Deconstructing the Tortoise and the Hare: How We Built a Web-based Student Tracking Application

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Overview

• Our Starting Point: What We Had in Place
• Clarifying Project Goals
• Application Design
• StudentTracker Demonstration
• Technical Development
• Testing and Implementation
• Impact Thus Far
• Lessons Learned
• Your Questions
I just got our consultant's report. He's identified our biggest problem.

I recommend that we build a tracking database.

Would you like to hear what the problem is first?

We can put it on the network.

I hate to dwell on the negative.

We like databases.
Our Starting Point

- Local Data Warehouse
- DataNet Application
  - Aggregated trend and detailed listing reports
  - Web-based, easy-to-use
  - Data dictionary & online help
  - Discussion forums
  - Access approval process
  - Mandatory training
  - Security mechanism
  - 86 users (at the time)
  - ASP.NET v.1.0
Clarifying Project Goals

• What, specifically, did we want to automate?
• What information should the application deliver?
  – Facilitate use of national definitions and measures
  – Allow analyses to extend beyond these standards
• Usability requirements?
  – Easy-to-use interface
  – Robust online help system
  – Flexibility in defining cohorts
• Relationship to DataNet?
Initial Design Mock-up

- Driven by two questions
  - How will users define cohorts?
  - What reporting options to offer?
- Step-by-step “wizard” interface:
  1. Identify the cohort to track.
  2. Verify the cohort.
  3. Choose options for report output.
## Initial Design Mock-up

### Sample Aggregate Report

<table>
<thead>
<tr>
<th></th>
<th>Enrolled</th>
<th>Graduated</th>
<th>Discontinued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2001 (cohort)</td>
<td>307</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fall 2002</td>
<td>215</td>
<td>-</td>
<td>92</td>
</tr>
<tr>
<td>Fall 2003</td>
<td>166</td>
<td>-</td>
<td>141</td>
</tr>
<tr>
<td>Fall 2004</td>
<td>118</td>
<td>29</td>
<td>160</td>
</tr>
</tbody>
</table>

### Sample Detailed Enrollment Listing

<table>
<thead>
<tr>
<th></th>
<th>Fall 2001</th>
<th>Fall 2002</th>
<th>Fall 2003</th>
<th>Fall 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student1</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Student2</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Focus Groups

- Invited active DataNet users & other key campus stakeholders
- Two sessions with ~10 participants each
- Refreshments
- Provided copies of mock-up to jumpstart discussion around informational needs
- Used a set of questions to structure the conversation
- Very useful in helping us refine our thinking
Focus Groups: What We Learned

• Considerable need for retention and graduation data, and for otherwise tracking student enrollment
  – Variety of forms, many different contexts:
    • Assessment and intervention
    • Advisors tracking individual students
    • Changes in majors and credit loads over time
    • Undergraduates going on to graduate study

• Many barriers to obtaining this information
  – “I would weep at my desk if it just appeared to me this way.”

• Importance of flexible cohort definitions was even greater than anticipated

• We would not be able to address everything
“Finalizing” Design

• Returned from maternity leave
• Revisited focus group notes
• Creative, collaborative discussions
• Revised original mock-up

• Settled on 4 initial report types:
  – One-year, fall-to-fall retention analysis
  – Six-year graduation rate analysis
  – Term-by-term aggregate report
  – Term-by-term student listing report

• Added much greater flexibility to cohort definition options
“Finalizing” Design

- Revised structure of wizard:
  1. Choose type of report.
  2. Identify basic cohort.
  3. Further define cohort.
  5. Select report preferences.

- “Stand-alone” application, integrated with DataNet through shared components and common user interface.
Demonstration
Technical Development

• Decided on an overall architecture
• ASP.NET v.2.0, SQL Server 2000
• Performance testing on the back-end database

• Started with coding the simplest report (fall-to-fall retention analysis)
• Other reports followed
  – Each presented unique technical challenges
  – Shared components simplified development
Technical Development

• Additional Functionality
  – Saving cohorts and reports
  – Downloading to Excel
  – Logging and error handling

• Formatting and design
  – Researched best practices
  – Created graphical elements
  – CSS (Cascading Style Sheets)

• Multiple learning curves
• Major coding took about nine months
Meanwhile, back at the ranch...

