

# Application for 2016 University of California Larry L. Sautter Award for Innovation in Information Technology

**Project Title:** Student Portal Redesign (SIS)

**Submitted by:** Kevin Yeung,  
Director, Student Information Systems  
[kevin.yeung@ucsf.edu](mailto:kevin.yeung@ucsf.edu) / (415) 502-6463

## Project Leaders and Team Members:

The success of this project was due to the tremendous efforts of the following people:

- Elizabeth Watkins, Dean, Graduate Division & Vice Chancellor, Student Academic Affairs (**Project Sponsor**)
- Wendy Winkler, Chief of Staff to Dean, Graduate Division and Vice Chancellor, Student Academic Affairs & Director, Graduate Student Financial Support
- Doug Carlson, Registrar & Director of Student Information
- Kevin Yeung, Director, Student Information Systems
- Adele Anfinson, Director, Student Health and Counseling Services
- Ron James, Interim Director, Student Financial Aid
- Jeff Harter, Associate Registrar
- Jina Shamim, Associate Registrar
- Charles McDonough, Operations Manager, Student Health and Counseling Services
- Lisa Dong, Systems Analyst, Student Information Systems
- Alex Siu, Development Lead, Student Information Systems
- Angela Fang, Development Lead, Student Information Systems
- Lawrence Roberts, Systems Architect, Student Information Systems
- Garland Woo, Developer, Student Information Systems
- Alvin Yue, Developer, Student Information Systems
- Robert Turbyfill, Systems Administrator & DBA, Student Information Systems
- David Tse, Developer, Student Information Systems

## Executive Summary

UCSF students use the student portal to file their study list, pay fees, check for holds, view grades, submit their Statement of Legal Residence, and maintain personal information such as address and telephone number. All students use the portal at least once per quarter.

Designed in the early 2000s, by 2014 the previous portal's user interface and the technology supporting the portal had become dated. Working with the Office of the Registrar (**OR**), the Student Information Systems (**SIS**) staff planned a complete redesign, creating an intuitive and user-friendly interface, revising the menu structure, and reorganizing and streamlining the presentation of information. The redesigned portal implemented new technologies to improve the user experience. In the process, SIS designed an architecture that allowed ease of maintenance and future enhancements and could be reused for other projects. The project was a collaborative effort between SIS developers, departments in Student Academic Affairs (**SAA**) and students (through their participation in the in-person focus groups). While we refer to the project as a redesign, it actually replaced the old portal completely.

## **Growing Needs for Student Portal Redesign**

By 2014, the growth and adoption of mobile devices, particularly among the younger generation, such as UCSF's student population, had increased phenomenally. On the other hand, the old Student Portal was designed in the early 2000s when web applications were only accessible through browsers running on desktops and heavy clunky laptops. Ten plus years is a very long time in the technology world; some features couldn't be rendered correctly on mobile devices while other features simply looked dated.

OR and SIS came together to plan for the Student Portal redesign. We were presented with a unique opportunity to start fresh. In the years since the old Student Portal was released, SAA staff and developers knew all too well the frustrations, deficiencies and pain points of the old system; all this would be rectified in the new system.

## **Planning**

The project team knew from day one this was not simply a matter of replacing the old system with a new one using modern technologies. Innovation was required to maximum the returns on the efforts being invested on this project. During planning and design, we sought to:

- Design an intuitive user interface to reduce user errors, thereby reducing staff hours to rectify the errors;
- Build a framework that could be reused and integrated with other projects;
- Increase student usage and interaction with the portal;
- Plan for the future with a code base that is easier to maintain and enhance.

## **Collaboration**

The project is a collaborative effort of departments in Student Academic Affairs including Student Information Systems, Office of the Registrar, Student Health and Counseling Services and Student Financial Aid, as well as external departments such as the Police Department (for ID badges). Student input and feedback were important considerations and vital to the user acceptance and validation of the new, intuitive user interface. SIS planned and budgeted for several in-person student focus groups.

