OE RESOURCE REQUEST APPLICATION

University of California, Berkeley

I. SPONSORSHIP

A. Initiative

Initiative	IT Foundation		
Initiative Manager	Pamela Brown / Karen Kato		
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B. Sponsorship

Sponsor Name	EDW - Erin Gore		
Sponsor Signature		Date	3-31-2011
Sponsor Names	Student - Harry LeGrande, Student - Cathy Koshland		
Sponsor Signatures		Date	3-31-2011
OE Program Office Signature		Date	

C. Give the title of the resource

Enterprise Data Warehouse (EDW) and Business Intelligence (BI) Projects – Student Registration (Curriculum and Course Data)

II. PROBLEM STATEMENT/CASE FOR CHANGE

A. Identify and describe what needs the proposed solution is seeking to address.

In April 2011, the campus will launch a major release of student data in the EDW that will allow analysts to provide information on the student experience – from admissions to graduation. This release will include applicant, registration, degree and graduation/retention data, but a critical component that will be missing is information about the student's curricular experience, from the classes they taught to who was their instructor to the grades they received.

Without this information, analysts across the campus are piecing together data elements and creating shadow systems that allow them to better understand student demand, enrollment needs, curricular changes, and faculty workload. This information is even more critical as the campus invests in common good curriculum – reading & composition, foreign languages, and math & science common good courses – to better support an undergraduate's experience.

This proposal is to incrementally build upon the foundation of the existing data in the EDW to integrate data from new source systems. Doing so will result in many benefits, including but not limited to:

- Improve data security, reliability and accuracy.
- Reduce data duplication and hosting costs of maintaining data in multiple systems.
- Simplify the data access request process by reducing duplicative data stores.
- Improve understanding of data by developing common definitions.

Provide easy-to-use BI tools to produce reports and dashboards to:

- Facilitate quick development of ad-hoc reports to meet the growing campus analysis and visualization needs.
- Save analyst time by minimizing the need to integrate data locally, developing complex metrics once and reusing them and making ad hoc report creation simple.
- Improve quality of campus analysis by exposing data descriptions (metadata), using consistent calculations and certified reports.
- Allow users to start at the high level, identify exceptions/issues and drill down to the critical detail for improved response.

B. Describe the solution that is being proposed to meet the identified need(s).

The EDW and Business Intelligence team will continue to build upon the foundational EDW core data elements, existing data subjects and Business Intelligence tools that have been implemented to further benefit campus reporting and analysis. Each of the projects below is also referenced in other OE initiatives. We will coordinate with the OE program office to ensure the proposals are in synch and all inclusive.

Under direction from the Institutional Data Council, the OE Faculty Head and the Student Services OE Initiative, we are recommending the following project:

A major area for improvement is around course registration and planning. The EDW proposal in support of this need begins with adding and integrating the following major groups of data to the Enterprise Data Warehouse (EDW) :

- Course / Class / Syllabus
- Class Planning – Schedule, Degree and Breadth Requirements
- Class enrollment, registration and grades awarded
- Faculty class instructing (CSIR) / Faculty Bio
- Official UCB Class Evaluation & Student to Student Class Evaluation

New OBIEE Cal Answers dashboards and reports will be created which will help faculty and staff:

- Determine how well the campus is supporting the common good curriculum.
- Evaluate which courses and classes should be expanded or reduced and assess future demand.
- Integrate course and student data together to better highlight the timeliness of course taking patterns, characteristics of students who enroll and their performance in courses by instructor.
- Faculty Evaluations
- Support for statistical package(s) will be evaluated and implemented if deemed beneficial to campus.

The data architecture deliverables for this project will also support providing course offerings, degree requirements and official UCB course evaluation data to students through web services called from the Student Portal. This will help students improve their academic planning. Future projects may expose additional data, reports and dashboards to students through the Student Portal.

C. Describe the alternate approaches you evaluated in the process of developing this proposal and why those alternatives were not selected.

- Continue the status quo. Faculty and students have made it very clear that the status quo is not meeting their needs. For this reason, this solution was rejected.
- Shadow Systems - Allow individual departments/groups to develop their own solutions. While this has been the norm for many years, UC Berkeley can no longer afford to spend money on redundant systems and can no longer afford to make decisions based on incomplete information. For this reason, this solution was rejected.
- Statistical Packages: To date, software licenses and desktop support for statistical packages (SAS, SPSS) have been provided by individuals or departments on campus work stations. To date, campus workstations have not been allowed access to the EDW for HR/Finance or Fundraising data for security reasons. Campus student analysts have been using statistical tools and with the addition of student data in the EDW, the need for evaluation has arisen. We do not yet know enough about the following

options:

- In the near term, utilize Cal Answers as the interface to pull data from the EDW to local workstations where campus analysts can perform their work by integrating data with other data sources that are not in the EDW.
- Provide a central statistical reporting solution to securely provide the EDW and other campus data to campus analysts. The statistical reporting software is not a feature set of Cal Answers. This is the recommended solution.

