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# Implementation of Coeus Grant Management Software at the Desert Research Institute

Patricia Kingsmill  
*Regis University*

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**REGIS UNIVERSITY**  
**SCHOOL FOR PROFESSIONAL STUDIES**

MASTER OF SCIENCE  
IN  
COMPUTER INFORMATION TECHNOLOGY

Implementation of Coeus Grant Management  
Software at The Desert Research Institute

**PROFESSIONAL PROJECT**

Patricia Kingsmill  
December 2005

**Regis University  
School for Professional Studies  
MSCIT Program**

**ADVISOR/MSC 696 AND 696B FACULTY APPROVAL FORM**

Student's Name: Patricia Kingsmill

Professional Project Title: Implementation of Coeus Grant Management Software at The  
Desert Research Institute

Advisor's Declaration: I have advised this student through the Professional Project Process and approve of the final document as acceptable to be submitted as fulfillment of partial completion of requirements for the MSC 696 or MSC 696B course. The student has received project approval from the Advisory Board or the 696A faculty and has followed due process in the completion of the project and subsequent documentation.

**ADVISOR**

Michael Nims  
Name Signature Date

**MSC 696 or MSC 696B Faculty Approval**

\_\_\_\_\_  
Name Signature Date

**Regis University  
School for Professional Studies  
MSCIT Program**

**CERTIFICATION OF AUTHORSHIP OF PROFESSIONAL PROJECT WORK**

Submitted to:

Student's Name: Patricia Kingsmill

Date of Submission:

Title of Submission: Implementation of Coeus Grant Management Software at The Desert Research Institute

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## **Abstract**

The Internet and electronic commerce have opened up new opportunities for efficiency in research administration. Public Law 106-107 or the Federal Financial Assistance Improvement Act signed on November 20, 1999 and the President's Management Agenda have formally charged federal grant-making agencies with creating a single electronic system to find and apply for federal grant opportunities. In response to this directive, recipient organizations will need the ability to electronically prepare and submit proposal information and receive funding data from the sponsoring agency. This project reviews the implementation of a software package, MIT's Coeus Grant Management System, as a solution to the need create a proposal on line, obtain internal approval and subsequently submit it to a sponsoring agency.

The goal of this project is to provide a software solution for creating a proposal, performing institutional on-line review and approval of the scientific narrative and budget of proposals and generating a dataset to upload to Grants.gov, the central web site established for all government proposal submissions. MIT has developed their Coeus Grant Management System to assist their departments, laboratories and research administration offices in proposal development and pre- and post-award management. Coeus is a client-server application developed in Powerbuilder and Oracle. It is available for both Windows and Macintosh platforms and is further being developed for a JAVA component.

The Internet and electronic commerce have made information and the sharing of ideas more accessible and streamlined. A successful implementation of a program to conduct

research administration business with Grants.gov will increase efficiency, minimize administrative burden and enhance the search for funding opportunities.

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# CHAPTER 1: INTRODUCTION

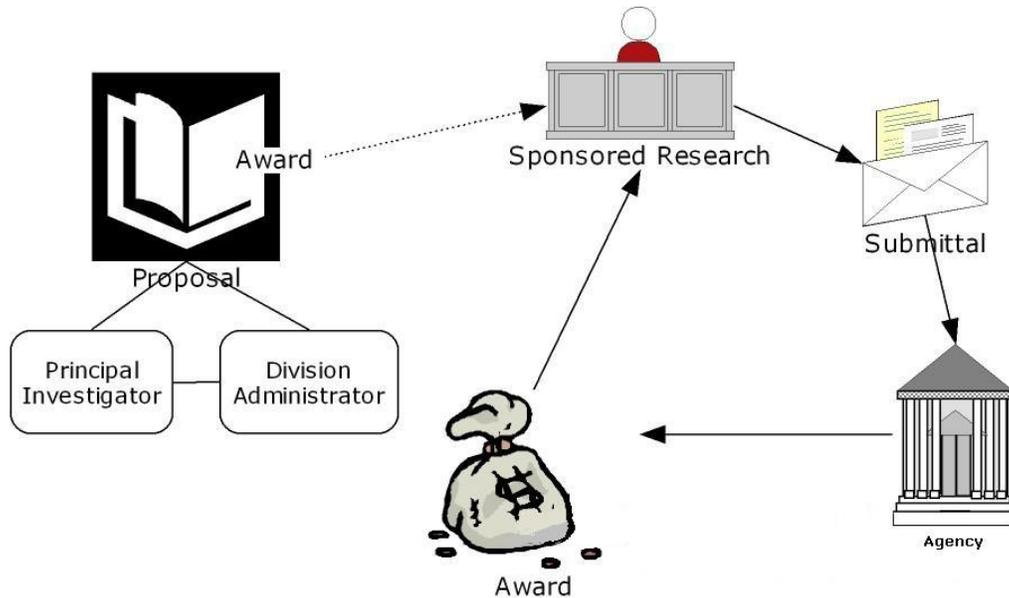
## **Problem Statement**

The Internet and electronic commerce have opened up new opportunities for efficiency in research administration. The federal government and the research community can interact in a more consistent manner across all agencies and streamline the grant process. The government has done their part through new programs and a common application, now recipients of federal funding have the opportunity to increase the efficiency of their internal processes and more effectively use their resources for research administration. This federal initiative necessitates universities constructing or buying their own internal proposal creation, routing, approval, archiving, and submitting system. The system will then route applications to the common federal portal, which, in turn, will forward them to the proper funding agency system. Thus a single data entry for both the research grants office and the federal agency is created.

## **Review of Existing Situation**

The Desert Research Institute (“DRI”) is a not for profit environmental research institute that receives over \$20 million in federal funds each year, which accounts for a majority of the research funds they receive. The organization is grouped by area of study with each department consisting of research scientists and administrative support staff including a Division Director. Proposals are developed through a collaborative process at the department level – the department administrator assists with creating budgets while

the scientist generates the statement of work or scientific narrative. Proposals are centrally approved by the Sponsored Research Office who also accepts and negotiates the contractual terms of funding received by a sponsoring agency.



**Figure 1**

The process of creating a proposal, submitting it to an agency and subsequently receiving a funding document is a paper exercise as illustrated in Figure 1. Proposals are created on a desktop using word processing programs such as Microsoft Word for the scientific narrative and addendum, which may include figures or Curriculum Vitae of the participating staff. Spreadsheet programs such as Microsoft Excel are used to develop the budget components, which is a manual calculation of salary costs for the period of performance, associated benefits as well as any travel costs, supplies or equipment needed for the project. Additionally, indirect costs or overhead must be applied to the total expenses in accordance with institutional policy. Depending on the

size of the proposal, the writing process can undergo multiple edits and iterations that are passed between the lead scientist and administrative staff through hard copy or email attachment. Likewise the budget may be adjusted to fit the dollar amount available to award from the federal agency.

After internal review and approval, the final proposal document is then printed and sent to an agency for consideration. The division administration staff retains the hard copy of the document while the electronic version of the proposal may reside on the desktop of the administrator, lead scientist, or a combination of both locations. If the proposal should need to be retrieved later for reference or as a template for future proposals, finding the correct version of the document can prove to be a challenge.

If accepted, a grant document is created by the funding agency and mailed to the research organization for signature. During the life of the project, more documents are created by the institute for submitting progress reports and documents required for closing the project while the sponsoring agency issues contractual modifications the award to add funds or extend the period of performance. After extensive review of this process, it has been recognized by the federal government that the life cycle of a research project can become more efficient and reliable through electronic commerce.

Electronic Commerce is defined as the conducting of business communication and transactions over networks and through computers (dictionary). This can be done through information technology such as email, World Wide Web and electronic data interchange.

The concept of utilizing electronic commerce to perform government functions originated in a 1993 National Performance Review report entitled “Creating a Government That Works Better and Costs Less.” The report outlined four areas for improving the federal grants process:

- Eliminate red tape
- Improve response time in review and approval process
- Make consistent the required grant forms and criteria
- Reduce redundancies in reporting requirements (NPR)

Congress adopted the Government Performance and Results Act to require agencies to develop strategic plans and performance measures for dealing with the report’s recommendations. Working groups were formed, such as the Federal Research Managers Group, the Government Information Technology Services Working Group and the Chief Information Officers Council to pool resources and information across agencies. Each of these groups reported that the federal grant process could benefit from an electronic solution. Ultimately, the Department of Health and Human Services would operate as the lead agency for submitting an action plan to the Office of Management and Budget.

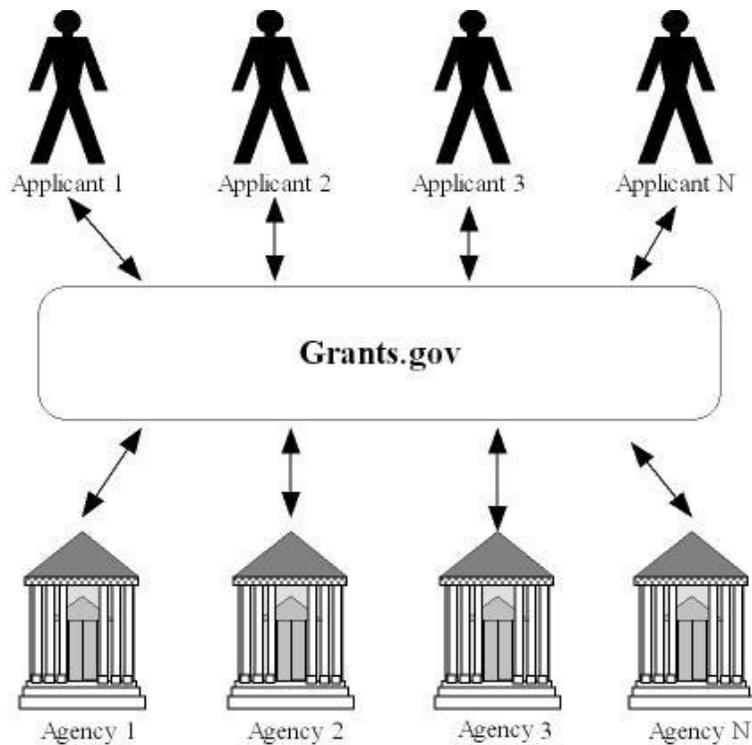
Meanwhile, as early as 1986 the Federal Demonstration Partnership (“FDP”) has been looking for ways to simplify the federal granting process. The FDP is a cooperative initiative among 10 federal agencies and 92 institutional recipients of federal funds. The partnership began as an experiment to test and evaluate a grant mechanism utilizing a

standardized and simplified set of terms and conditions across all participating agencies. The FDP has evolved into an organization dedicated to finding efficient and effective ways to support research. To date the FDP has streamlined the terms and conditions for research grants, automated standard contract actions and identified models for electronic award notifications and datasets for submissions of institutional and individual registration information. Future efforts will include increasing the number of participating federal agencies and identifying opportunities to make administrative requirements simpler for the recipient organizations (FDP).