Other than the IBM DB2 database that our code abstracted, the technologies used for this project are entirely open source. The advantages of open source technologies are already known - cost, security, auditability, collaboration, interoperability, customizability, flexibility and quality. Free, open source technologies make it easier and more likely that other UC campuses can reuse our project's code. Before and during the project implementation, we talked to other development teams at UCSF and other UC campuses (namely UCLA and UCB) to validate our design choices and technical approaches for this project.

## **Design and Implementation**

A set of robust RESTful web services is used to interface between the front-end of the Student Portal and the backend database. The main driver behind choosing REST was to make complex things simpler. REST used in combination with JSON allows a fat-free (low overhead), convenient way of accessing REST resources in an asynchronous fashion using AJAX and JQuery for highly responsive, interactive user interfaces.

The other main driver for choosing REST was that the simple but robust web services created here could be reused as a rich set of APIs for other projects. For example, the web service for loading a student's demographic information in this project could be reused with little or no modifications for a data request for the Faculty Portal, UCOP IR reporting, Moodle (a learning management system) or the campus-wide Cross Campus Enrollment System (a UCOP led initiative).

We invested a considerable amount of time in overhauling and redesigning the user interface to be intuitive to reduce user errors and thereby improve operational efficiency by reducing staff time spent correcting those errors. A case in point is the redesign of the course enrollment page. The two screenshots below show the course enrollment page in the old and new Student Portals.

**FILING INSTRUCTIONS (Top Half of Screen)**

Your study list is the official record of all courses for which you are accountable. Credit will not be awarded for courses not listed.

- To add a course, use the drop down menu and select the department for the course you would like to add.
- To edit a course's units, grade type, or instructor or to drop the course, click the image for that course.

For information about adding faculty to "My Instructors", see below.

**For Students Enrolled In Multiple Programs**

If you are enrolled in more than one program, you must file a study list for each program. You can select the study list for each program by using the **View Study Lists for all Programs and Terms** drop down menu below. Select the program and term; then add, drop or edit courses for that study list.

[After-Hours Classroom Access Policy](#)

**Your Study List**

Your Study List for	Program	Add Course(s)
ST14	Or CranFacSci - Masters	<input type="button" value="Add Course"/>

Grade	Subject	Number	Units	Grade Type	Course Title	Instructor	Status	Edit
NR	OR CRA FAC	250	2.0	Pass/Fail	Research	Miller Art J	Active	

Total units: 2.0

**Dropped Courses**

Subject	Number	Units	Grade Type	Course Title	Instructor	Status	Edit
ORTHODONT	OT439	8.0	P/NP or S/U	Clinical Orthodontics III	Nelson Gerald D	Dropped	
ORTHODONT	OT404.20	0.5	P/NP or S/U	Orthodontics: Interdisciplinary Treatment	Sharma Arun B	Dropped	
ORTHODONT	OT436	2.0	P/NP or S/U	Orthodontic Practice Management	Nelson Gerald D	Dropped	

**[[Bottom Half of Screen]]**

ORTHODONT	OT408	0.5	P/NP or S/U	American Board of Orthodontics Phase II Exam Review Seminar	Adams Gregory L.	Dropped	
ORTHODONT	OT407.10	0.5	P/NP or S/U	TMD and Orofacial Pain for Orthodontists	Mcneill Charles	Dropped	
ORTHODONT	OT406	1.0	P/NP or S/U	Journal Club	Miller Art J	Dropped	
ORTHODONT	OT404	2.5	P/NP or S/U	Treatment and Diagnosis	Nielsen Ib L	Dropped	
ORTHODONT	OT403	1.0	P/NP or S/U	Orthodontic Literature Review	Johnson Earl S	Dropped	
ORTHODONT	OT402	1.0	P/NP or S/U	Treatment Progress Seminar	Nelson Gerald D	Dropped	
ORTHODONT	OT401	1.0	P/NP or S/U	Clinical Orthodontic Research	Miller Art J	Dropped	
ORTHODONT	OT400	1.5	P/NP or S/U	Orthognathic Surgery Conference	Nielsen Ib L	Dropped	