III. IMPACT AND STRATEGIC ALIGNMENT

A. Describe how the proposed solution aligns with the OE goals:

- Reduce administrative costs and enable the campus to direct more resources to teaching and research
- Advance an effective and efficient operating environment
- Instill a culture of continuous improvement that leads to high quality performance and outcomes

Continue to build reusable essential core components that will make adding new subject areas to the EDW more efficient. Provide easily-consumable data, reporting and dashboards to enable user efficiency. The efficiency gains will result in a better use of staff time that focuses on analysis, instead of data collection and clean-up and will provide more comprehensive analysis of data for campus decision makers. This will be accomplished through:

- Consistent and reliable certified data means less time validating data sources. The data integration and report work can be performed once and continually utilized by all.
- Improved accuracy of published data through certification of data, metrics and reports.
- Improved analysis and time savings by developing reports and dashboards that identify data exceptions and support drilling down into data for further analysis.
- Faster development of ad hoc reports by analysts through easy-to use tools and pre-built reports and metrics. This enables campus decision-makers faster access to ever-changing business questions.
- Automated workflow to seek access to EDW data, reports and dashboards. Consolidating data for reporting makes data access management easier to administer.

Shadow systems for data collection can be reduced and eventually eliminated as campus users see missing data added to the EDW and trust its accuracy. This is a hard savings of infrastructure and time in addition to improving data security on campus by reducing access points and focusing resources. The IDMG found numerous shadow systems on campus that require some infrastructure, but lots of time in cleansing and integrating data sets. By performing this work and exposing it in the EDW, time is saved all over campus.

Instill a culture of continuous improvement that leads to high quality performance and outcomes. Easier and more powerful access to integrated campus data will encourage greater use of data and more analytical thinking, driving a culture change rewarding factual analysis and devaluing anecdotal assessment.

B. Identify any other anticipated benefits in implementing the proposed solution.

The Student Services OE Initiative is depending upon the EDW/BI solution in support of course registration.

C. Identify the risks of not implementing the solution.

- Reduced decision-making capability.
- Inability to track goals through performance metrics.
- Frustrated students that lack the tools they need to make good class decisions.
- If we do not implement a secure solution for statistical packages, the campus analysts will need to extract data from the EDW through Cal Answers and integrate with non-EDW data. This strongly increases the likelihood and need for shadow systems to host duplicative data.

D. Describe the constituency that is intended to benefit from the proposed solution (e.g. students, faculty, staff, 1-many units)

This is a campus-wide solution that will benefit campus staff, faculty, researchers, and executive-level administrators. It will increase

their ability to easily access consistent established answers derived from integrated campus-wide data. It will reduce the time spent by analysts integrating, validating, and cleaning-up data, and free them to spend more time on value-added work. Everyone making decisions on campus will be working with more accurate and consistent data, reducing doubt created by inaccurate and/or conflicting data, and reducing time wasted by such. Examples are UC Berkeley's cabinet (viewing financial trends), Advancement (more revenue for fewer dollars spent), students (student, department and UC trends) faculty (student and teaching trends), staff (integrated data from finance, student, HR, advancement etc.)

E. Describe the extent to which this proposed solution is a collaborative effort either within campus or with external partners.

This project will be a combined effort of input and resources from: The Vice Provost Teaching, Learning, Academic Planning and Facilities, Academic Units, Office of Planning and Analysis (OPA), Equity and Inclusion, Graduate Division, Admissions & Enrollment, Registrar's Office, OE Student Services Initiative and Information Services and Technology (IST).

Campus analysts and management representing the breadth of campus groups using the data under development will be included in data requirements, report and dashboard design and QA testing to ensure the deliverables are meeting the requirements of the campus.

F. If applicable, describe how the proposed solution may enable additional projects to be considered.

The EDW will become essential as a source of reliable data on which to assess current and future projects. It will be able to provide the reliable data needed for meaningful cost-benefit and performance analysis, and establishment of baselines. As other data-driven initiatives emerge they will benefit by the existence of the EDW foundational subject areas. As more and more data is added, people will increasingly rely on it to answer cross functional area questions rather than copying data and looking for the needle in a haystack. Over the long-haul, it could well prove to be the campuses biggest cost savings project.

G. What is the impact of the proposed solution on the existing systems and processes? Does it eliminate the need for existing systems and processes?

- This solution will add value to the existing/new systems that are the original capturers of this information. The redundant and piece meal systems currently providing this functionality may be eliminated.
- Over time, shadow systems can be reduced and eventually eliminated. Through exposure of the student data, we expect academic departments to begin implementing automation for updating websites and replace existing manual data entry.