- Authentication system
- DataNet 2.0
DataNet Integration

- Common interface design
  - Global navigation
  - Selection criteria components
  - Styles and formatting
- Integrated online help system
- Same data dictionary
- Shared discussion forums
- “Sister applications”
Launching StudentTracker

- Asked DataNet users to volunteer as beta-testers
- Developed pilot training for testers
  - On using the application
  - On cohort survival analysis
  - Training manual
- Launched to all DataNet users
  - Offered special training sessions
- Integrated with ongoing DataNet training
- Presentations to campus groups
Assessing Impact Thus Far

• Applications currently serve ~200 campus data users
• StudentTracker served up ~1,300 reports in first six months of production
• Our office:
  – Enhanced understanding of student tracking
  – Developed skills and knowledge that apply to other projects
  – Application facilitates our reporting and analyses
Continuation Rates of First-time, Full-time Freshmen:
Six-year Graduates vs. Non-graduates
Fall 1998 - Fall 2000 Cohorts

Graduates

All FTFTFT

Non-graduates

Percent Retained

Continued to 2nd Fall  Continues to 3rd Fall  Continued to 4th Fall  Continued to 5th Fall  Continued to 6th Fall
Lessons Learned

• Application design: more challenging than coding?
  – Understand well what is to be automated
  – Conduct a needs assessment
  – Settle on design before major coding
  – Design work can seem intangible, unproductive—but is actually quite necessary

• Be willing to re-work the design plan
  – Abandoned initial plan to include annual cohorts
  – Corrected a major limitation during testing phase

• Big, complex projects become manageable with:
  – Good support: training, mentorship, time, patience
  – Breaking the task down into smaller, simpler pieces
  – Persistence (ironically), and the desire to learn new skills
What’s Next?

- Priorities driven by larger institutional conversations
- Currently redesigning our entire web presence
  - Move away from static reports
  - Integrate dynamic content and existing applications with role-based user authentication
- Possible enhancements to StudentTracker:
  - Establish cohorts by uploading student IDs
  - Integrate additional data sets
    - End-of-semester grades and GPAs
    - National Student Clearinghouse
    - Survey and application data
  - Add new reporting functions
    - Fall-to-n\textsuperscript{th} term retention
    - Degree completion analyses
    - Progression measures
Questions?

• For further information…
  – Our website: http://ir.unlv.edu
  – Email: christina.drum@unlv.edu
• Thank you!
Persistence and Graduation Reports

Welcome to StudentTracker, where you identify a cohort of students who were enrolled at UNLV during a given term, and then track their enrollment and graduation in subsequent terms.

This wizard will guide you through the following steps:

1. Choose the type of report you would like to run.
2. Identify the basic cohort you would like to track.
3. Further define your cohort.
4. Verify the cohort you have selected.
5. Select preferences for report output.

Get Started >>

StudentTracker is a service of the UNLV Office of Institutional Analysis & Planning. Data access is governed by this policy agreement.
One-year, Fall-to-fall Retention Analysis

The one-year, fall-to-fall retention analysis, as its name implies, automates reports that present a cohort’s one-year retention. An example of this type of report is shown below. This example shows first-year retention by ethnicity of a fall 2005 cohort of new freshmen. The first column of figures shows the number of students in the cohort. The second and third columns of figures show the number and percent of the cohort who were enrolled in the following fall.

<table>
<thead>
<tr>
<th>One-year Retention of First-time, Full-time Freshmen by Ethnicity</th>
<th>Fall 2005 Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Retained in Fall 2006 (#)</td>
</tr>
<tr>
<td>African American</td>
<td>273</td>
</tr>
<tr>
<td>Asian</td>
<td>538</td>
</tr>
<tr>
<td>Caucasian</td>
<td>1,141</td>
</tr>
<tr>
<td>Foreign National</td>
<td>48</td>
</tr>
</tbody>
</table>
Cohort Survival Analysis

In the context of measuring student retention and graduation, cohort survival analyses involve identifying a cohort, or group, of students who enrolled during a given term, and then tracking this group longitudinally across subsequent terms. Sometimes the analysis only considers one subsequent term, as in the case of measuring one-year retention rates. Other analyses look at multiple points in time after the initial cohort term.

