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Leveraging BI Technology and Analytics
Towson University using iStrategy

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Agenda

- Introductions
- Background on Towson University Reporting
- Towson Decision to purchase iStrategy HigherEd Analytics Solution
- Overview of iStrategy HigherEd Analytics Application
- iStrategy DW Project Review and Lessons Learned
- Demo of Towson University Analytic Reporting Application

About Towson University

- Comprehensive public liberal arts university
- 2nd largest university in Maryland, approximate enrollment:
  - 13,000 Undergraduate
  - 5,000 Graduate
- Implemented PeopleSoft 8.0 in Fall 2002 (Modules: Admissions, Financial Aid, Student Financials, Student Records, Advising, HR and Payroll)
- Prior to PeopleSoft (with old Legacy System), administrative reporting staff were very proficient in Crystal Reports and highly self reliant for reporting.
- After PeopleSoft was implemented, users were frustrated with:
  - lack of reporting capability
  - lack of end user tools
  - reliance on IT staff for reports/queries
  - growing backlog of report development requests

Challenges Reporting Against PeopleSoft

- Departmental staff wanted direct access to create their own reports but had difficulty finding data in the 15,000 tables and views.
- Data Integrity Concerns
  - Inconsistent results depending on who wrote the report and what table/view they decided to use
- Effective Dating Issues
  - Overall challenge dealing with effective dating
  - Difficult, if not impossible, (especially in Crystal Reports) for end users to get distinct counts when using multiple attributes from effective dated tables.
- PS Query and Crystal Reports development against Production System caused performance issues.
- Reporting only available to Super Users with Tools and Skills.
- Reporting Tools – maintenance and licensing costs limited access.

Initial Attempted Solutions

1. Copy of Production Database
   - To address production reporting performance issues, created an Oracle Database with all PS Tables and Views. Users logged in using an Oracle Account and DBASE Security to access tables through Microsoft Access or Crystal Reports.

2. Data Mart
   - Created an Oracle Data Mart using a “star schema” model to provide users with a single max effective dated row of data for each student.
   - Use PL/SQL scripts to populate: Bio Demo Summary, Program Plan Stack Summary, Enrollment Summary, Course Info Summary and Admissions Summary Tables.

Issues with Attempted Data Mart

- After almost one year and hundreds of hours of development, Admissions, Bio Demo and half of Student Records data mart was built; accuracy was never completely validated. Never completed Program Plan Stack, Financial Aid, Student Financials, or HR/Payroll.
- Data Inconsistencies:
  - When data appeared to be inaccurate, very difficult to determine the issue… had to evaluate logic and criteria of report, and compare to source data in PeopleSoft.
  - Data still dependent upon report writer approach, so 2 people often get 2 different results.
- Processes took several hours to run and if error occurred, tables were empty. Users would have to wait another 24 hours for data (design issue).
- Licensing and maintenance issues with Crystal Reports so only Super Users have access to data and reports.
- **In short, the effort was vastly underestimated in terms of complexity, scope, approach, staffing and cost.**

