Student Success Systems

Dr. Bob Bramucci, Vice Chancellor, Technology and Learning Services
Jim Gaston, District Director of IT – Academic Systems
Ari Nur, Saddleback College Student
About Us

- About the SOCCCD
  - Two-college district in southern California
  - Approximately 41,000 students (23,000 FTES)

- Two Colleges, Three Campuses
  - Saddleback College in Mission Viejo
  - Irvine Valley College in Irvine
  - Advanced Technology and Education Park (ATEP) in Tustin
SOCCCD Student Success Systems

MAP
Sherpa
Predictive Analytics
Student Dashboard
The Problem
Percentage of 25- to 34-Year-Olds with an Associate Degree or Higher, 2007

Source: Organisation for Economic and Co-operative Development, 2009
The Planets Align...
Progress So Far

The College Completion Agenda
2011 Progress Report

The Goal: Increase the proportion of 25- to 34-year-olds who hold an associate degree or higher to 55 percent by the year 2025 in order to make America the leader in educational attainment in the world.

55% by 2025
Technology & Productivity
Moore’s Law

Moore's Law and Processor Speeds

Growth rate of 27 percent per year (doubling in 2.7 years)

Figure 2. Clock speed of different generations of Intel microprocessors (*) and trend line.
Computer Prices

Figure 11. Computer prices and output in the U.S. economy, 1972-99
Communications Speed

Figure 3.
Search Time

Figure 9. Search time for document deposited at Library of Congress.
Computers often exhibit Exponential rather than Arithmetic efficiencies
Disinvestment by States

Figure 6 | STATE SUPPORT FOR HIGHER EDUCATION PER FULL-TIME EQUIVALENT STUDENT, FISCAL YEARS 1990-1991 TO 2009-2010
We Can’t Get There Alone

- 80-90% spent on salaries + benefits in K-12 and postsecondary education limit options (we can’t realistically double the number of people)

- Declining state investment

- Economic history shows that technology often produces **exponential** changes

- Is increased automation the answer?
It’s not just *what* we created (an integrated suite of student success software applications)

- It’s *How We Built It.*
SOCCCD’s SECRETs

1. Student-Centered Design

2. Agile Software Development Methods
   - Inclusive
   - Flexible

3. Human-Centered Allocation of Function
Student-Centered Design
Agile Software Development
Allocation of Function

Vs.
Fitts’ List

HUMANS

- Complex pattern recognition and generalization
- Judgment under uncertainty

MACHINES

- Rote calculation
- Routine, repetitive, precise movements
Human-Centered Allocation of Function

- We believe that simply replacing people with machines is NOT the best answer.

- Rather, we can allocate functions between humans and machines in a *strategic* way that allows people to leverage their unique human strengths—a “human-centered design” approach.
SOCCCD Student Success Systems

MAP

Sherpa

Predictive Analytics

Student Dashboard
My Academic Plan (MAP)
MAP Project Goals

Create a system that provides:

- **Self-service guide** for students to develop academic plans
- **Tracking system** for counselors and students to monitor progress toward goals
- **Automated assistance** to help students select classes that achieve their goals
- **Integration with Project ASSIST** to reduce data maintenance and increase accuracy
Process

- **Design Team**
  - Counselors
  - Students
  - Articulation Staff

- **Timeline**
  - Discussions began in late 2004
  - Development began in Fall 2005
  - MAP went online on April 27, 2007

- **Technology**
  - Service Oriented Architecture (SOA)
  - Integration with Project ASSIST
# Usage Statistics - Plans Created

<table>
<thead>
<tr>
<th>College</th>
<th>Type</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irvine Valley College</td>
<td>Associates</td>
<td>12,865</td>
</tr>
<tr>
<td></td>
<td>Certificate</td>
<td>5,231</td>
</tr>
<tr>
<td></td>
<td>Transfer</td>
<td>57,209</td>
</tr>
<tr>
<td>Saddleback College</td>
<td>Associates</td>
<td>32,148</td>
</tr>
<tr>
<td></td>
<td>Certificate</td>
<td>13,939</td>
</tr>
<tr>
<td></td>
<td>Transfer</td>
<td>80,258</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td></td>
<td><strong>201,650</strong></td>
</tr>
</tbody>
</table>

From: 4/27/07 to 2/23/14
MAP Demonstration
Sherpa
Sherpa is a recommendation engine that guides students to make informed decisions regarding courses, services, tasks and information.
Let’s translate this into the real world...