Much of cohort survival analysis revolves around defining the cohort to study. For a number of standard reports—e.g., IPEDS and the Common Data Set—a standard cohort definition of first-time, full-time baccalaureate-degree seeking freshmen is used. Sometimes a researcher is interested in examining a particular student characteristic (e.g., academic preparation, ethnicity) or course-taking behavior (e.g., students who took an English course during their first term). In these cases, it is common practice to begin with a standard cohort definition and then break down the results of the study by the other measure(s) of interest. The following report, for example, shows retention rates of a fall 2005 cohort of first-time, full-time freshmen by ethnicity.

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Fall 2005 Cohort (n)</th>
<th>Retained in Fall 2006 (n)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>273</td>
<td>181</td>
<td>66.3%</td>
</tr>
</tbody>
</table>
Report Selection

1. Choose the type of report you would like to run.

- One-year, fall-to-fall retention analysis
- Six-year graduation rate analysis
- Term-by-term aggregate report
- Term-by-term student listing report
Basic Cohort Selection

2. Identify the basic cohort you would like to track. You may choose from the options below, or load a saved cohort.

**Cohort Term:** Fall 2000

**Cohort Level:** Undergraduate

**Basic Cohort:**
- All Undergraduates
- First-time Freshmen
- New Undergraduate Transfers
- All Admitted Undergraduates
- Non-admitted Undergraduates

- Include baccalaureate degree-seeking students only.
Further Cohort Definition

You may further define your cohort by selecting from the options below.

Student Characteristics

Enrollment Status: Full-time

Residence: All Students

College of Major: All Colleges

Department: All Departments

Major: All Majors

Additional Student Criteria:

Match all conditions in this group

[X] [>>] High School Region Code is NVCL

Add

Course Enrollments (in Cohort Term)

Include Students Enrolled in:

Match all conditions in this group

[X] [>>] Course Prefix is ENG

Add
4. Review and confirm your cohort selections.

You have chosen to run a six-year graduation rate analysis for a Fall 2000 cohort of 916 first-time freshmen.

**Student Characteristics**

*You have filtered this cohort to include:*
- Baccalaureate degree-seeking students only
- Full-time students only
- Nevada residents and non-residents
- Students majoring in:
  - College: All Colleges
  - Department: All Departments
  - Major: All Majors

Records matching the following condition:
- High School Region Code Is NVCL

**Course Enrollment Criteria**

*Cohort includes:*
Records matching the following condition:
- Course Prefix Is ENG

**Save Cohort for Future Use**

You may now modify this cohort by returning to the previous screen(s), or proceed and set your report preferences.
Report Preferences

5. You may select up to three group-by options below.

Group By:
- High School GPA
- Student College
- Student Department
- Major
- Program
- Gender
- Ethnicity
- Residence

- Include Totals
- Include Certificates in Graduation Results

<< Return to Cohort Verification  Display Report >>

Start Over
### Six-year Graduation Rate Report: Fall 2000 through August 2006

<table>
<thead>
<tr>
<th>High School GPA</th>
<th>Fall 2000 Cohort (#)</th>
<th>Graduated by August 2006 (#)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.25 - 2.49</td>
<td>2</td>
<td>1</td>
<td>50.0%</td>
</tr>
<tr>
<td>2.50 - 2.74</td>
<td>74</td>
<td>12</td>
<td>16.2%</td>
</tr>
<tr>
<td>2.75 - 2.99</td>
<td>133</td>
<td>31</td>
<td>23.3%</td>
</tr>
<tr>
<td>3.00 - 3.24</td>
<td>242</td>
<td>71</td>
<td>29.3%</td>
</tr>
<tr>
<td>3.25 - 3.49</td>
<td>201</td>
<td>87</td>
<td>43.3%</td>
</tr>
<tr>
<td>3.50 - 3.74</td>
<td>168</td>
<td>88</td>
<td>52.4%</td>
</tr>
<tr>
<td>3.75 and above</td>
<td>91</td>
<td>55</td>
<td>60.4%</td>
</tr>
<tr>
<td>No HS GPA</td>
<td>5</td>
<td>2</td>
<td>40.0%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>916</strong></td>
<td><strong>347</strong></td>
<td><strong>37.9%</strong></td>
</tr>
</tbody>
</table>

**Notes:**
1. Small cohort counts may limit generalizability of results.
2. If the cohort is limited to one student level (e.g., undergraduate, graduate), then only degrees conferred at that level are included in the graduation results.
3. Certificates are included in graduation results.