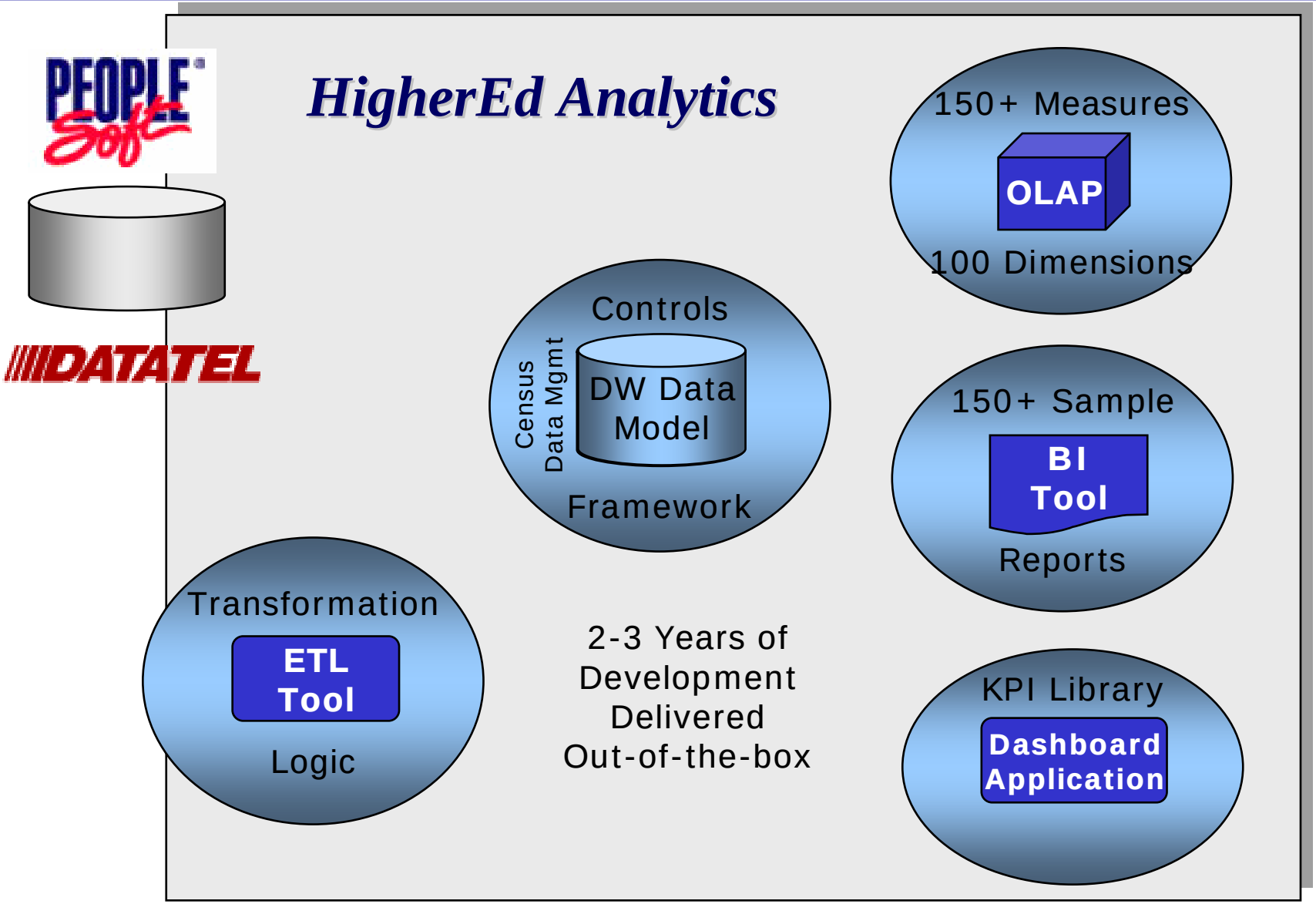
Decision to Purchase iStrategy

- iStrategy had a successful implementation at Coppin State University (USM sister school) and had approached Towson prior to our internal project to build a DW (2003)
- As often happens, we had to learn things the hard way:
  - We thought we could do it internally
  - We severely underestimated the expertise and effort that building a complex data warehouse required
  - We believed that we could take IT developers with no experience in DW development, dimensional modeling, ETL, DW control framework and build what is a very complex application
- As iStrategy continued to gain credibility within the University System of Maryland, Towson decided to abandon the internal DW project and purchase iStrategy's HigherEd Analytics Student DW and reporting application (March 2005)
- After the gap analysis of iStrategy, Towson concluded that our custom data mart was only 15% of what iStrategy delivered out of the box

About iStrategy Solutions

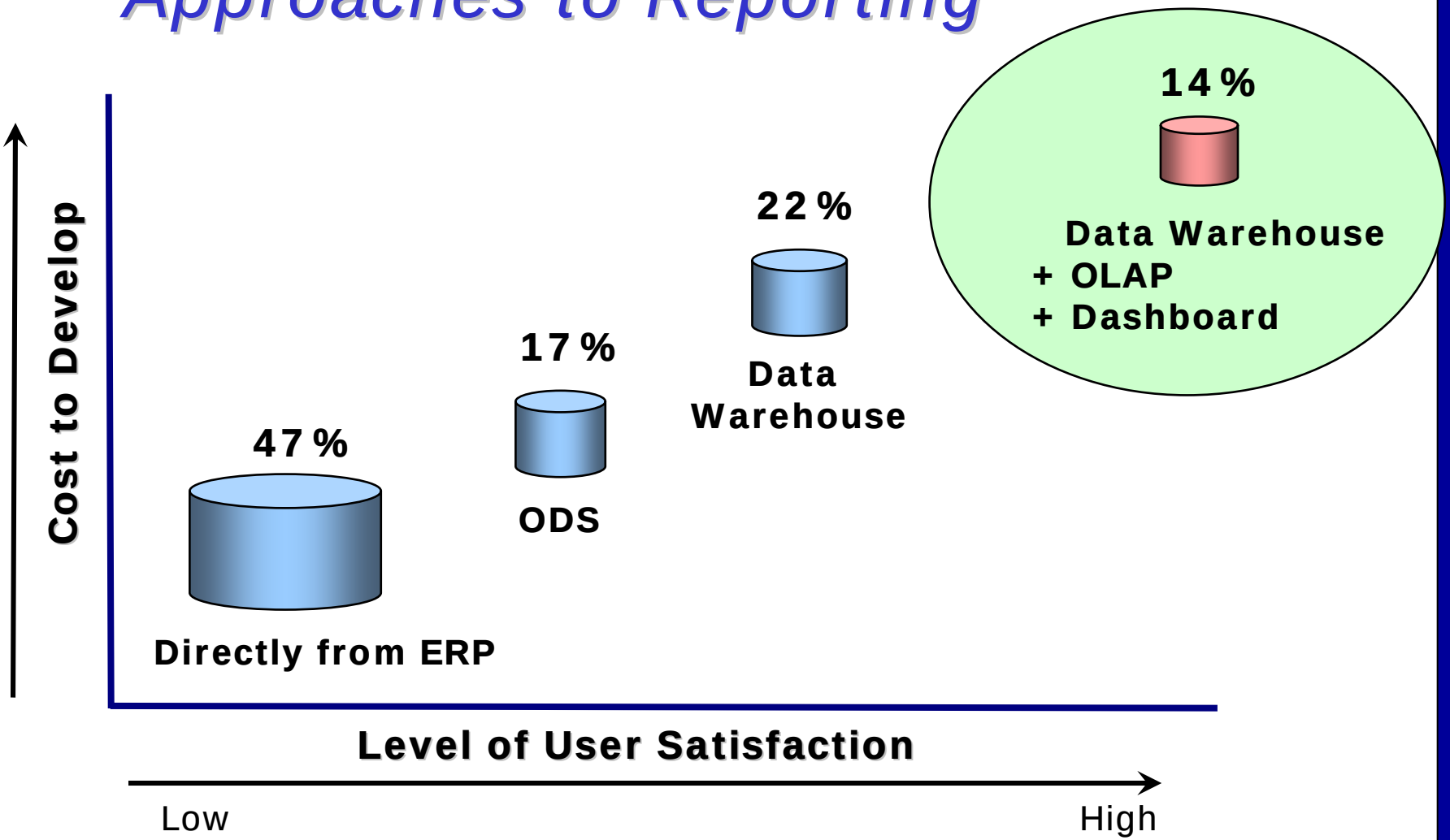
- Founded in 1999, iStrategy is a privately held firm based in Maryland, specializing in business intelligence and data warehousing
- 15+ years experience in data warehousing, analytics and performance management across various industries
- In 2002, iStrategy was engaged by Gallaudet University to design and implement an enterprise data warehouse
- In 2003, iStrategy released the PeopleSoft edition of HigherEd Analytics™, the first packaged "analytic application" for colleges and universities
- Mature Product – four years of development, ten (10) customers (14 campuses)
- Recently completed Datatel version; signed agreement with Datatel to be exclusive distributor to Datatel customers