Nudge

Here is some advice for you...

Profile
What makes a nudge, a nudge?

- Personal
- Timely
- Relevant
- Actionable
<table>
<thead>
<tr>
<th>Student Profile</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>New student, not matriculated</td>
<td>Link to online orientation</td>
</tr>
<tr>
<td>GPA &gt; 3.5</td>
<td>Link to honors program</td>
</tr>
<tr>
<td>GPA &lt; 2.0</td>
<td>Link to tutoring program</td>
</tr>
<tr>
<td>Transfer student</td>
<td>Courses that fulfill GE pattern</td>
</tr>
<tr>
<td>Does not have academic plan</td>
<td>Link to MAP (academic planning tool)</td>
</tr>
<tr>
<td>Low assessment scores</td>
<td>Recommend basic skills classes</td>
</tr>
<tr>
<td>First time student</td>
<td>Step-by-step instructions</td>
</tr>
<tr>
<td>Returning student</td>
<td>Recommend classes based on goals, success patterns and transcript details.</td>
</tr>
<tr>
<td></td>
<td>Only display classes with an empty seat and that don’t conflict with student’s schedule</td>
</tr>
</tbody>
</table>
Phased Approach

☑ Phase One – Closed Class Assistance
  ● Assists students in finding a replacement class during registration

☑ Phase Two – Profiles and Nudges
  ● Announcements, Email, SMS, Voice-To-Text

☑ Phase Three – Portal Refresh
  ● Calendar, To-Do List and News Feed

☑ Phase Four – Mobile
  ● In beta release

☐ Phase Five – Predictive Analytics
  ● In development

☐ Phase Six – Student Success Dashboard
  ● Beginning in Spring 2014
Some Promising Early Results

Closed Class Assistant:
Has directly resulted in over 20,000 enrollments since October 2010.

Matriculation Pilot:
Probation numbers dropped 39% one month after Sherpa notification.
Sherpa Demonstration
Predictive Analytics
Uses

- Early Alert
- Course Recommendation
- Adaptive Learning
Machine Learning

- Decision trees
- Neural networks
- Bayesian networks
- Learning Automata
- Support Vector Machines
Three Math Models

• Global: is student predicted to fail any of his/her courses?

• Specific: A, B, C, D, F grade prediction for any particular class a student might take

• Regression Model
Problem Structure

• Millions of movies—but you’ll only view a small subset

• Thousands of courses—but the average student will only take a small subset
Matrix Factorization Model

\[ r_{sc} \approx \mu + b_s + b_c + q_t^c p_s + \sum \alpha x_s \]

- \( r_{sc} \): Predicted score for student \( s \) and course \( c \)
- \( \mu \): Overall mean score
- \( b_s \): Bias for student \( s \)
- \( b_c \): Bias for class \( c \)
- \( q_t^c \): Class-student interaction
- \( p_s \): Weighted sum of student variables
- \( \alpha \): Weighting factor for student variables
Student Success Dashboard
Focus on Student Success
Next Steps

- Research
- Scaling Up
- Additional success modules
Goals for Today

- Make you aware of the student success software we’ve created and how we created it.

- Our goals are to scale up these systems to reach millions of students, and to find investment partners to add new success modules.

- Conversations are generating interest!
  - Sacramento
  - The California Community College System (25 colleges have expressed interest)
  - Other states (e.g., State of Washington)
  - DC: USDOE, Senate HELP, Education and Workforce
Questions?

http://www.soccccd.edu/sherpa

Bob Bramucci: rbramucci@soccccd.edu
Jim Gaston: jgaston@soccccd.edu