Public Law 106-107 or the Federal Financial Assistance Improvement Act signed on November 20, 1999, and the President's Management Agenda have formally charged federal grant-making agencies with creating a single electronic system to find and apply for federal grant opportunities. Agencies have already responded to the mandate and developed electronic processes. In 1986 The National Science Foundation opened their FASTLANE system for electronic processing of grants including reporting, notification and awarding capabilities (NSF). The National Institutes of Health NIH Commons was first utilized in November 1996 to support the entire grant life cycle from proposal submission through closeout (NIH). The Office of Naval Research AwardWeb and AdminWeb provide award downloading and tracking capabilities (ONR). Formally, in 1997 the Interagency Electronic Grants Committee was established by federal research agencies that conceived of a Federal Commons to create a single point of entry for electronic grant administration. Several pilots were produced and then handed off to E-

Grants and Grants.gov as the government portal intended to act as a universal translator to any agency system. As Figure 2 illustrates, Grants.gov provides:

- A single source for finding grant opportunities.
- A standardized manner of locating and learning more about funding opportunities.
- A single, secure and reliable source for applying for Federal grants online.
- A simplified grant application process with reduction of paperwork.
- A unified interface for all agencies to announce their grant opportunities, and for all grant applicants to find and apply for those opportunities.



**Figure 2**

The search function is currently available and all granting agencies were required to post their opportunities effective November 7, 2003. As of October 1, 2004, all federal applicants are required to apply for funding through Grants.gov (Grants.gov).

### **Goals of the Project**

In response to this directive and for process improvement considerations, DRI will need the ability to electronically submit proposal information and receive funding data from the sponsoring agency. To ignore this opportunity to integrate with an on-line system would mean that DRI would continue to create proposals and route them internally by hard copy or email, then re-key the proposal data in the format accepted by Grants.gov. In order to completely eliminate the paper process, the issue at hand is how to perform institutional on-line review and approval of the scientific narrative and budget of proposals and generate a dataset to upload to the Grants.gov website. DRI should also be able to electronically receive award information from the sponsoring agency and transmit the details to internal financial or grant management systems, thus reducing manual data entry.

The goal of this project is to implement a software solution for creating a proposal, performing institutional on-line review and approval of the scientific narrative and budget of proposals and generating a dataset to upload to Grants.gov, the central web site established for all government proposal submissions. MIT has developed the Coeus Grant Management System to assist their departments, laboratories and research

administration offices in proposal development and pre- and post-award management. Coeus is a client-server application developed in Sybase Powerbuilder and Oracle. It is available for both Windows and Macintosh platforms and is further being developed for a JAVA component.

### **Barriers and/or issues**

A change to an established business process is difficult to facilitate and such a significant change means that employees will not only have to learn a new program, but also possibly alter their business practices to accommodate it. It is imperative to include as many potential users as possible in the process and communicate early and in many formats the how and the why of the implementation. Executive sponsorship is crucial in the success – a key decision maker should take responsibility for the ultimate decision to select and implement the software, thus becoming a central sounding board for issues, concerns, complaints and complements about the process. Other critical success factors:

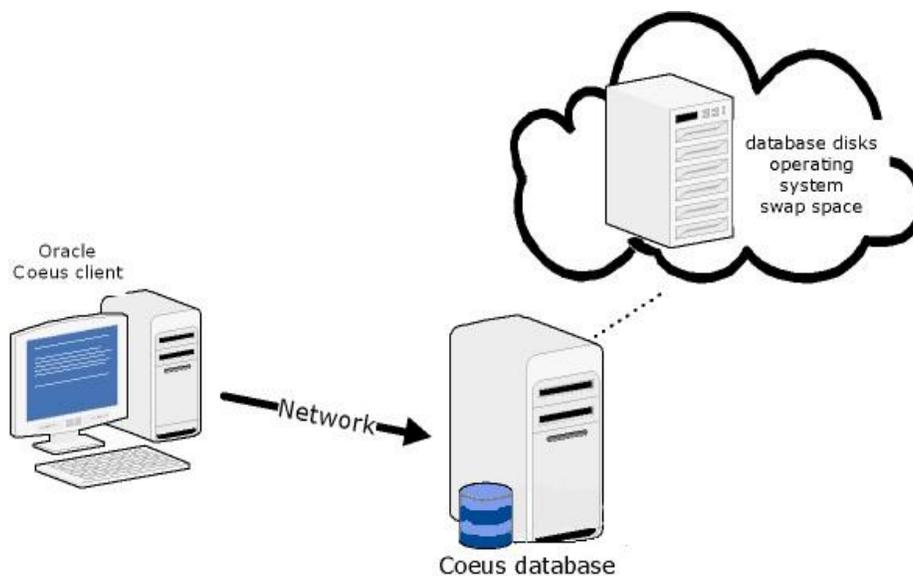
- Defining why a business practice is in place rather than how. This analysis will determine if the process is needed, has value and what impact it has on the organization. (Oregon DMV)
- Document every move/document the system
- Involve internal audit
- Obtain sign-offs from users on all major moves

- Announce several months prior to release using many communication methods (e-mail, web site, meetings) to emphasize that a MAJOR change is coming. Each communication should include information about how the change will affect the organization and the benefits and report on the progress of the implementation, even if that progress is minimal. (Oregon DMV)
- Decide who gets trained first
- Define resources for testing (Atella)

The choice of using Coeus as a software solution brings up several issues. The methodology used by Coeus can be a dramatic change in business practice, placing a greater burden on the divisions to maintain proposal data rather than what has been traditionally the responsibility of the Sponsored Research Office at DRI. Extensive training is needed to make users proficient in entering and reporting data. From a technical standpoint, there is a steep learning curve for technical expertise needed for implementation, unless there are in-house resources available with Powerbuilder and/or Coeus experience. The Coeus user community has reported difficulty in loading legacy data into Coeus for historical reporting. MIT estimated that the software contains 271 tables, 885 stored procedures and 57,872 lines of executable PL/SQL code written by multiple programmers with differing styles. Coeus is a very robust piece of software that can have many more tools than are required by an institution so that the scope can be overwhelming to the user. MIT has moved on to build other modules and has not done any work to standardize the coding methodology of the older functions. Overall, implementation will drive a business practice re-engineering that the institute might not be ready to undertake.

## Scope of Project

The scope of this project includes loading Coeus on a secure server, customizing the user interface to DRI specifications, loading legacy proposal and award data and training the users. Coeus is a client server product using an Oracle database with a user interface created in Sybase Powerbuilder. A typical set up includes installing the Oracle and Coeus client on the user's desktop. An in-house server will house the Coeus database spread over six logical disks, with an additional disk for the operating system and another for swap space (see Figure 3).



**Figure 3**

Because the Coeus license includes the source code the software can be customized to meet the needs of the users, although the goal of the project is to have essentially a plug-and-play implementation with minimal modification to the source code or user interface. Individual modules can be selected for use and components specific to an organization

can be readily added. Change requests are handled by a three person subcommittee of the implementation team. This subcommittee includes the Project Manager, a member of the development team and a representative of the user group. Each change request is investigated for feasibility and time needed to complete the request and then evaluated for its return on investment. Training is instructor lead with hands-on exercises to guide the users through the features of Coeus as they relate to their job function. A manual was created as permanent reference material as well as “Quick Reference” materials to guide a user through the frequently used functions. The trainer remained available as a resource for Help Desk questions as well as one-on-one instruction at a user’s desk.

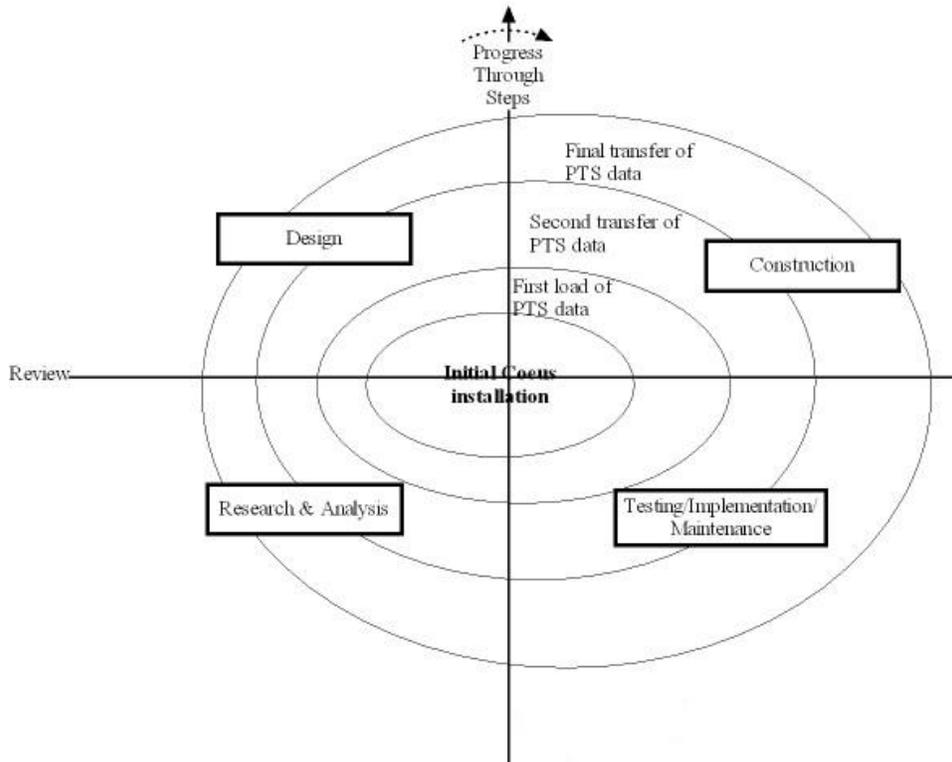
## CHAPTER 2: PROJECT METHODOLOGY

The goal of the project was to replace the current proposal and awards management software package with MIT's Coeus, providing faculty with a more stable, robust, comprehensive, and efficient tool to facilitate the proposal development process which will ultimately increase total research funding. The optimal solution is an institute-wide grants management system that replaces the paper-based routing and approvals process with its multiple points of data entry, costs for making extra copies and federal express shipping. Once in place, such a campus system should provide savings and give expediency for the grants environment.