**Source:** Student Information System, UNLV StudentTracker

**Report Date:** 10/15/2007

**Cohort Definition**

- This Fall 2000 cohort of 916 first-time freshmen includes:
- Baccalaureate degree-seeking students only
- Full-time students only
- Nevada residents and non-residents
- Students majoring in:
  - College: All Colleges
  - Department: All Departments
## Fall 2005 to Fall 2006 Retention Report

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Fall 2005 Cohort (#)</th>
<th>Retained in Fall 2006 (#)</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>African American</td>
<td>272</td>
<td>181</td>
<td>66.5%</td>
</tr>
<tr>
<td>Asian</td>
<td>533</td>
<td>402</td>
<td>75.4%</td>
</tr>
<tr>
<td>Caucasian</td>
<td>1,134</td>
<td>772</td>
<td>68.1%</td>
</tr>
<tr>
<td>Foreign National</td>
<td>40</td>
<td>37</td>
<td>92.5%</td>
</tr>
<tr>
<td>Latino</td>
<td>415</td>
<td>263</td>
<td>68.2%</td>
</tr>
<tr>
<td>Native American</td>
<td>41</td>
<td>29</td>
<td>70.7%</td>
</tr>
<tr>
<td>Not Disclosed</td>
<td>123</td>
<td>81</td>
<td>65.9%</td>
</tr>
<tr>
<td>Unknown</td>
<td>368</td>
<td>291</td>
<td>75.0%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>2,946</strong></td>
<td><strong>2,076</strong></td>
<td><strong>70.5%</strong></td>
</tr>
</tbody>
</table>

Note: Small cohort counts may limit generalizability of results.

Source: Student Information System, UNLV StudentTracker.
Report Preferences

5. Please indicate your report preferences below.

Track Cohort through: Fall 2006

Display Intervening Terms:
- Fall
- Spring
- Summer

Include Certificates in Graduation Results

<< Return to Cohort Verification  Display Report >>

Start Over
# Retention and Graduation Rates of Fall 1998 Cohort through Fall 2006

<table>
<thead>
<tr>
<th></th>
<th>Still Enrolled (not graduated)</th>
<th>Graduated Undergraduate Level</th>
<th>Graduated Graduate Level</th>
<th>Not Enrolled (not graduated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>#</td>
<td>#</td>
<td>#</td>
</tr>
<tr>
<td><strong>Fall 1998</strong></td>
<td>20861</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Fall 1999</strong></td>
<td>11951</td>
<td>2250</td>
<td>565</td>
<td>6095</td>
</tr>
<tr>
<td><strong>Fall 2000</strong></td>
<td>7524</td>
<td>4546</td>
<td>1211</td>
<td>7580</td>
</tr>
<tr>
<td><strong>Fall 2001</strong></td>
<td>4846</td>
<td>6444</td>
<td>1667</td>
<td>7904</td>
</tr>
<tr>
<td><strong>Fall 2002</strong></td>
<td>3060</td>
<td>7847</td>
<td>1905</td>
<td>8049</td>
</tr>
<tr>
<td><strong>Fall 2003</strong></td>
<td>1786</td>
<td>8859</td>
<td>2041</td>
<td>8175</td>
</tr>
<tr>
<td><strong>Fall 2004</strong></td>
<td>1121</td>
<td>9365</td>
<td>2135</td>
<td>8240</td>
</tr>
<tr>
<td><strong>Fall 2005</strong></td>
<td>763</td>
<td>9632</td>
<td>2186</td>
<td>8280</td>
</tr>
<tr>
<td><strong>Fall 2006</strong></td>
<td>526</td>
<td>9832</td>
<td>2228</td>
<td>8275</td>
</tr>
</tbody>
</table>

Notes:
1) Small cohort counts may limit generalizability of results.
2) If a student has earned multiple degrees during the time frame indicated, only the earliest degree is reflected in the results.
3) Certificates are included in graduation results.

