</td>
</tr>
<tr>
<td>• Cube data needs to be validated with</td>
<td>• Compare and validate data after changes are</td>
</tr>
<tr>
<td>every update and change</td>
<td>implemented</td>
</tr>
<tr>
<td>Issues with reporting tools</td>
<td>Acquiring knowledge of MDX and getting better</td>
</tr>
<tr>
<td></td>
<td>understanding of reporting tools</td>
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</tbody>
</table>
Data Tools Caveats

- Intended to be descriptive.
- Typically explaining why requires good research design and systematic inquiry.
- Not intended to replace requests for customized reports and more systematic investigations to understand why and how an intervention impacted student success and learning.
- Do not allow for causal inferences. Correlation does not mean causation.
Lessons Learned – Critical Success Factors…

- Good environmental scanning and understanding of key decision making, strategic plan metrics should guide project planning.
- Clear deliverables, specifications, and prototypes at onset.
- Cohesive team with trust, transparency, and openness.
- Shared visions of success and make assumptions explicit.
- Focus on decision making, strategic planning goals, and providing relevant data — not just on providing access to more data.
Lessons Learned - Continued

- Best outcomes attained if iterative process with small-scale campus rollouts.
- Communicate the purposes effectively and accurately (manage expectations) - do not overpromise.
- Focus on some key deliverables yet understand that project necessitates continuous change and improvements.
- Identify metrics to judge effectiveness of project - develop an assessment plan for measuring success of the BI Initiative.
- Understand resources available and leverage available assets.
- Importance of Metadata and clear documentation.
Visions for the Future

• Series of visually appealing reports and dashboards to mark progress toward strategic planning goals
• Storytelling with Tableau example: http://www.postsecondaryanalytics.com/edatta_in_tool/
• All campus rollout
• Develop a series of public reports and dashboards