### **Software Development Life-Cycle Model Followed**

The Project Plan as determined by the Project Manager included six phases: Research & Analysis Phase, Design Phase, Construction Phase, Testing Phase, Implementation Phase and Maintenance Phase based on a spiral model of the software development life cycle.

The spiral model is an iterative rather than sequential method of development. The system development life cycle is diagrammed as a spiral, starting at a center and working around until the project is complete. The planning phase is high level and includes a feasibility study, a listing of user requirements, and an implementation (Satzinger, 681-



**Figure 4**

685). Work for this project began with the first installation of Coeus in a test mode with each subsequent installation adding more customized features and legacy data to the database. The spiral model was a good fit for this implementation in that as data was transferred from the existing PTS database to Coeus, it required an analysis of the data elements, construction of a script to perform the transfer, testing and maintenance for data integrity. A waterfall methodology would mean that all of the PTS data would have to be ready for transfer at the same time before it could be tested. The spiral methodology enabled the implementation team to work through the challenges in the transfer process on a small data set. Also, the source of any unexpected results of the testing were easily identified and corrected.

## **Research & Analysis Phase**

The Research & Analysis Phase of the project started in 1997 as new grant management solutions came to market and were evaluated by DRI's Administrative Computing staff. Before the selection of Coeus as a software solution, research was conducted to evaluate several other offerings on the market. Criteria used to evaluate each software package included evaluating the flexibility of the solution, the business processes performed, the technical environment required to run the software, cost and available maintenance and support of the software. Because Electronic Research Administration is a fluid process and never considered finished, the software vendor must be able to support an environment in transition. The software evaluated included:

- Grant Application and Management System from ERA Software Systems – a system created by a consortium of colleges and universities. The license for the software includes membership in the consortium with a fee of \$20,000. This solution was rejected due to DRI budget limitations to maintain membership in the consortium (GAMS).
- InfoEd from InfoEd International, Inc. – a web-based solution for proposal development. This solution was rejected due to the lack of post-award functionality (InfoEd).
- Oracle - Oracle's solution was based on MIT's Coeus Proposal module. The software was not in production at the time of review.

- grantsERA from Research and Management Systems – this proposal development package was specific to the needs of organizations applying for grants from the National Institutes of Health and therefore not applicable to the environmental research activities of DRI (RAMS).

Coeus was initially reviewed in 1999. At that time the post-award module was fully functional; however, the proposal development module was in its infancy and had only been beta-tested. Due to the lack of a complete cradle-to-grave ERA package, an interim Proposal Tracking System (“PTS”) was procured from the Arkansas Children’s Hospital Research Institute in 2001. PTS was designed to record proposal submissions and award information including reporting requirements, researcher profiles and project timeframes. The database is comprised of a Microsoft Access database installed on the user’s machine with an Access or SQL Server backend database loaded on an in-house server. Security is handled through an individual logon, which grants the user specified permissions to view, edit, or write to the database.

PTS was a viable short-term solution that became an integral part of the proposal and award process at DRI. However, its last update occurred in January 2000 and even if upgrades were available, DRI had made extensive modifications to the software that would have to be recoded in a new release. Also, as DRI personnel upgraded desktops and versions of Access that ran on those desktops, PTS would no longer function or functioned in a very limited capacity and would not be practical for an ever-changing environment.

When the choice of a long-term research administration solution was narrowed down to Coeus, members of the implementation team attended a demonstration of the software by MIT at the University of California, Riverside (Appendix A). The final evaluation and selection were based on several factors that caused Coeus to stand apart from other solutions:

- Cost: \$500 for the license, which includes the source code and upgrades. Many electronic research administration packages that were researched did not include the source code so additional costs would be incurred if DRI required customizations.
- Software developed and maintained by a university with over \$1,000,000,000 in grants and contracts annually. Thus, the software is developed by an end user who will create enhancements and new features from their own experience rather than a vendor who would develop software based on their interpretation of user needs.
- Over 100 universities have licensed Coeus; consequently, it has a proven track record of performance.
- Active user community that drives and participates in the software development.
- MIT's Office of Sponsored Programs is a member of the Federal Demonstration Partnership; therefore, they are able to influence the direction taken by federal sponsors in the area of research administration.

## **Research Current Situation and Problem/Opportunity**

The activities during this step were to evaluate the continued viability of the existing grant management software against building something in-house or purchasing a third party solution. Given the rate of degradation of the current electronic research administration system, the need for a new system had reached a critical point.

Development of a replacement ERA package would require time, knowledge and resources not available in-house. Researching third party solutions was the only viable solution. At the same time DRI's Executive Staff increased their need for data and tracking of award activity. The Vice President for Research began to publish a quarterly report of active research projects. The President of DRI required proposal and award data for an annual science report, the National Science Foundation's Science Resources Statistics, as well as periodic reports to the University and Community College System of Nevada Board of Regents, state officials and potential sponsors. Additionally, DRI was updating its web site to include more data about the research staff and areas of study. Information contained in these reports was manually culled from a variety of sources that consisted of unreliable and inconsistent data. A new system would not only enhance the capabilities of research administration but also ensure data integrity and ease of reporting for DRI executive staff needs.

## **Determine Costs**

As part of the evaluation of the software alternatives, cost was a large factor that was considered because DRI lacks a large pool of discretionary funds. The costs included the price of the hardware, software while labor costs for installation, training and maintenance were not a factor for the project. All labor was in-house with a staff dedicated to this type of work.

## **Develop Proposal for Grant Management System**

Once a determination was made to select Coeus as the grant management software solution, a proposal was developed for presentation to Executive and Division Administrative Staff. The proposal outlined the current situation, costs involved and the rationale for the selection as well as addressing concerns that surfaced after the initial evaluation in 1999 (Appendix B). At that time the staff members reviewing Coeus expressed concerns about the limited capabilities of the system with regard to proposal formats supported, the continued need for off-line methods of calculating proposed expenses for projects, and questions about the feasibility of integrating Coeus with DRI's financial system. The project was given the go-ahead with a timeline of completion in seven months, on July 1. The Vice President for Finance and Administration understood that this was an ambitious goal but he wanted the launch of the new software to coincide with the new fiscal year and for DRI to be an example to the Coeus community that a fast-tracked implementation is possible.

The project risks were also considered during this phase. These risks were primarily resource related – does DRI have the funds and manpower available to complete the project? The assessment was that the resources were available and that the commitment of the implementation team meant that the project would be made a top priority for all team members.

### **Develop Tasks and Plans**

When approval was secured to proceed with the project, the Project Manager created a Work Breakdown Structure (“WBS”) to list the tasks to be performed and project plans to follow (Appendix C). The WBS was created with a criteria in mind that the status/completion be measurable, start and end of events be clearly defined, each activity has a deliverable, time and cost are easily estimated, activity duration is within acceptable limits and that work assignments are independent (Wysocki, 84). Given the experience of colleagues at The University of Nevada, Reno who also licensed Coeus, the Project Manager was confident that the schedule was realistic in its goals. This WBS was then presented and agreed to by the implementation team.

### **Design Phase**

The design phase included a completed project plan, identifying the Coeus components that were to be used or reasonably modified to satisfy the project goal. Training and support plans were also developed at this time. During this phase a plan was formulated

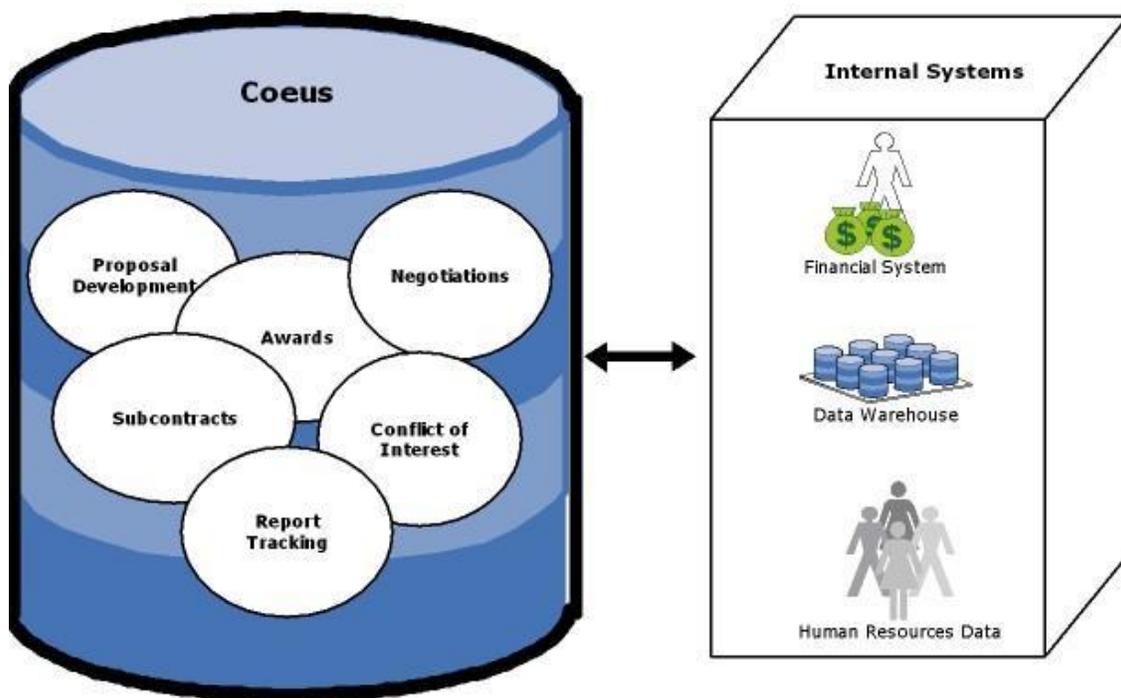
to address the transfer of data from PTS to Coeus and data verification. To ensure the integrity of the data, PTS would remain operational until the data in Coeus was certified. The final portion of the project plan included an assignment of tasks and roles to complete the implementation. The plan was approved by the Executive Sponsor and agreed to by all members of the implementation team.