H. What is the impact on the proposed solution on the workload?

Profile/Impact in hours	Current Workload	1-time workload requirement	Ongoing workload requirement
Student	None	None	None
Staff	Run reports as needed	Training, requirements and testing if on project team. Online training is estimated at 2 hours for general users and an additional 4 hours of classroom time for advanced ad hoc users.	Estimate 5% efficiency gains for moderate users. Estimate 5-10% efficiency gains for frequent users of student, procurement, HR and/or financial data.
Faculty	Run reports as needed	Training is estimated at 2 hours for general users	No change - run reports as needed

IV. WORK PLAN AND PROPOSED SOLUTION DESIGN

A. Provide a statement of:
- Deliverables — results the solution must deliver to achieve the stated objectives.
- Constraints — factors that may limit the options for providing the solution (*e.g., an inflexible deadline*).

General Deliverables for All EDW Projects

- **Project Phases** - Projects will be broken up into small deliverables over the length of the project to better enable course correction of deliverables.
- **Data** - New data will be integrated with other subject areas in the enterprise solution allowing cross functional analysis and a consistent cross-campus view. Detail and summaries will be made available to support campus needs. See section 4C for details.
- **Reports & Dashboards** – New development for reports and dashboards will be performed in OBIEE Cal Answers. This solution will deliver certified and re-usable metrics that will measure goal achievement. It provides faster ad-hoc reporting development for campus analysts and drill-down capabilities for all users.
- **Security** - Utilize the recently deployed and flexible EDW security model to meet the expanding data security needs of the campus. Provides information that people need while protecting sensitive data.
- **Metadata** – Capture business and technical metadata and expose through reports and in mouse rollover in OBIEE Cal Answers.
- **EDW Access Request** – For all new data, work with the Identity Management team to utilize the EDW Access Request system, a web-based workflow that assigns security roles based on data proprietor approvals.
- **Tool Training** – Create online training for the OBIEE tool. Create online and classroom training for ad hoc report development in OBIEE.
- **Subject Area Training** – Create online and classroom training for new data, reports and dashboards. Provide tier 1 training to the Service Desk.
- **EDW Support** – Develop a Service Level Agreement (SLA) which defines roles, responsibilities, and processes related to ongoing support of the EDW and BI services.

General Constraints for All EDW Projects

- **Funding** – Project work can start when one-time work is funded and a source of ongoing funding is secured.
- **Project Resources** – EDW/BI projects require a great deal of time in concentrated blocks from data proprietors, functional subject matter experts and technical staff. External project teams will be utilized as much as possible to staff EDW projects and backfill or provide functional and technical expertise, but dedicated oversight is required by both functional and technical leads.

Student Registration Deliverables:

- **Embedded Analytics** - Course Enrollment data will be provisioned to the Student Portal via web services.
- **Statistical Packages**: Survey IR Analyst group to determine existing tools used. Develop and share project proposal including expense forecasts for one time and ongoing support.

B. Provide a work plan for the proposed solution with high-level steps to complete the solution, including timeline. (Try to limit your plan to no more than seven steps.)

The following process, used to integrate student data into the EDW, would be followed to integrate curriculum and course data projects.

Milestone	Responsibility	Timeline
Project funding approval		
Phase 1		
Identify specific data and reports that are needed	Functional Teams & IST	Month 1
Design the data model to hold all required elements	IST	Month 2
Develop data copying requirements and scripts to copy data.	IST	Month 3
Define data structures to OBIEE Define and develop metrics and reports Define security Capture available metadata	IST Functional teams and IST Functional teams and IST Functional teams and IST	Month 5
QA testing Train users and service desk support	Functional teams Functional teams and IST	Month 6
Implement into production	Functional teams and IST	Month 7
Phase 2		

Identify specific data and reports that are needed	Functional Teams & IST	Month 8
Design the data model to hold all required elements	IST	Month 9
Develop data copying requirements and scripts to copy data.	IST	Month 10
Define data structures to OBIEE Define and develop metrics and reports Define security Capture available metadata	IST Functional teams and IST Functional teams and IST Functional teams and IST	Month 12
QA testing Train users and service desk support	Functional teams Functional teams and IST	Month 13
Implement into production	Functional teams and IST	Month 14
Phase 3		
Identify specific data and reports that are needed	Functional Teams & IST	Month 15
Design the data model to hold all required elements	IST	Month 16
Develop data copying requirements and scripts to copy data.	IST	Month 17
Define data structures to OBIEE Define and develop metrics and reports Define security Capture available metadata	IST Functional teams and IST Functional teams and IST Functional teams and IST	Month 19
QA testing Train users and service desk support	Functional teams Functional teams and IST	Month 20
Implement into production	Functional teams and IST	Month 21