My Grade Sheet | My Instructor List | View Study Lists for all Programs and Terms

[View past grades](#) | [My Instructors](#) | **View Study Lists by Program and Term**

- SP14 - Dent Postgrad
- SP14 - Or CranFacSci
- WI14 - Dent Postgrad
- WI14 - Or CranFacSci
- FA13 - Dent Postgrad
- FA13 - Or CranFacSci
- ST13 - Dent Postgrad
- ST13 - Or CranFacSci
- SP13 - Dent Postgrad
- SP13 - Or CranFacSci
- WI13 - Dent Postgrad
- WI13 - Or CranFacSci
- FA12 - Dent Postgrad
- FA12 - Or CranFacSci
- ST12 - Dent Postgrad
- ST12 - Or CranFacSci

**\* My Instructors**

For courses that do not have a designated faculty (a "Short Department list" ("short list") or an All Instructors list. If you have a set of instructors that you usually take courses with, you can add them to your "My Instructors" list. All faculty who have been added to your "My Instructors" list will always appear on the "Department or "short list" screen to add

Also, if your web browser is having **problems loading the My Instructors screen** so that they will always appear on the "Department or "short list" screen to add

Click here if you would like to go to the [My Instructors screen](#)

For questions or comments please contact [par@ucsf.edu](mailto:par@ucsf.edu)

University of California San Francisco

**UCSF** Office of the Registrar  
Student Academic Affairs

Summary | Study List & Grades | Fees | My Profile

Study List Information

**Dent Postgrad**

Enroll in at least 4 unit(s) by 8-5-2016

We require you to meet your minimum enrollment requirements by your deadline. Study list filing will remain open until **8-5-2016**. You will be able to add and drop courses until that date.

Filter by Curriculum:

- Dentistry
- Dentistry Postgraduate
- Oral & Craniofacial Sci
- All

SU16

**Summer 16**

Dentistry Postgraduate

No courses enrolled

**Study List Add Request**

[Course Catalog](#)

Term SU16

Curriculum:

Subject:

Course Number & Title:

Units:

Grade Type:

Instructor:

Total Units After This Action : 0.0

To add a course in the old Student Portal, a student was required to go through several pages. For complex use cases, such as when student had multiple curriculums or chose an instructor for independent study courses, long text instructions were displayed to the student. In the new Student Portal, the user interface is intuitive and streamlined using a well thought out design and employing modern technologies such as AJAX for a highly responsive user interaction, thereby reducing errors and steps. A simple link to the course catalog allows the student to review the course before adding it. Also, recognizing the similarity of the information, we combined grades and course enrollment into a single page. We constantly challenged ourselves to design an intuitive user interface so no instructions would be needed. Early data suggest that paper study list change petitions to correct study list errors have declined by 15 to 20 percent, reducing workload for students, faculty, and staff.

All design decisions followed responsive web design guidelines and principles to ensure the new portal looked and functioned as well on a mobile device or tablet as on a desktop or laptop. We never incorporated new technologies just for the sake of using them. We selectively chose features in new technologies that benefited the user or reduced user errors. For example, we selected (technology) so that when new students uploaded a photo for their ID badge, the redesigned portal detected when a mobile device was being used and allowed them to take a picture using their phone and then automatically uploaded it. Additionally, we used context-sensitive notifications and overlays to ask students to verify key information, such as their address, periodically when they first log in to the portal each quarter. This UI change resulted in a 38 percent increase in students updating their addresses.

During our development phase, SIS consulted over 90 students through three in-person focus groups to confirm our design decisions were on track with the intuitive designed we had hoped for. During these sessions we received priceless feedback that we incorporated into our later development phase. SIS cleared the final hurdle when an online follow-up focus group provided a virtual thumbs-up the month before we launched.