### **Implementation Phase**

The construction phase began with the procurement and set up of the server, disk drives and the installation of the software. The software installation necessitated the installation of Oracle as the database platform. Fortunately, DRI was already licensed to use Oracle on Sun Solaris and Windows NT. The Oracle database was then created to hold Coeus and the installation of that software followed. DRI followed the MIT recommended 12-step process included with the site license a to populate tables, create user accounts and implement security protocols.

An assessment of the software capabilities and features was made, laying the groundwork for future training materials and user manual. Because the license did not include detailed user documentation or a data dictionary, figuring out how to get Coeus implemented required trial and error, consultation with other users and specific questions asked of the Coeus help desk. Coeus is a software package that includes modules to support functions for proposal development, awards, subcontracts issued under an award, negotiation of award terms and conditions, financial conflict of interest tracking, and project deliverable tracking (see Figure 5). The database is able to fully integrate with

existing internal systems such as Human Resources, Financial and data warehouse information if the licensee wishes to create scripts to facilitate a data feed between Coeus and those systems.



**Figure 5**

A majority of the construction phase was devoted to mapping the legacy data from PTS to Coeus. Fundamentally, PTS organized data according to scientific effort with proposal submission and award information summarized on one screen. Coeus, with a modular format, stores the data separately as proposals and awards with a linking feature to join them. In order to convert the data to Coeus, each PTS field was matched with a Coeus field and a procedure was written to export the data from PTS and import it into Coeus.

This activity consisted of research to find out what the field is used for in PTS, finding a similar field in Coeus, copying the data to Coeus, and testing the functionality. In many cases data was incomplete or missing, which necessitated constructing records manually in order to make them complete and consistent throughout the database.

Another task within the construction phase was to develop the reports and routing sheets that were available in the PTS system. DRI's proposal process included the routing of a hard copy of the proposal to the Sponsored Research Office. Accompanying this proposal was a cover sheet with summary information about the proposal with such information as the title of the proposal, principal investigator ("PI"), or lead scientist, for the project, funding amount requested and the potential sponsoring agency. In some departments the PI and Division Director signed this cover sheet. For awards, a similar "Notice of Award" was necessary to provide a snapshot of the award and provide a signature block for division administrative personnel to acknowledge acceptance of the award.

### **Testing Phase**

The testing phase was an exercise in proposal development. The task was to create a test proposal and see it through the entire process to award close out to verify that all components of the software were functioning and correct. Other testing was performed to verify the accuracy of the imported legacy data and to test the routing processes and procedures and user access security. Users gain access to Coeus through role assignment; therefore, it was necessary to test that each role was granted the appropriate access to

match a job function and that users could not perform tasks outside their privileges. All members of the implementation team and the end users were responsible for testing the software and reporting any unexpected behavior.

### **Train Users**

Training was conducted in the DRI Computer Lab through weekly sessions for users from Division Administration, Sponsored Research, as well as any interested Executive Staff and Information Technology staff. Each week a product feature was highlighted with a facilitator directing students through the steps to accomplish a specific task. The order of the sessions mirrored the life cycle of the grant process, beginning with proposal development and concluding with closeout of the award. Materials were provided as an accompaniment to the training session that included examples of scenarios encountered when performing a function. Weekly makeup sessions were scheduled for those who could not attend the regularly scheduled session. Individual training was made available to all users at their desk and a manual was provided. On-going support was provided by telephone, email or at the individual's workstation. Users were strongly encouraged to play with the Coeus test database that was installed on their desktop.

### **Maintenance Phase**

During the maintenance phase the system is in production and continually evaluated to determine if it still meets the needs stated at the beginning of the project. The system is updated as business rules or processes change or as problems arise. The organization participates in user group meetings and evaluates each new version of Coeus as it is

released to determine if an upgrade is desired to take advantage of the new functionality. Internally, as changes are made to systems that interact with Coeus such as Human Resources, Financial and Data Warehouse, the interface to Coeus is evaluated and modified as appropriate. Continued usage increases the overall awareness by the organization of the data that is available for reporting and the possibility of eliminating “shadow” systems for data gathering.

### **Short Review of the Deliverables from Each Phase**

Each phase of the project resulted in a project deliverable. The Research and Analysis Phase produced trip reports after off-site evaluations of Coeus, analysis of product alternatives, and a Work Breakdown Structure. The design phase involved the creation of project, training and support plans. The Construction phase concluded with a full load of legacy data into the Coeus database. Testing and Maintenance Phases resulted in a training manual, training materials and a quick reference guide for users.

### **Short Review of the Milestones from Between the Phases**

The milestones between phases enabled the completion of the next iteration of the installation. First, procurement of new hardware facilitated the installation of the software and for loading of the legacy PTS data to begin. As this was taking place, other team members were familiarizing themselves with the functions of Coeus and starting to develop training materials. The final transfer of the legacy data in PTS enabled a full testing of that data to take place. Training was completed prior to the disbanding and cut off of PTS for the full implementation of Coeus. The maintenance phase commenced

with DRI's participation in Coeus user group sessions and distributing their manual to the Coeus user community through a web link posted to the Coeus user community listserv.

### **Outcomes**

The project outcomes include the installation of Coeus on all user machines with a fully populated database of legacy data from the PTS system. Procedures were developed and distributed for entering data and reporting on that data. Users were trained on all aspects of the system and provided with a manual and other reference materials on the use of the system.

# CHAPTER 3: PROJECT HISTORY

## **How the project began**

In 1996 the National Council of University Research Administrators began to hold conferences to discuss Electronic Research Administration (“ERA”). Members of DRI’s Information Technology department attended some of these conferences and saw an opportunity for process improvement. DRI department administrators were each tracking proposals and awards for their division with no standard methodology or consistency in the data collected or reported. The Controller wished to have a common proposal development process and reporting solution so a committee was formed to research the various ERA options. PTS was selected as an interim solution with the understanding that the committee would continue to review software packages as they became available.

## **How the project was managed**

The project plan was executed through a team, which included the Technical Manager acting as the Project Manager, and two staff from the Administrative Computing Department. Additionally, a Division Representative and Process Manager were named from the division administration staff and Sponsored Research Office, respectively. The Technical Manager assumed the overall responsibility for the project with the authority to assign tasks, establish deadlines and be the final decision maker on all project matters.

The Process Manager was responsible for project matters affecting business processes and for ensuring that those business processes comply with federal and state regulations and policies. The Division Representative was responsible for working with division administrative personnel to solicit input for the project. Meetings were held weekly to update the management team on project status. Also during these meetings the Technical Manager would present any change requests made by the users for decisions regarding their inclusion or exclusion from the project deliverables. The Controller acted as the scribe, recording the decisions made, organizing meetings, preparing project status reports to the Executive Sponsor, and distributing information to the team members.

**Was the project considered a success?**

From the perspective of meeting all deliverables, the project was considered a success. The system went live on the scheduled date, all legacy data was loaded into the appropriate tables, the PTS system was disbanded and staff were trained on the new software. From a user satisfaction perspective, the project did not meet its goal. Many functions of the software were not fully utilized including proposal development and internal routing of proposals for approval. Division administrative staff was reluctant to use Coeus to create proposals, reasoning that it required more effort and time than their limited resources would allow. The administrative staff was only willing to utilize the proposal tracking and award functions of Coeus, mirroring the functions available in PTS. Sponsored Research Office staff became responsible for maintaining the award data and performing quality assurance checks on the proposal data.

This very robust software solution was not developed to its full potential and no additional user groups beyond division administrative staff have become involved in its use. At the initial planning sessions it was anticipated that additional staff members would be included in the user group, for example, scientific staff who generated proposals and Division Directors who would have interest in the types of proposals that were submitted and their success rate. Unfortunately, the Implementation Team was discouraged by the division administrative staff from presenting to these groups with the possibility of using the software.

### **What changes occurred to the plan?**

The implementation plan was adhered to with only minor schedule adjustments when additional time was needed to transfer legacy data to the software. The plan also included designs to fully utilize the proposal development, and report tracking modules. Use of these modules was scaled back to a voluntary rather than mandatory participation and many features that could have eliminated process redundancies were not used at all.

### **How did the project end?**

The project ended on July 15<sup>th</sup> when the system went live. The project team disbanded and a transition was made to a maintenance mode of keeping abreast of features in Coeus releases and ensuring the quality of the data stored in the database.

### **What went right and what went wrong?**

There are several activities that were a success for the project. The planning process for the project laid a solid foundation for the work to be done and eliminated one of the primary reasons why many software projects fail. The staff participating in the project had a strong ability to quickly become familiar with the software, its functions and underlying table structure such that training for the end users was effective and complete. Outside of DRI, the assistance from MIT and other institutions was an invaluable resource for understanding the most effective use of the software and implementation lessons learned.

On the other hand, several things went wrong for the project. Although humans are adaptable and capable of adjusting their behavior to suit the circumstances, in an organizational structure, change is discouraged. Consistency and conformity are encouraged to maintain a required level of organizational output. Therefore, employees accumulate skills that help them promote stability and maintaining the status quo and reject the qualities needed to embrace organizational change that can lead them into an

unknown situation (Holland, 16). In order to facilitate a business process change, two questions need to be continuously asked throughout the life of the project, “Can we do it?” and “Do we want to do it?” The answers to these questions will reaffirm the commitment of the participants to the project and the ability of the organization to bring it to a successful conclusion. The self-interest of employees should not be overlooked and the benefits of a new system need to be expressed at the employee level, i.e., how does it benefit them personally, rather than the advantages to the organization as a whole. The benefits of changing need to outweigh the comfort of doing nothing (Baum, 22). The implementation team would have had a smoother transition to a new system if they had been aware of this strategy to combat user resistance.