iStrategy Solution Components



ECAR Study on Academic Analytics - December 2005 (378 Institutions)

Approaches to Reporting



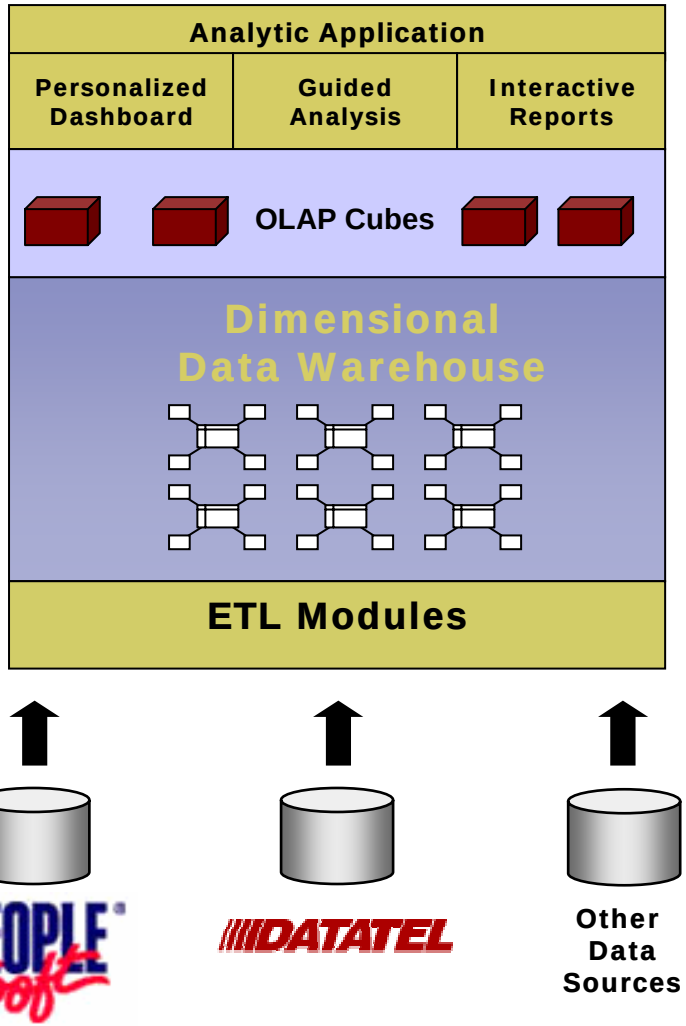
2005 ECAR Study on Academic Analytics - December 2005 (378 institutions): Key Findings

"More advance use of analytics appear to be having a significant impact in individual functional areas....[particularly recruitment and retention]."

"Institutions with leaders who are committed to evidence-based decision making report significantly better outcomes."

"Given the potential for academic analytics to improve student retention, enrollment and fundraising, institutions will likely succeed in making the case for investment".