Our project also overhauled the complex database schema. At nearly two decades in age, the SIS database schema is even older than the old Student Portal we were replacing. The database schema was developed over time by, various employees and contractors who came and went, each with his or her own style, ideas and ways of making changes to the database. Thus after two decades the database schema had become unnecessarily complex, disorganized and unwieldy. A good portion of time was spent reorganizing and normalizing the database and outlining best practices for going forward.

Our SIS team realized from the beginning that to succeed in undertaking a project of this scale (a total of 18 months was eventually spent on this project) with very limited developer resources (1 system analyst and 6 developers, and all had other projects or tasks to work on concurrently), it was absolutely necessary to set up an efficient development process and a continuous integration environment that would allowed the developers to fully concentrate on their individual core tasks. We had to track and follow up on feature requirements, changes and inputs from representatives of the multiple departments and incorporate the feedback from the 90+ students from various focus groups. We chose the Atlassian suite of development tools to provide the full continuous integration environment - Stash (for managing the Git repositories including branching, merging and other code management functionalities), Bamboo (automated deployments and QA), Jira (for change requests, ticketing and tracking code changes) and Jira Agile (for project management and Agile functionalities). Each developer was required to write test cases before his/her code could be checked into our code repository (this is known as code coverage). These test cases allowed for automated testing, ensuring new code would not break existing functionalities; QA automation was essential for us as we do not have a QA team.

## Measuring the Success of the Project

Our focus on innovation and quality led to the project's success and timely delivery. The new Student Portal was launched just as fall study list filing began, the complete opposite of a "soft launch." The new portal withstood the test, providing a refreshed and improved online experience just in time to welcome a new class of students. During this fall quarter launch of the new portal, students enrolled in thousands of courses and over 2,000 payments were collected.

### Project resulted in:

- Intuitive, streamlined, interactive UI redesign, resulting in fewer user errors and greater clarity.
- Responsive web design leading to increase usability and accessibility of the portal on all devices.
- Reorganized and normalized database schema resulting in better data integrity, optimized queries, better query performance (updates, indexing) and improved concurrency resolution.
- Web services framework that can be reused for other projects with little or no modifications; allowing for easy integration with other applications or web services.
- Applying best code maintenance practices and code coverage to facilitate changes or additions of new features and enhancements to the Student Portal.
- Efficient development process and robust continuous integration environment to improve productivity while reducing potential bugs introduced by new code changes.

### Data results since the project launch include:

- Significant increase in mobile activity from 10 percent to 18 percent
- User interface changes have led to positive student behavioral outcomes including:
  - 348 percent increase in students adding an emergency contact address!
  - 15 to 20 percent decrease in the number of paper study list change petitions filed due to the new user interface preventing students from making mistakes during registration
  - 38 percent increase in students updating address information; ensuring mailings are sent to the correct address
  - 75 percent increase in students entering their expected graduation term
  - 42 percent increase in students entering or updating a secondary e-mail address

### Future opportunities:

- Project was built using free, open source technologies and designed modularly; facilitating future opportunities for other UC campuses to reuse our code or collaborate on similar projects.
- Frameworks and web services built for the new Student Portal are already being reused or integrated into several other current projects and applications including UCSF's centralized Event Service Bus and API services, Moodle (learning management system supported by the UCSF Library) and the upcoming Cross Campus Enrollment System led by UCOP.
  - The same framework and web services will be reused in the redesign and overhaul of the Faculty Portal and Staff Portal in the upcoming years.
- A recent major new feature was completed in the new Student Portal quickly due in no small part to the back end changes and development process changes put in place for this project.
- The foundation from this project is being reused for the huge online petition project currently in our pipeline; this project will move our paper based process and manual workflow routing of approvals for more than three dozen petitions to an electronic process, saving our entire UCSF population time and money.

### Reference URL:

- <http://saa-10.ucsf.edu/sautter/> - Link highlighting a few key design decisions for this project and comparison of some pages of the old and new, redesigned Student Portal using screenshots.