The lack of an effective executive sponsor and commitment from senior management to support the project contributed to the voluntary rather than mandatory use of system features beyond minimal data entry. Also, the plan to involve the research staff as part of the user group never materialized so that they were not participants in the benefits of a streamlined proposal process. The Work Breakdown Structure called for a strategy of creating a scientific staff advisory committee to provide feedback on the usability and features of Coeus. This committee was never formed. Perhaps if a longer timeframe than the six months allotted for implementation were given, some of these mistakes could have been avoided or alleviated.

### **Project variables and their impact**

The major variables for this project are often cited as the very reason why some projects fail. Time and resource constraints lead to the selection of third party software that was

available at the lowest cost in comparison to other solutions. The actions of the Executive Sponsor impacted the team members in that there was a tolerance for the users to be resistant to change and an acceptance of their attempts to lobby support for abandoning the project. DRI Executives did not discourage division administrative personnel from reopening the evaluation of alternate software packages or the possibility of building something using in-house resources. The dissatisfaction of the administrative personnel meant that they were unwilling to help with the testing process and were critical of the pace of the project schedule citing that the testing period was inadequate. Testing was limited by the tester's imagination in that they can only test those scenarios that they feel are the most likely execution paths for the software (Whittaker). Under these circumstances, user reported bugs are unavoidable. Unfortunately, every bug reported strengthened the administrative staff's argument that Coeus did not address their needs. The impact of this activity became a morale issue for the core team members although they were committed to the project and were able to bring it to a successful conclusion.

### **Findings and analysis results**

Due to the efforts of the implementation team the project met all of its goals. Credit for the success can be attributed to the fact that the focus of implementation was narrowed to selecting only those modules of the software that were recognized to be of immediate use to DRI. A large component of the project was to migrate the legacy proposal and award data to Coeus, which involved significant trial and error and testing to ensure that all records were correctly entered in the new database tables.

An unexpected task that emerged involved completing the installation steps listed in the Coeus documentation. Many of these steps included analysis of DRI's business process or creating research codes and report categories that were not previously defined.

However, these tasks were easily incorporated in the Work Breakdown Structure and did not negatively impact the project schedule.

# CHAPTER 4: LESSONS LEARNED

## **What was learned from the project experience?**

The project team should have been more aware of the resistance to change that they faced when implementing the software and the strategies available to alleviate the resistance. Despite early acceptance by the end users of a need for a standard research administration solution, when there were key personnel changes at the executive staff level, a general mistrust of the new executive staff member, fear of failure and bureaucratic inertia set in as obstacles to the project.

The team also underestimated the importance of organizational politics (Yourdon, 43). Politics can come into play when the need for the new system is questioned. In this case the key stakeholders had a slight understanding of the need to replace the existing system, which was failing. However, the disagreements arose when a senior executive, who did not have the political clout to back up the approval of the implementation, mandated the use of Coeus. This decision led to stakeholders becoming annoyed and resentful of the project and the project manager. Coupled with this difficulty was the team's overestimation of the user's capacity for change (Holland, 27). It was assumed that because individuals understood the inevitable failure of the PTS system that they would embrace a new system that offered many more functions and was a solution for the future. This was not the case as was indicated by the fact that the user change requests

were geared toward making Coeus look like PTS with the rough edges smoothed over (ZDNet).

### **What would have been done differently?**

As with any experience, hindsight is 20/20. In retrospect, there are several actions that would have improved the outcome of the project. A first step would have been to develop a project charter and have all key stakeholders sign it in order to seal their commitment. A stronger commitment from the stakeholders would have increased their participation in testing and reduced their complaint that the system did not meet their needs. Although there was preliminary work conducted by Administrative Computing staff to gather information about how divisions conducted their research business, this information was not later used to specifically discuss with each employee the benefits that a new system would have for them. This individualized attention would have flushed out the concerns of the staff about their role after production of a new system.

It would have been advantageous to gather more system documentation and experiences of others in the Coeus user community before starting to transfer data from PTS.

Complete documentation would have avoided heading down the wrong path as was done with incorrectly loading data into the award module of Coeus. Also, understanding the lessons learned from other institutions would have decreased the time spent in trial and error and left more time available for testing and reassuring the users about the benefits of the system.

A smoother implementation would have occurred if the Implementation Team did not let the emotions of the users drive the project. The dissatisfaction of the users and their resistance to change lead to their attempts to undermine the project by approaching the President of DRI with a request to terminate the implementation. This action lead to the project team diverting energy away from testing to responding to inquiries from the Executive Staff that might not otherwise have occurred. An additional project champion, an individual who sees the value of the project and is also powerful in the organization, might have had a positive impact on the outcome (Yourdon, 50).

Finally, it is always a good idea to reward project team members for their efforts at the end of the project regardless of whether the project was a success or failure. The rewards do not have to be monetary, in fact, recognition of achievement and job enrichment are much more effective motivators to performing a job well (Yourdon, 94-98).

### **Did the project meet initial expectations?**

The initial expectations of the implementation team were that, after an initial training and startup period, that the user community would embrace the features of Coeus and use them to their full potential. Complete information would be entered, proposals would be created online and routed electronically for internal approval, and award data tracked. As federal electronic submission procedures solidified, Coeus could handle that process with ease and eliminate the need for duplicate data entry. These expectations were narrowly met in that a new research administration software package was in production. This

system has the ability to integrate with other internal systems as well as federal grant portals making it a solution that can grow with the organization should new requirements arise.

**What would be the next stage of evolution for the project if continued?**

If the project continued it is expected that additional available modules of the software would be brought on line that were originally excluded from implementation. These modules include Subcontracts, Negotiations and Conflict of Interest.

DRI maintains a data warehouse of financial information with a user interface in WebDB. The data warehouse is updated nightly in order to reflect the most current project expense data. An enhancement to the use of Coeus would be a feed to the data warehouse in order to expand the reporting capabilities of the system. Currently Coeus is limited in the types and number of pre-formatted reports available within the database. If a user requires a report that is not available, they must request the data from Administrative Computing staff who build the report through an ODBC connection to the underlying tables and use Access to extract the needed data.

Additionally, an improvement to the award process would be a link to the financial system programmed to retrieve award budget information from Coeus. This transfer could be used for account set up information with the proposed budget detailing the line items for projected expenses.

The next version of Coeus will be in Java to support a web-based version of the product. Digital certificates will be used for user authentication; however, DRI expects that it will port Coeus to the existing WebDB interface and develop a login system that is tied to e-mail user names and passwords.

Should the full proposal development module be used, an electronic signature system is required to verify the identity of the authorized institutional representative. MIT uses Kerberos for single sign-on user authentication, and act as their own digital certificate authority. Installations that have not implemented this technology will have to issue Oracle user IDs for access into Coeus. Because Oracle does not directly interface with operating system password verification, third-party software such as Kerberos would have to be installed. However, even with an Oracle user ID, electronic signatures are not legally binding without a digital certificate so this issue would need to be addressed as well.

The Coeus software continues to evolve and DRI could take advantage of the enhancements by upgrading the software. MIT has released Coeus IRB1.0 to track activities of an organization's Institutional Review Board ("IRB"), which meets for ethical review of research studies to protect human subjects rights/welfare. Release 4.0 of Coeus includes a converted front end from Powerbuilder to Java. The new Coeus Java is completely redesigned as an object oriented application based on the functional specifications from the Powerbuilder application and provides a rich user interface and

functionality to Coeus users. The decision to migrate to Java was made for reasons such as cross platform support and vendor independence. Version 4.1 of Coeus, released in October of 2005, includes a Grants.Gov system-to-system proposal submission capability as well as enhancements to the Awards and IRB modules.

Over the years MIT has spent thousands of hours of programming for non-MIT functionality requested by the Coeus user community at a rate of \$50/hour. In order to defray the costs and prioritize a functionality wish list, MIT has drafted a consortium agreement for all new licensees of Coeus. The entry level for the Coeus Consortium is \$500, which includes the benefits of attending the Coeus User Group meeting, receiving all upgrades, and the ability to suggest improvements and/or enhancements to the base product. The next level is \$25,000 for a Basic Membership. This lets the licensee assist in the design and functionality of the next release. A Basic Member will be invited to participate in these discovery sessions. The Basic Member's voice will be heard and the additional programming hours to make the software more flexible and more palatable to the licensee's organization will be considered and eventually approved by the Steering Committee.

The Steering Committee level pays \$50,000 which allows the member to prioritize and make the final decisions about the design and timing of future releases. The Steering Committee also has oversight for the Consortium's funds for such things as the allocation of the Consortium's money to cover costs for programming a feature or for other types of activities such as hiring a technical writer to create a comprehensive end-user guide and technical manual. Also, the Steering Committee will decide if in-kind contributions

offered by Coeus users are sufficient to warrant a waiver of membership fees for a period of time. For example, if a school offers the services of a Java programmer in order to cover their membership, the Committee would be responsible for verifying that the person being offered had the necessary competencies and/or the services being suggested seemed reasonable. DRI should consider the levels of membership and how much they would like to participate in the future of Coeus.

The government has also experienced some recent changes with regards to Electronic Research Administration. In April of 2005 the US Government Accountability Office (“GAO”) published a report entitled, “Grants Management: Additional Actions Needed to Streamline and Simplify Processes.” This report reviewed the origins of the efforts to streamline the grant management process. These efforts have addressed the life cycle of the grant process from announcement to application to award to postaward and closeout. The report comments that some of these efforts have been more successful than others due to uncertainty in the roles of workgroups and their lack of consultation with the grantee community. The Grants.gov initiative is the most successful in that it has built participation by the grantee community into their process, soliciting feedback on their success, publicizing availability and providing training for the system. Originally planned to provide a common portal for all phases of the grant cycle, in early 2004, OMB instructed Grants.gov to cease development beyond implementing an application process.

For other phases of the grant life cycle, a new initiative is planned, the Grants Management Line of Business. This plan will include a common system for financial

and performance reporting and simplify the administration and management of grants across all agencies. In support of this effort, the Post-Award Work Group has already agreed upon a common Performance Progress Report, Real Property Report and financial report. The working groups have proposed a consortium to pool resources to investigate potential solutions for streamlining and consolidation of the grant process. To continue with the notion of a single portal for the grantee community, any solution would have to integrate with Grants.gov.