HigherEd Analytics Overview

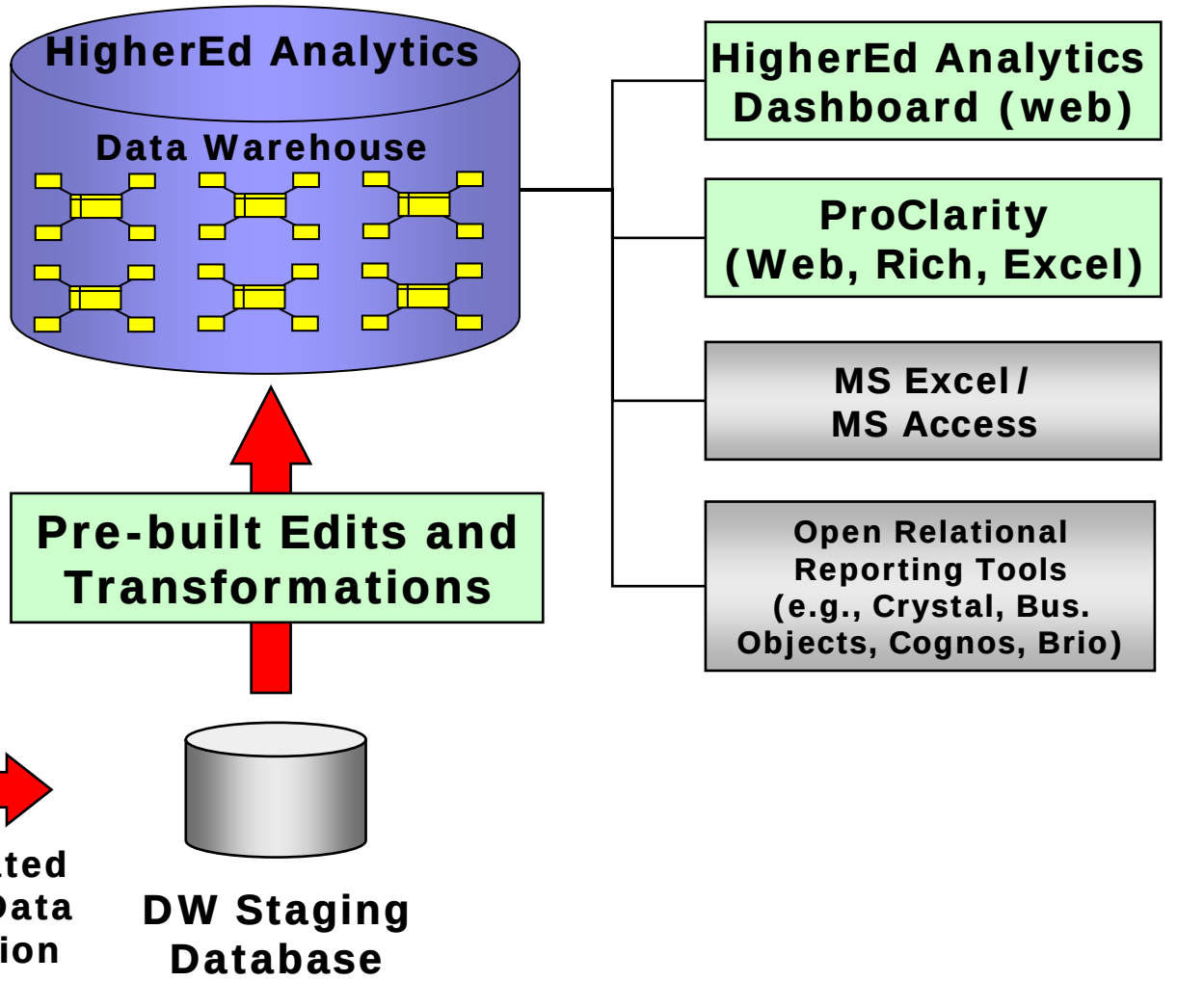


- Intuitive self service access to reliable information ("single version of the truth")
- Single DW solution for casual and power users
- Rich library of higher education performance metrics
- Powerful analytic capability to support decision making and management information needs
- Personalized Dashboard for executive users
- "Out-of-the-box integration to leading ERP vendors
- An open technology platform that is easily extensible
- Rapid deployment capability

HigherEd Analytics Components

Baseline Installation in 1–2 Days!

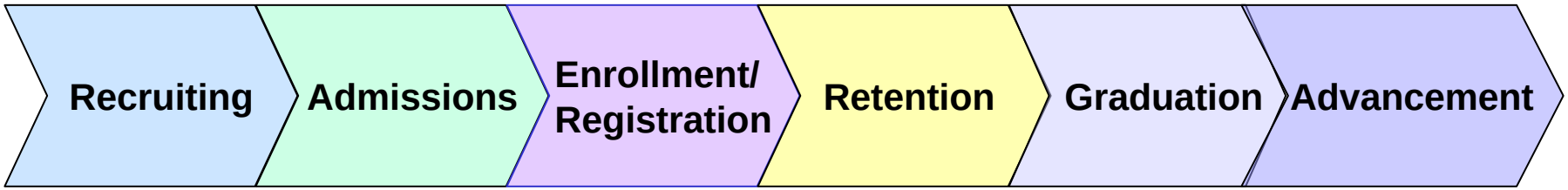
- Restructured for reporting efficiency
- Substantial Derived information
- Dimensional Data Model
- 120+ Measures
- 80+ Dimensional Attributes