Source: Student Information System, UNLV Student Tracker
Report Date: 10/15/2007
Report Preferences

5. Please indicate your report preferences below.

Track Cohort through: Fall 2006

Display Intervening Terms:
- Fall
- Spring
- Summer

Display Term-by-term Enrollment by: Standing

- Include Student Names
- Include Graduation Data

Include Student Characteristics (from cohort term):
- Origin
- Student College
- Student Department
- Major
- Program
- Gender
- Ethnicity
- Age

<< Return to Cohort Verification
Display Report >>

Retrieving report...
# Fall 2003 Student Listing: Persistence and Graduation through Fall 2006

## Fall 2003 Cohort

<table>
<thead>
<tr>
<th>PersonID</th>
<th>Origin</th>
<th>Fall 2003</th>
<th>Persistence by Standing</th>
<th>Degrees Conferred</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fall 2004</td>
<td>Fall 2005</td>
</tr>
<tr>
<td>L0000</td>
<td>AZ</td>
<td>U04</td>
<td>U04</td>
<td></td>
</tr>
<tr>
<td>L0001</td>
<td>AZ</td>
<td>U04</td>
<td>U04</td>
<td></td>
</tr>
<tr>
<td>L0005</td>
<td>NM</td>
<td>U04</td>
<td>U04</td>
<td>U04</td>
</tr>
<tr>
<td>L0005</td>
<td>HI</td>
<td>U03</td>
<td>U04</td>
<td>U04</td>
</tr>
<tr>
<td>L0005</td>
<td>OR</td>
<td>U01</td>
<td>U02</td>
<td>U03</td>
</tr>
<tr>
<td>L0005</td>
<td>CO</td>
<td>U03</td>
<td>U04</td>
<td></td>
</tr>
<tr>
<td>L0005</td>
<td>NM</td>
<td>U02</td>
<td>U03</td>
<td>U03</td>
</tr>
<tr>
<td>L0005</td>
<td>CO</td>
<td>U02</td>
<td>U02</td>
<td>U02</td>
</tr>
<tr>
<td>L0005</td>
<td>HI</td>
<td>U01</td>
<td>U02</td>
<td>U03</td>
</tr>
<tr>
<td>L0005</td>
<td>WA</td>
<td>U02</td>
<td>U03</td>
<td>U04</td>
</tr>
</tbody>
</table>

**Note:** The table above shows the fall 2003 cohort of students along with their persistence by standing and the degrees conferred through fall 2006.
Frequently Asked Questions

Select a category:

- About DataNet and StudentTracker
- About the Data
- Running DataNet Reports
- Running StudentTracker Reports
- Data Documentation
- Preferences
- Community Resources
- Training
- Preliminary and Final Reports
## Index of Data Elements (by Name | by Title)

<table>
<thead>
<tr>
<th>Element</th>
<th>Data Source</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>AcademicYear</td>
<td>ALLGRADS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>ACTC</td>
<td>STUDENTS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>ACTE</td>
<td>STUDENTS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>ACTM</td>
<td>STUDENTS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>ADMITCODE</td>
<td>STUDENTS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>ADMITYEAR</td>
<td>STUDENTS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>AGE</td>
<td>STUDENTS</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>ApprovalYear</td>
<td>PMD</td>
<td>IAP Data Warehouse</td>
</tr>
<tr>
<td>AFRGDPTCD</td>
<td>APRG</td>
<td>Student Information System</td>
</tr>
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<td>AFRGGRDDT</td>
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<td>Student Information System</td>
</tr>
<tr>
<td>AFRGSCHCD</td>
<td>APRG</td>
<td>Student Information System</td>
</tr>
</tbody>
</table>
## Community

### Forums

<table>
<thead>
<tr>
<th>Forum</th>
<th>Topics</th>
<th>Most Recent Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DataNet / StudentTracker</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Announcements</strong></td>
<td>35</td>
<td>Christina Drum 10/09/2007</td>
</tr>
<tr>
<td>Announcement from the Office of Institutional Analysis and Planning that would impact the DataNet and StudentTracker applications are posted here</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Open Discussion</strong></td>
<td>55</td>
<td>Marissa Blas 10/09/2007</td>
</tr>
<tr>
<td>This is an open forum for all DataNet and StudentTracker users to discuss data issues and ask questions.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training and Testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Training Forum</strong></td>
<td>31</td>
<td>Julie Johnson 10/09/2007</td>
</tr>
<tr>
<td>For practicing community functions during training sessions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>