The GAO report cites concerns that the agencies are not meeting the goals of P.L. 106-107 due to lack of leadership among the work groups and that individual agencies have not internally streamlined their process and cannot realize the benefits of the common efforts and that they are not reporting on the status of their progress as required by Congress. P.L. 106-107 sunsets in November, 2007; therefore, to ensure significant progress, GAO recommends action be taken to clearly define the goals of any initiatives, ensure that progress reports are filed, and that grantee input be solicited. OMB plans to form a Grants Governance Committee to coordinate these actions. Any new features of Grants.gov or alternate government portals should be considered for integration with future releases of Coeus.

# Appendix A

## **Trip Report: An Evaluation of Coeus**

November 21, 2001

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## Summary

On October 18, 2001 the Desert Research Institute sent a team to Riverside, CA to attend a demonstration of Coeus, an electronic research administration software package developed at the Massachusetts Institute of Technology.

The team highly recommends Coeus as a research administration tool for DRI. The overall cost would be approximately \$13,000 using in-house labor and existing software licenses. It will take approximately 6 to 9 months to install and implement the necessary components to replace our current system, PTS. Five of the eight modules would be required to replace PTS.

What is Coeus? As stated on the Coeus web page ([web.mit.edu/ops/www.coeus](http://web.mit.edu/ops/www.coeus)): MIT has created the Coeus system to assist their Office of Sponsored Programs, departments and laboratories in proposal development and pre- and post-award management. The purpose of the system is to simplify and make more efficient, award acquisition and administration for all offices within the Institute. With its comprehensive proposal development module and post award functionality, Coeus is one of the first cradle-to-grave award management tools in the nation. This software now makes it possible to prepare proposals, route them internally to obtain proper approvals, and submit them to sponsors electronically.

Why are we looking at Coeus? DRI is in need of a new electronic research administration (ERA) solution. Beginning in the fall of 1997 DRI search for a suitable ERA package. Several were reviewed, including Coeus. At that time, none met DRI's needs mainly due to lack of needed functionality and cost. ERA was still in its infancy. As an interim solution, the Proposal Tracking System (PTS) was purchased in the spring of 1999, and DRI continued following the development of ERA packages. PTS is a small Microsoft Access database that tracks proposals and awards.

Overall, PTS has worked okay for DRI and has become an integral part of the proposal/award process. However, it does not provide all the functionality DRI needs. There are some aspects of proposal development not handled by PTS that have become cumbersome for DRI to continue doing manually. There is also the issue of upgradability – PTS was developed for Windows95 and Access 97. As Microsoft has upgraded the operating system and Access, PTS has degraded. That is, portions of PTS no longer work or only partially work. Even if upgrades were available for PTS (they aren't) they would be of limited use since DRI made extensive modifications to PTS. DRI is approaching a critical situation, as several business managers do not have complete functionality with PTS on their newer computers, and at least one cannot use it at all. The longer we wait, the worse the situation will become. It is time to replace PTS, hopefully with a complete ERA solution.

Can Coeus solve DRI's problems? Coeus is a comprehensive package that can fit well into DRI's environment. It does what PTS does and much more. As is, it has most of the functionality DRI needs. Concerns noted when Coeus was previously reviewed have

been resolved. Source code comes with the product, so modifications are possible. Also, since it is modular, additional components specific to DRI could be added. Financially, Coeus is more affordable than some other options. The license fee for Coeus is \$500, so the major cost to DRI would be the hardware to run it on and personnel time to install and implement it. The fact that Coeus runs on an Oracle database using a Powerbuilder front end means DRI would not have to buy or learn additional software. DRI has licenses for and knowledge of both Oracle and Powerbuilder. Some of the additional systems we would eventually want to connect to Coeus also run on Oracle (e.g. human resources and financial data warehouses).

There are other ERA solutions currently on the market. The majority of other options do not include source code, so must be used as is. Most do not include both pre- and post-award systems, but some do. For instance, Oracle has an ERA solution. It is expensive and is actually an older version of Coeus with the Powerbuilder front end redone using an Oracle product. GAMS is another. It was created by a consortium of colleges and universities. Use of GAMS comes with membership in the consortium. The last known price for joining the consortium was \$20,000. VeriSign has a pre- and post-award system. It runs on Windows NT using SQL Server and has a fairly steep licensing fee. GlobalSign is much like VeriSign in that it runs on Windows NT using SQL Server. The major drawbacks to these alternate solutions is cost and lack of flexibility. Those using a different database engine also require learning that product, and add a layer of complexity for connecting to the data warehouses.

There are stories of campuses spending a great deal of time and money to implement Coeus. For instance, the University of North Carolina at Chapel Hill has sunk \$2.1 million into their implementation. It is not yet in production, so the cost may increase. That cost includes the Oracle and the Powerbuilder licenses which they did not have, cost of hardware, cost of implementing digital signatures and single sign-on user authentication (hardware and software), and 2.5 years for a 7 person team. They are spending a great deal of time doing data conversions to get the history of their 7,500 yearly awards, and are integrating Coeus with their financial, human resources, and other systems (e.g. conflict of interest). Some of their business processes are being redesigned. There will be a totally electronic system from proposal development through award close-out and deliverable archiving. This is not the level of implementation DRI should expect initially – perhaps in the long-term, but certainly not initially.

DRI's implementation would be more along the lines of the UNR's implementation which is close to plug-and-play. UNR is only using the pre-award module, and RI would use both pre- and post-award. We do not have the figures for UNR's costs, but it took 2 people about 3 months to get the software installed and ready for the Pre-award Office to begin populating the tables. That task has not been completed, so total time to production is not yet known. There are other, unrelated factors delaying the release of Coeus on the UNR campus. DRI is at an advantage since we have a lot of information in PTS that can be imported into Coeus. That should reduce the set-up work load and time.

## **What is Coeus?<sup>1</sup>**

Coeus is a comprehensive electronic research administration package developed at MIT to solve their research administration needs. This system was designed to handle the volume of an institution that processes over \$1,000,000,000 in grants and contracts annually, or 33 times larger than DRI.

At present over 100 universities (including UNR) have licensed Coeus and are or will be using this system to manage their pre- and post-award activities. The main modules in Coeus that are available include:

- 1. Proposal Development**
- 2. Proposals**
- 3. Awards**
- 4. Subcontracts**
- 5. Negotiations**
- 6. Person**
- 7. Conflict of Interest**
- 8. Report Tracking**

At a minimum, in order to replace PTS, we would need the Proposal Development, Proposals, Awards, Person and Report Tracking modules.

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<sup>1</sup> Description of this system was taken from MIT's web page, <http://web.mit.edu/ops/www.coeus>

## **1. The Proposal Development Module**

The Proposal Development Module has been designed to allow departmental administrators and investigators to construct full proposals from the desktop. First, the user must create a proposal shell, which includes the basic header information typically found on an institutional proposal routing form. Once this piece is done, work on the proposal can be distributed by function and managed through use of system roles.

The Proposal Development Module also contains a robust tool for creating budgets. It stores all approved EB and F&A rates, and inflation factors, and ensures compliance with the Cost Accounting Standards (CAS) by allowing the user to budget in the same manner in which expenditures will be incurred.

After the budget has been created and the science appended, the proposal is marked "complete." The user then submits the proposal for on-line approvals. The system applies business rules created at the departmental, Dean's Office and VP of Research levels, securing appropriate approvals along the way. When complete, the proposal will go through a final Institutional review before it is submitted electronically to those sponsors that can accept an electronic proposal. Alternatively, the proposal can be printed for those sponsors that will require a paper proposal.

The Proposal Development Module also is integrated with the Sponsor table (list of all sponsors) and Rolodex table (List of sponsor contacts).

### **Advantages to DRI:**

- A. DRI would be assured that all factors such as inflation and recharge rates would be consistently applied institute wide and more importantly, the manner in which we propose would be consistent with the way expenses are incurred, a CAS requirement.
- B. This module contains the required forms that must be prepared and submitted along with the proposal. The forms in the system are programmed to capture the required financial and administrative information automatically, minimizing processing effort.
- C. Coeus would do all of the arithmetic for the proposal. Users would never have to worry about or spend time checking for arithmetic errors in the proposal budget.
- D. The format of all proposals would be consistent throughout the Institute.
- E. Coeus would allow the user, (P.I. or business manager), to create accurate budgets with a minimum of effort or knowledge of Excel or Lotus.

## **Drawbacks to DRI**

- A. Although Coeus can create multiyear budgets, this system currently cannot create budgets with multiple tasks. Budgets requiring multiple tasks would have to be created off line and only the total costs per year recorded in Coeus. This would result in double posting, increasing preparation time.
- B. This is an unknown, however we suspect more complicated budgets, involving extensive lab and field rental recharges, may also have to be recorded “off-line” and only totals posted to Coeus. This too would create additional effort.
- C. This is also unknown, but we suspect the system would not be as flexible as Excel or Lotus spreadsheet and it would take some training and practice to get used to preparing budgets from Coeus.
- D. Coeus does not have a DIP Sheet procedure associated with the proposal system. Although not necessary, having the DIP Sheet system connected to the proposal system would ensure the Division Director approved all proposals processed. Additional programming would be required to integrate the DIP Sheet system into Coeus.

## **Potential to be a Great Advantage or Additional Drawback:**

- A. The automated approval process may or may not be of use to DRI.

At present the approval rules at DRI are as follows:

- a. The business manager is authorized to issue proposals without approval from the Sponsored Research Office
  - i. Federal proposals: Funding level less than \$500,000
  - ii. Non federal proposals: Funding level less than \$250,000
  - iii. ICR at the approved rate
  - iv. No applied research funds or cost share requested

Note: At present DRI administration must rely solely on the business manager to make certain these rules are followed. Only after an award would administration ever know if the above were followed.