Information Scope

Fact-based Decisions/Improved Results

Information Chain

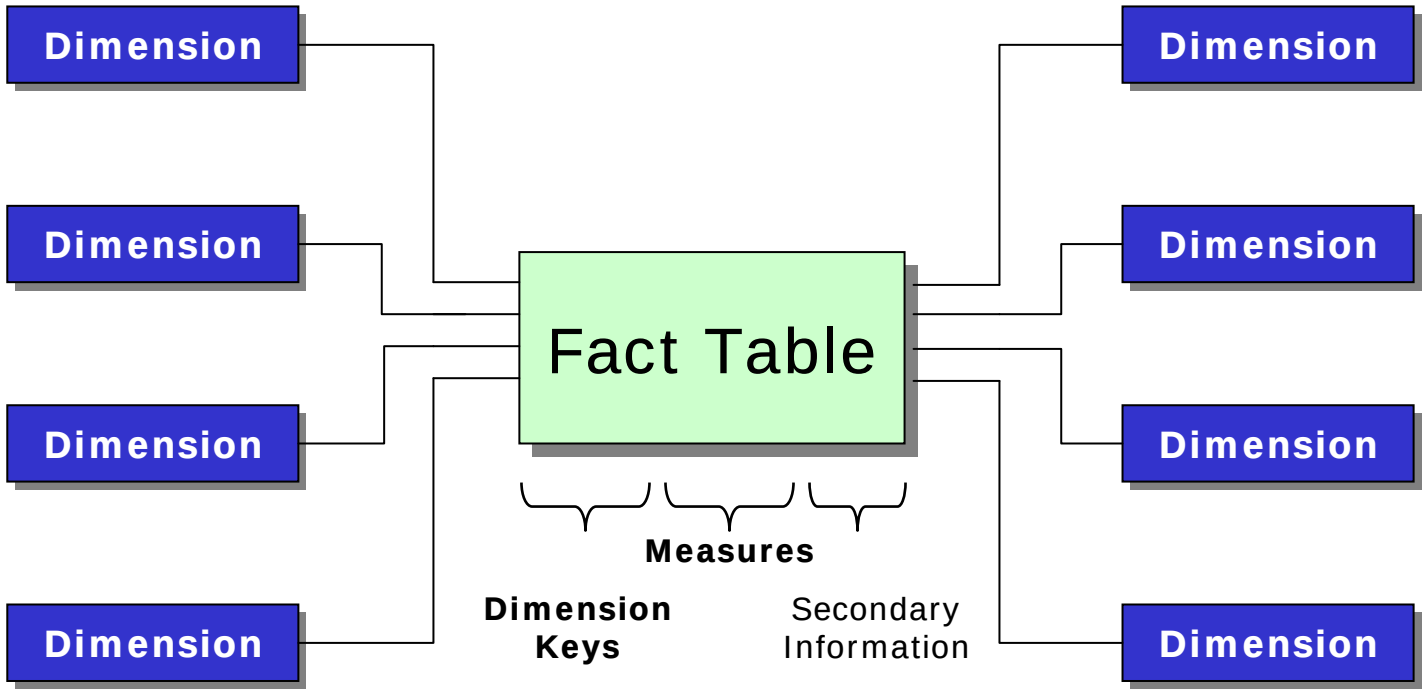


Institutional Information Users

- **Recruiting**
- **Admissions**
- **Registrar**
- **Institutional Research**
- **Financial Aid**
- **Office of Planning**
- **Alumni/Fund Raising**
- **Provost**
- **Deans**
- **Academic Affairs**

Dimensional Data Model

Star Schema Design



Student Data Warehouse Content

Dimensions

Admissions:
Application Method
Applicant Zip Code
Applicant Fin Aid Interest
Applicant Housing Interest
Applicant High School
Recruiting Category
Applicant Status
Admit Category
Applicant SAT Band
Applicant HS GPA Band
Applicant HS Rank Band
Applicant Age Band

Faculty Attributes:
Faculty
Faculty Rank
Highest Education Level
Tenured Status

Graduates:
Graduate Apply Status
Degree
Years to Graduate Band

Fact Areas

- Admissions
- Student Term
- Student Plan
- Class Schedule
- Class Registration
- Faculty Term
- Graduates
- Student Financials

Dimensions

Institutional:
Term
Career/Plan
Academic Org

Student Term:
Academic Level
Academic Standing
Cohort/Cohort Type
Student Term Status
FT/PT; Credit Hour Band