C. What are the data requirements for the proposed solution?

Data Requirements for Student Registration

- Course
- Class
- Grade Distribution
- Class enrollment / registration
- Class Enrollment for Future Semesters
- Faculty class instructing (CSIR)
- Faculty BIO
- Online Class Evaluation
- Student to Student Reported Class Evaluation
- Degree Requirements
- College Breadth Requirements
- Class Syllabus Information
- Learning Objectives

D. What are the technical requirements for the proposed solution?

This proposal will likely result in requiring:

- Additional database storage
- DBA participation to create tables, views, and performance tuning activities.
- Enough OBIEE and database CPU/Memory/IO to support additional staff users during peak loads and additional student users through web services.
- Statistical Package – Develop a proposal that hosts the chosen statistical packages on a VM in the campus Data Center, with terminal server or other software support that allows multiple users. The operating system would be administered by the Windows Server team. Network encryption and firewalls would be setup between this statistical package application server and the databases that it requires access to. A .25 FTE would be required to administer the software for the statistical package of choice.

E. What are the greatest risks for the proposed solution and the plan to reduce or eliminate the risks.

	RISK	MITIGATION PLAN
1.	One Time and Ongoing Funding	Seek OE one-time funds. Seek incremental ongoing costs from the revised look at the financial model which may include this either from common good funding, or from a more robust allocation to decision making and data infrudtructure. If for some reason the financial model is not revisited and no additional funding is available, the funds allocated for enhancements will be utilized for baseline support until common good funding is secured.
2.	Functional and technical resources are not available and/or skilled.	Hire outside consulting to fill in gaps in skill set and resources.
3.	Campus resists using a new BI tool (OBIEE Cal Answers)	Curriculum design including the development of online and facilitation of classroom and drop-in training is essential. Developing support from change leaders who will utilize the certified reports is equally essential.
4.	Expectation Management / Project Management	Existing EDW management can concurrently oversee 2-3 large projects. Given the perceived campus demand, the EDW projects include extra management support (project management, technical leadership).

F. How does the proposed work plan allow for evaluation and course correction to ensure the outcomes meet the campus needs?

Each project will have a Project Manager, Project Sponsor and executive EDW Sponsor who will oversee the work effort. The project plans will be developed with milestones to ensure the data deliveries and basic report deliveries are on track.

v. CHANGE MANAGEMENT

A. What is the change management plan to successfully implement the outcomes of the proposed solution?

- Strong communication plan through list serves, updated websites, consistent updates on progress of projects and marketing quotes from thought leaders.
- Development of a solid training program: Forums to prepare the campus. Online, Classroom training for the tool AND the data and drop-in workshops. Advanced training for ad-hoc report development.

B. What incentives and/or disincentives are proposed to influence behavioral changes necessary for the successful outcome of the proposed solution?

- Free use of the OBIEE reporting tool.
- Delivers actionable metrics.
- Statistical Package – Data access will be mandated through the central service for improved security, but should provide equal or superior service to existing desktop solutions.

C. Who has been identified as the change leaders and implementers to carry out the changes necessary for the successful outcome of the proposed solution?

- Senior management in Student Affairs, Provost, Finance & Budget, OPA, Admissions, Office of the Registrar provide support for reviewing certified reports and data from EDW.

VI. FUNDING MODEL AND BUDGET

A. Could the proposed solution move forward with partial funding? If yes, describe the revised scope, including the associated savings impact.

This proposal has been developed with fully-costed estimates.

Partial funding of the following individual projects is possible by limiting the scope of data sources incorporated into the EDW. Based on input from functional owners and IST, the IDC would prioritize the data to be incorporated into the EDW.

B. What is the plan for sustainable funding to support ongoing operations of the proposed solution?

The EDW/BI function is seeking common good funding to cover the incremental ongoing costs for approved projects.

C. Please download and fill out the OE Resource Request Budget Template located at [location] and follow the instructions on the first worksheet in the workbook to complete the budget ant line descriptions. Include both completed sheets with the Resource Request.

VI. ASSESSMENT PLAN

Please use the table below to detail your metrics.

METRIC CATEGORY	SPECIFIC MEASURE	MEASURE BASIS	DATA COLLECTION METHOD	DATA COLLECTION FREQUENCY	FUNCTIONAL OWNER OF DATA COLLECTION	LARGER GOAL TO WHICH METRIC RELATES
FINANCIAL PERFORMANCE						
1	Staff and Student Time Savings through use of Student Data	Project	Survey	Annual	OSRCS	
OPERATIONAL PERFORMANCE						
1	# Reports Run for Student Data		OBIEE Stats	Monthly	IST EDW	
2	# Users for Student Data		Database Stats	Monthly	IST EDW	
CUSTOMER SATISFACTION						
1	Data Accuracy, Reliability	Project	Survey	Annual	OSRCS	
2	Student Report Benefit	Project	Survey	Annual	OSRCS	