- b. Currently the following issues need to be reviewed by others during the pre-award stage. Again these issues are only brought to administration’s attention if the business manager, P.I. or division director thinks to do so:
  - i. Safety issues – Handling hazardous materials, etc.
  - ii. Facility needs
  - iii. Insurance requirements
  - iv. Use of human subjects

Note: By utilizing the automated approval process, built in safe guards could be programmed to assure that for any proposal over a certain dollar amount, or that includes an ICR waiver, applied research funds, and/or cost share, the appropriate individual would be notified requesting their approval. Also, by requiring P.I.s to state if the proposal will include hazardous material, new facilities, equipment to be transported to field sites, or human subjects, the appropriate individual(s) would be alerted to insure all required approvals are obtained and forms prepared.

Offsetting the above advantages is the increased thru-put, administrative effort, and maintenance of such a system.

## **2. The Proposal Module**

The Proposal Module contains those works that have been submitted to sponsoring organizations for funding. Where works in progress are stored and edited the Proposal Development Module, only completed works are stored in the Proposal Module. Each proposal that has been officially submitted by the organization to the external sponsor is assigned a unique identifier. Through the identifier, the user can view basic data on funding source, title, department, principal investigators, and amount proposed. Also in this module, the user is able to generate a Current and Pending Support Report for any investigator listed in the proposal. Current and pending information can be downloaded in a variety of formats for subsequent modification to conform to individual sponsor's requirements. Once a proposal is funded, the information in the Proposal Module forms the basis of the actual award.

### **Advantages to DRI**

- A. The major advantage of this system would be that this could serve as a depository and retrieval system for all proposals issued by DRI. At present, proposals are mainly stored in a P.I.'s personal computer. This limits access to the proposal by others who may need to use it to prepare an abstract. The risk of the proposal being lost for everyone increases significantly through the passage of time.
- B. Another advantage would be the automation of the Current and Pending Support Schedule, a schedule normally prepared by the business managers.
- C. This module would replace DRI's current system for maintaining a record of proposals, PTS.

### **Drawbacks to DRI**

- A. This would be an additional step for the P.I. to transfer the proposal from his/her PC to the Proposal Module. This duty could be performed by the business manager minimizing the P.I. involvement.

### **3. The Award Module**

The Award Module maintains detailed information on awards and subcontracts including a complete history of every change made to an award and subcontract from notice through closeout. The Coeus system stores all agency contacts ( in the electronic rolodex), maintains all reporting requirements (financial, technical, property, patents), maintains the terms and conditions, required cost sharing, special reviews (animals, human subjects, biohazards, etc.), F&A rates (whether limited by agency or fixed for the life on Federal awards), as well as the required approvals for the equipment, foreign travel, and subcontracts.

#### **Advantages to DRI**

- A. This system provides a detailed reporting format of all grants and contracts, clearly outlining the terms and conditions of the grant or contract being managed.
- B. Detailed tracking of budget to actual are tracked for each contract or grant.
- C. This module has expanded capabilities over the PTS system currently in use.

#### **Drawbacks to DRI**

- A. A significant amount of time could be required to record the necessary information for this module. However, using cut and past techniques could minimize input effort to maintain this module.
- B. There would be a danger in relying strictly on information recorded in Coeus without confirming the actual terms and conditions in the contract or grant. As a result, unauthorized transactions could be approved based on erroneous contract data posted to this system.

### **4. The Subcontract Module**

The Subcontract Module is maintained under the awards that fund the agreement and contains detailed information on subrecipient agreements. Data in this module includes: the amount, the start and end date, the investigator at the receiving organization, other administrative contacts, and all required close out information. Historical information is captured as the subcontract is modified to allow tracking of change orders to the subrecipient agreement. Additionally, funds released from incoming invoices are also maintained.

#### **To Be Reviewed By Users**

- A. We are not sure if the time to maintain this module would be worth it, given the limited number of subcontracts we issue.

## **5. The Negotiations Module**

The Negotiation Module allows the Sponsored Research Office to track negotiations for individual proposals. It provides administrators with tools to keep notes and track the progress of the negotiation, facilitates sharing of electronic files, and generates status reports for negotiations.

### **To Be Reviewed by Users**

- A. We are not sure if this module is useful to DRI, given the limited number of times we truly negotiate grants or contracts.

## **6. Person Module**

The Person Module is the central repository for information regarding employees and students that may be associated with proposal or awards. The person module allows for multiple degree records to be stored, allows for biosketch information in Word and PDF format to be stored, allows the user to produce current and pending support lists for any investigator, and tracks all required training.

### **To Be Reviewed by Users**

- A. This module needs further review. This may be the answer to DRI's problem in handling multiple resume versions as well as information needed for proposals. Some of this module could be kept current using the HR data warehouse under development.
- B. We may be able to modify this module and use it for our SOQ. This could be where we place our research capabilities, describe our labs, as well as the biographies of the P.I.s.
- C. If this module is used, it would have to be another area that would have to be maintained.

## **7. The Conflict of Interest Module**

The Conflict of Interest module allows authorized users to check and maintain all conflict of interest and financial interest disclosures that may compromise professional judgment in carrying out research work. PIs can maintain their financial interest disclosures in the Coeus database, and the Sponsored Research Office can track the apparent conflicts through their resolution as well as maintain the required annual conflict of interest disclosure reports for individuals PIs on existing NIH and NSF proposals and awards.

### **To Be Reviewed By Users**

This is a questionnaire designed to identify a potential conflict of interest. This issue needs to be addressed in DRI, but the required effort to set up who receives this information and how the records are maintained may outweigh any benefits derived from this module.

## **8. The Report Tracking Module**

The Report Tracking Module tracks due dates and maintains the report status for required reports for an award. This module has sophisticated grouping and sorting capabilities to allow custom reports to be generated directly from the application that are relevant to the PI, department administrators and/or central offices. Three views are available at the click of an icon for the most useful vies of the data. These views can be subsequently modified to tailor the report to the desired user specification. Once the reports are sorted and grouped, the information can be downloaded.

### **Advantages to DRI**

- A. This module would replace the current Proposal/Contracting system at DRI (PTS).

## **Concerns Raised about Coeus from visit to MIT in 1999**

On June 11, 1999, DRI attended a 6-hour presentation at the MIT campus on the capabilities of Coeus. Several disadvantages of the system were identified at that time. That list was referenced during the most recent visit in an effort to determine if the issues had been addressed in the current release of the software. It seems that most have been addressed. Below are the identified concerns and how they stand in Coeus version 3.8.

- Works on two platforms (Windows/IBM & MAC); Unix must use PDF  
It still works mainly on the two platforms, but there is a web-based version for Unix users. Implementation of the web-based version as MIT uses it would take some time and would likely not happen initially. However, those most likely to be users of Coeus at DRI are using a version of Windows.
- Pre-award system is in its infancy and has been only beta-tested  
The pre-award system is now fully functional with the versions currently in production. It has been in production over two years and is very stable.
- Only prints two forms currently (NIH & NSF)  
There are many agency forms available through the Coeus web site. MIT has created forms for all the agencies they work with. Any form not created and ready to accept Coeus data can be integrated through the use of the DRAW program. This program enables you to scan an image of the original form and place database variables on the form. The forms print to a postscript printer.
- Salary – all in % effort; we would have to convert to time sheet (hourly)  
Salary is still in percent of effort. DRI can write an add-on program to convert percent of time to hourly, much like is done for the computer recharge report.
- Does not put budget onto forms yet.  
All forms are fully integrated and Coeus will populate the budget information on the selected form.
- Proposal development system may need work to eliminate the use of Excel spreadsheets (or incorporate them in the system)  
Most of the proposals generated by DRI encompass salary and standard operating expenses. Coeus is capable of capturing and calculating these expenses and preparing the proposal documents. Only those proposals requiring multi-tasking may require continued use of an Excel spreadsheet.
- Not sure whether it handles multi-task, multi-year budgets. Would still need to use Excel spreadsheets (similar to Fastlane)  
Coeus can handle multi-year budgets, but multi-task budgets are still an issue. MIT is developing a proposal hierarchy function that was presented as a potential solution to this issue.

- MIT system dependent on the leadership of the Office of Sponsored Programs. If something happens to Direct of Sponsored Programs, this may have a major impact on the availability of the MIT system to others or the future development of the MIT system.
  - Coeus is owned by MIT, not OSP. With over 100 licensees (including all the University of California campuses), countless user groups and a dedicated staff of 6 on the development team, Coeus could very well be the industry standard for electronic research administration and should not be affected by the loss of one individual.
- Not sure that it will integrate with Advantage in the same manner that it does with the accounting system at MIT (i.e., account set up, budget and end date modification).
  - Integration with Advantage is not a goal of DRI. All information available in Coeus can be incorporated with financial information for reporting purposes, through the data warehouse. Account set up will continue to be processed in the same manner as it currently is.
- Lacks a researcher profile and capabilities/facilities statements for proposal boilerplate.
  - The Person Module is capable of handling multiple versions of a profile that can be edited for each proposal if necessary. We can probably use this module for capabilities and facilities statements as well.
- Proposals have to be complete (entirely) before going through the routing channels. This would be quite different than DRI's current practice.
  - This is no longer an issue. Pre-proposal status can be used to route proposals before they are considered complete.
- This program doesn't allow for submission of hard copy proposals. The majority of our proposals are still submitted hard copy.
  - The Proposal Module allows for data entry of any proposal created outside of Coeus, in the same way that we use PTS.
- We do many NSF proposals and this system produces and EDI submission which NSF doesn't accept at present time, although they have apparently made a commitment to accepting EDI.
  - NSF proposals can be submitted through the 194 transaction set, and 10-20 minutes later the proposal will appear in the Fastlane system. Any difficulties that have been encountered have been problems that NSF needs to correct, which they are apparently working on.

- Not sure how this system will work with submitting multiple or collaborative proposals where we each have a separate budget.  
Collaboration is not a problem. The Proposal Development Module is designed to handle components from many different sources and formats. It puts them together when all components are completed. The “Aggregator role” is assigned to an individual who will collect all information for routing.

## **Coeus Technical Aspects**

Coeus is a client server product using an Oracle database with a user interface created in Powerbuilder. Each user’s machine must have an Oracle client installed, as well as the Coeus client. Currently, Coeus supports Windows (9x, NT, 2000) and Macintosh operating systems. There is a web-based client that could support Unix users, though more information on its implementation is needed.