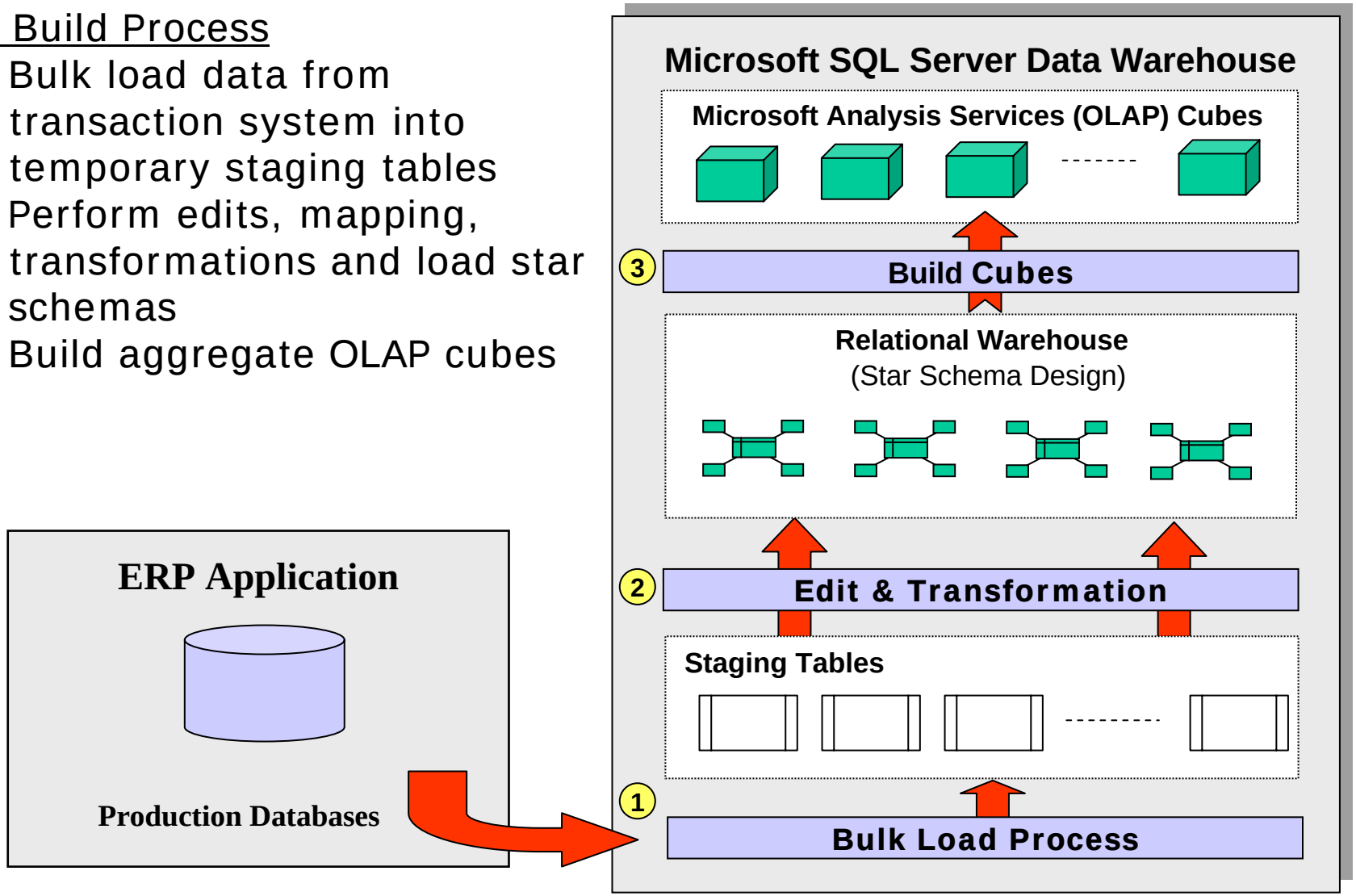
Class/Grade:
Subject/Class
Course Level
Class Type
Grade
GPA Band

Student Attributes:
Student
Student Citizenship
Student Ethnicity
Student Gender
Student Geography
Student Age Band

Data Warehouse Architecture

DW Build Process

1. Bulk load data from transaction system into temporary staging tables
2. Perform edits, mapping, transformations and load star schemas
3. Build aggregate OLAP cubes



Library of Metrics (Partial List)

Student Term
Student Count
Enrolled Student Count
New Enrollee Count
Num Student Withdrawals
Prior Year Student Count
% Change in Enrollment PY
Change in Student Count PY
Avg Credit Hours
Avg GPA Cumulative
Avg GPA Term
Avg Student GPA Change
Prior Term Cumulative GPA
Credit Hours Cum
Credit Hours Term
GPA Cum
GPA Term
Grade Points Cum
Grade Points Term
Cohort Retention %
Term Retention %
Academic Year Retention %

Student Plan
Student Count
Plan Count
SubPlan Count

Class Registration
Student Count
Registered Class Count
Enrolled Class Count
Drop Count
Dropped %
Avg Class Grade
Avg Classes Per Student
Avg Credits Per Class
Avg Credits Per Student
Avg Enrollment Per Course
Avg Enrollment Per Section
Credits Taken
Credits Earned

Class Schedule
Num Courses Offered
Num Sections Offered
Avg Section Capacity
Avg Course Capacity
Avg Sections Per Course
Course Utilization %
Section Utilization %
Faculty Count
Student to Faculty Ratio

Admissions
Applicant Count
Pending Count
Admitted Count
Matriculated Count
Enrolled Count
% Admitted
% Admitted Enrolled
% Applicants Enrolled
Avg SAT Math Score
Avg SAT Total Score
Avg SAT Verbal Score

Faculty Term
Average Years of Service
Faculty Count
New Faculty Count
Years Employed

Graduates
Degrees Count
Graduation Rates
Average Credit Hours
Average GPA
Average Years to Graduate

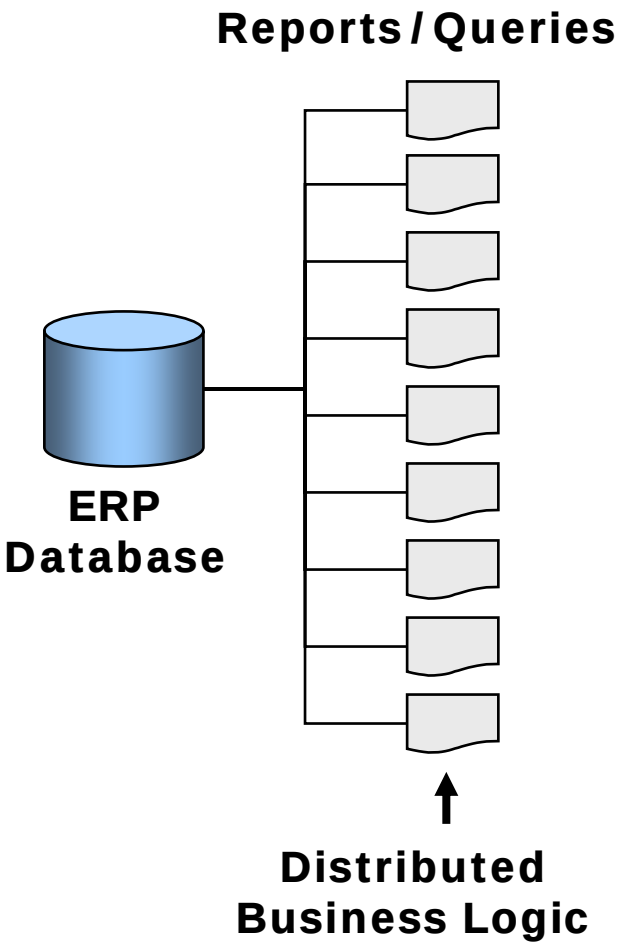
Academic Analytics & Derived Information

The vast majority of management information is derived using some business rules or algorithm!

Dimensional Attributes	**Measures**
Cohort Term	Admit Count
Degree Seeking Indicator	Enrolled Applicant Count
Enrolled Indicator	% Admits Enrolled
Financial Aid Indicator	Enrolled Student Count
First Term Indicator	Plan (Major) Count
GPA Band	Class Utilization %
SAT Band	Retention %
Student Term Status	Graduation Rates

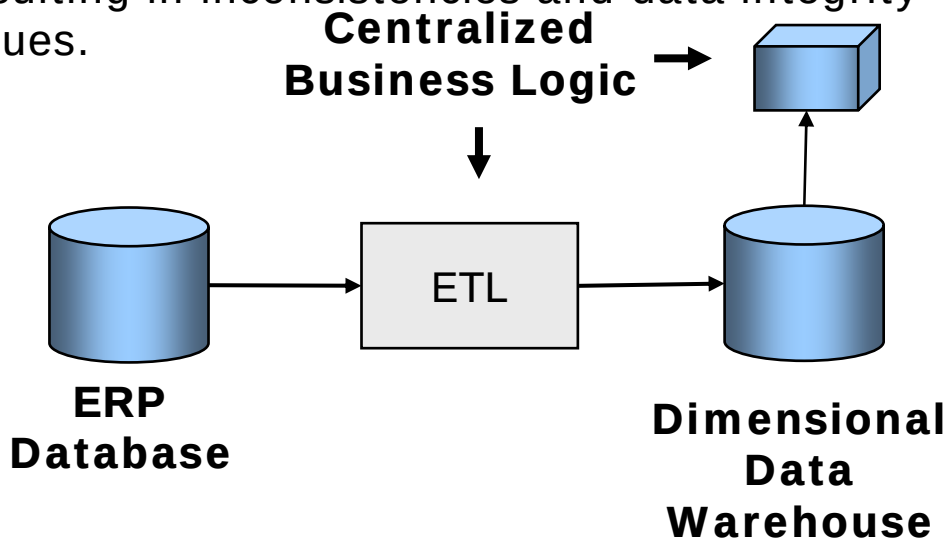
With query, Excel and other "distributed" reporting approaches, these business rules must be embedded (and repeated) in each report leading to ***inconsistencies, errors, misinformation and data integrity concerns***.

The Impact of Distributed Business Rules



** Measures derived in each report

The same logic must be continually repeated over and over in various similar reports resulting in inconsistencies and data integrity issues.



- Improved Data Integrity
- Improved Productivity
- Improved Access to Information
- Improved Decision Making

** Measures derived and stored in DW

HigherEd Analytics Product Modules

- Student – Current Version 2.4 (1st release 2003)
  - Admissions
  - Student Term/Student Plan
  - Registration
  - Degree Awards
  - Faculty
  - Student Financials
- Financial Management (released Dec 2005)
- Advancement/Contributor Relations (released Dec 2005)

- Financial Aid (planned for June 2006)
- Human Resources (planned for June 2006)

iStrategy Implementation at Towson

Core Project Team

- Project Manager (1) [resigned 3 weeks after project began]
- Technology Services Information Systems (3)
- Technology Services Database Applications (2)
- Institutional Research Staff (2)
- Enrollment Services Staff (3)
- Graduate School Staff (1)
- Undergraduate Admissions Staff (1)

  Total (13)
- iStrategy Staff (2)

Project Leadership

- We struggled with who should spear head the rollout
- We had commitment from all groups
- Project was driven by IR, but they saw IT as the project lead. The other offices saw IR as the desired lead.

Project Timeline

- Installation – June 2005 (1 day)
- GAP Analysis – mid June 2005 – Aug 2005
- Enhancements Implemented – end of Aug 2005
- Project Team User Rollout (Live 3 months) – Sep 2005
  - DW load daily from PeopleSoft production database
  - Used for Research and Analysis by Core Project Team (i.e., Enrollment and Admissions)
  - Ongoing Report Development and Data Validation
  - Additional Training for Core Project Team
- Initial Academic User Rollout – March 2006

Implementation Process: Gap Analysis

- DW Methodology and Data Model Orientation (3 days)
  - Trained Core Team on DW Concepts, iStrategy methodology and application architecture
  - Extensive walkthrough of each subject area
  - Reviewed dimensional data model/business rules through Towson data
  - “Painful” and time consuming process
  - Meetings often focused on numbers in the reports instead of the mappings and business rules
  - Project team members at first frequently questioned the numbers in the DW reports, but quickly came to realize that it was in almost every case bad data in PeopleSoft
- Business Rule Validation (10 weeks)
  - For each subject area, conducted meetings to review the data extracted, join logic, mappings and transformations
  - 80% of the rules/mappings are straight forward and 20% complex requiring some discussion…of which 10% is gray
  - Many internal meetings to discuss the “gray” areas
  - Within 10 weeks we had reached a consensus on the gray areas

GAP Analysis Results

Enhancements to Standard iStrategy Application

- Student Plan (Majors/Minors) Fact Table
- Several New Dimensions and Measures
- Refinement to several standard business rules

Customizations for Towson (2 weeks)

- Admissions
  - Modify Transfer College/Last School Attended and GPA rules
  - Modify Enrolled Applicant Criteria
- Student Term
  - Modify Credit Hours Attempted Term mapping
  - Modify Credit Hours Earned Term mapping
  - Modify Credit Hours Cum mapping
  - Modify Enrolled Student Criteria
  - Add Latin Honors algorithm and dimension
- Develop Student Plan Count Allocation by Department
- Added and Modified Several Dimensions

iStrategy Implementation: Lessons Learned

- Trying to build a data warehouse from scratch was more complex and resource intensive than initially thought
- Who owns the data? Who is responsible for the project?
  - This project was led by IT with strong involvement by functional staff (but not management)
- User fear of information
  - Initial Reaction, “That Can’t be Right!”
  - Project team felt accountable for data and business rules
  - Reluctance to accept the responsibility for data
- Gaining consensus on Business Rules was more complex and time consuming than originally thought.
- Need a Functional Expert to act as support, liaison and take on the “train the trainer role”
- Need more continued focus on end user training
  - ProClarity tool is very intuitive….some learned quickly and some didn’t
  - Long term proactive training program is required for the user that have difficulty

iStrategy Implementation: Lessons Learned (continued)

- At first we underestimated the power of the OLAP technology and didn't get it (having only Crystal reports as our benchmark). The OLAP technology is a key enabler:
  - Extremely fast (every report runs in 1-2 seconds even for a 5 year trend)
  - Always gives the same result (unlike the world of SQL queries)
  - Very easy to use
  - Powerful analytic capabilities that are intuitive (e.g., Top 25 high schools for Admissions Yields)
  - Drill to detail is a great feature
- All "Star Schemas" are apparently not the same
  - Crystal Reports are much easier using iStrategy's data model than Towson's data mart (due to effective use of key naming conventions, surrogate keys and conformed dimensions)
  - Report performance is also much better – detailed report for all students in a term runs in 2-3 seconds

Project Benefits for Towson

- iStrategy was significantly less cost to implement (and TCO) compared to any other alternatives
- Well architected and comprehensive DW content out-of-the-box (Admissions, Student Records, Student Financials)
- Rapid installation and deployment …dozens of delivered reports immediately available to entire user base
- Data is consistently reported, no matter who runs the report (“single version of the truth”)
- Source Data inaccuracies are immediately identified – drill down capabilities quickly identify who, what and where the data is skewed.
- Additional development and upgrade support provided by iStrategy (e.g., PeopleSoft 8.9)

Demonstration

Towson University HigherEd Analytics Application