Currently, all DRI business managers are using a flavor of Windows and have an Oracle client installed on their machines. The client/server version of AIMS was created using Powerbuilder, and, just like Coeus, requires the client to access the database. Only the Coeus client would need to be installed on those machines.

Coeus can run on any platform supported by Oracle, which covers most hardware currently available. The database should be spread out over 6 logical disks, with an additional disk for the operating system and another for swap space. MIT has 36GB configured in their system, but are currently using under 7GB of space for the database.

Coeus is composed of modules created using stored procedures. That means that code is stored in the database which increases speed and flexibility in doing database operations. It also means all components do not need to be used, and components specific to a campus can be added more readily.

The license for Coeus includes the source code, so changes can be made if desired. The license also includes future updates, so if massive changes are made to the code, future updates may be of little value. Coeus version 3.8 is due to be released in December, 2001. It will be a “clean install.” Purchasing prior to the 3.8 release requires installing 3.5, then upgrading to 3.6, then 3.7. A clean install means only 3.8 needs to be installed. 3.8 will be the last Powerbuilder version. Future versions will be java based, though MIT is still in the design process. Migration from the Powerbuilder versions to the java version are unclear.

MIT uses Coeus to feed their financial system, and their Human Resources data warehouse feeds the personnel tables in Coeus. It is not necessary to implement Coeus the same way, though the Human Resources feed is recommended. Otherwise the personnel tables need to be manually maintained.

Coeus can handle electronic routing and signatures. However, that requires the use of user authentication and digital certificates. They are using Kerberos (developed at MIT) for single sign-on user authentication, and act as their own digital certificate authority. Sites that have not implemented such technology will have to issue Oracle user ids for access into Coeus. This is usually a different id and password than a user's e-mail account since Oracle does not directly interface with operating system password verification. That requires the use of third party software such as Kerberos or something home-grown. Even with an Oracle user id, electronic signatures are not legal without digital certificates. As with other modules, it is not necessary to implement electronic signatures. Parts of the electronic routing could be implemented if desired.

DRI is licensed to use Oracle on Sun Solaris and Windows NT. (Personal Oracle is licensed for Windows 9x, but it cannot handle Coeus.) Currently, we are only running Oracle on Sun Solaris. The current computing resources of Administrative Computing cannot handle Coeus, so another machine would need to be purchased. Even though Coeus can run on an NT system and DRI has an Oracle license for NT, that would not be the best platform for a DRI implementation. Introducing another platform adds another layer of complexity. Information in the HR data warehouse would be needed to feed Coeus. So, implementation time would be extended to cover the learning curve and implementation of the connectivity between the two platforms should Coeus be put on an NT system. The up-front cost savings of such a choice would be lost in the long run through implementation and maintenance costs.

DRI is also licensed to use Powerbuilder, should changes to the source code be desired. Coeus was developed using Powerbuilder 5.3 because of the Mac support. DRI uses version 7.0. Mac support may not be as critical at DRI as it is at MIT, so that may be a non-issue.

MIT has done a fairly good job of documenting the basic installation and implementation process. Even if no changes are made to the code, it will take some time to get all the necessary information into the product before it can go into production. UNR Administrative Computing reports they spent 2 to 3 months getting the code installed and ready to accept data. They are only using the pre-award modules. It is not yet in production since the historical data and other information needed to be entered by the Pre-Award Office is not complete. DRI does have the advantage of having information currently in PTS that can be imported into Coeus. Even so, considering staffing and other duties, implementation of Coeus could take 6 months after the hardware is purchased, installed and ready to go.

The web-based version uses Perl scripts to generate the HTML code. MIT is using digital certificates for user authentication. In order to get the web-based version to work at DRI, we would have to develop a login system. It may be better to port Coeus to WebDB and develop a login system through that rather than Perl. It is anticipated that DRI will eventually need a login system that can be used within WebDB for other products. Ideally, the login system would be tied to our e-mail user name and passwords.

## Estimated Financial Costs

With our current staff and expertise, we should figure 2 months to get everything in-house and installed. Then a good 6 months should be scheduled for the initial implementation of Coeus. The initial implementation will likely be that which is necessary to replace the aging PTS system. Additional modules can be brought up gradually as time permits. Administrative Computing will continue to maintain and develop the data warehouse during this time, so if work loads and/or priorities change, the time-to-production could also change.

Estimated costs:

Coeus license	\$500.00
Hardware	\$12,500.00
(Sun Ultra enterprise 250 currently on discount)	
2 people, 8 months	

# Appendix B

## **Coeus Implementation Project Plan**

December 4, 2001

### **Goal:**

To replace the current PTS proposal and awards management software package with MIT's Coeus, providing faculty with a more stable, robust, comprehensive, and efficient tool to facilitate the proposal development process, to ultimately increase total research funding.

### **Objectives:**

1. To assist faculty in preparing and submitting proposals.
2. To provide an efficient electronic research administration package.
3. To verify compliance with all Institute, state, federal and sponsor rules and regulations using minimal controls.
4. To enhance the overall electronic research administration system capabilities, including data availability.
5. To provide an effective replacement for the current PTS proposal and awards management software.
6. To train users on Coeus.
7. To go live with Coeus on July 1, 2002.

### **Scope:**

- Purchase and install necessary hardware and software.
- Implement the Proposal Development, Proposals, Awards, Person, and Report Tracking modules of Coeus.
- Implement human resources data feed into Coeus.
- Implement minimal electronic routing.
- Convert PTS data into Coeus data.
- Communicate with users and conduct user training.

### **Exclusions:** (for this implementation – may be implemented at future date)

- Subcontract Module
- Negotiation Module
- Conflict of Interest Module
- Coeus to financials data feed
- Single sign-on capabilities
- Electronic signatures and/or digital certificates
- Redesign of user interface
- Web-based user interface
- Individual Oracle user password management

## **Deliverables**

- Installed and correctly functioning Coeus System
- Trained end users
- New electronic proposal development process

## **Constraints**

- The Coeus system must be compatible with the existing IT infrastructure.
- The current PTS system cannot be taken off-line until Coeus is in production. Therefore, both systems must be run in parallel until we are ready to cut over to Coeus.
- The team members all have other non-project related commitments and duties so availability could become an issue.
- The Coeus system must be available to Las Vegas users in a reliable, secure manner.
- Other stakeholders besides the implementation team must have their concerns about the software system heard and dealt with.
- The project must be completed by July 1, 2002.

## **Strategies**

- Meet with division management to bring them up to speed on the project.
- Create a faculty advisory committee for feedback on the usability and features of Coeus. It may be best to go through the Faculty Senate in formulating the committee, though committee members should be volunteers.
- Involve the Sponsored Research Office in defining the business compliance rules, as well as identifying critical components of the various modules to ensure the research process is supported.
- Involve the division business managers to ensure their role in the research process is understood and supported.
- Involve a current PTS user as a Coeus tester.
- Communicate with UNR to ascertain if they had any issues with their implementation of Coeus and what the solutions were.
- Send a team member to Oracle or Powerbuilder software training after analyzing software and identifying biggest training need.

## **Team Members**

### **Executive Sponsor**

The Executive Sponsor will provide Institute communication of the project status and will provide overall support to the project.

### **Senior Project Manager and Technical Manager**

This team member will have overall responsibility for the project. He/She will have the authority to assign tasks to team members, will establish task deadlines and will have final say on all project matters.

#### Division Manager

He/She will be responsible for working with division personnel to solicit input for the project. This will include organizing a faculty advisory committee and meeting with the division business managers. He/She will also work with other team members on business process issues.

#### Process Manager

The Process Manager will be responsible for project matters affecting business processes and for ensuring that the business processes comply with federal and state regulations and policies.

#### Team Member 1

This team member will work to learn the software, research the functional aspects of the software and test the software.

#### Team Member 2

This team member will assist the Senior Project Manager on the installation of the software and the overall software implementation. In addition, he/she will identify all of the populated PTS fields and identify the equivalent Coeus fields in order to facilitate the transfer of PTS data into Coeus.

#### Team Member 3

This team member will record and track all project tasks. This will include recording decisions made, organizing meetings, preparing project status reports to the VPFA, recording and tracking tasks to be accomplished, tracking project deadlines and distributing information to the team members. He/she will also provide overall project support for the project.

#### Team Member 4

This team member will be a current PTS user from one of the divisions to test the software and provide usability feedback. Possibly one of the financial assistants.

### **Resources**

- Sun Enterprise 250 and disk drives
- Backup software
- Training facilities

## **Stakeholders**

- Researchers
- Executive staff
- Division management
- Sponsors
- Sponsored Research Office
- Team members
- UCCSN
- Auditors

## **Assumptions**

- DRI can use the existing Oracle, Powerbuilder and backup software licenses for this project.
- Team members will be able to free themselves from other commitments enough to complete this project.
- Team Member 2 will continue with DRI through this implementation project.
- Funds are available to complete this project.
- Needed hardware can be purchased, installed and ready to go in a timely manner.
- Coeus 3.8 will be delivered in December 2001.

## **Critical Success Factors**

### Time Factors

- Key people, equipment and software must be available when necessary.
- Training for Team Member 1 must be at the appropriate time and not negatively impact the implementation

### Meeting Objectives Factors

- The Faculty Advisory Committee must be actively involved in the reviewing of the system capabilities and usability and giving feedback to the implementation team.
- The Sponsored Research Office must be actively involved in the defining of business compliance rules and assuring all required components are implemented.
- Administrative Computing must be involved in the installation of the system.
- Administrative Computing must be involved in the conversion and verification of the PTS to Coeus data transfer.
- The Network Manager must be involved in assuring connectivity and security for the system.
- Numerous team members must be actively involved in testing the system.
- Selected team members must be attentive to the training of users.

### Happy Customers Factors

- Coeus must function as expected with minimal user frustration.
- Training must be timely and adequate.

# Appendix C

## Work Breakdown Structure

1. Coeus Presentation Complete by end Dec.
  - 1.1. Develop a presentation of Coeus for division management
  - 1.2. Schedule meetings with each division individually
  - 1.3. Hold presentation meetings
  
2. Installation Complete by end Dec.
  - 2.1. Purchase required hardware and software
  - 2.2. Install new hardware
  - 2.3. Install Solaris
  - 2.4. Install Oracle
  - 2.5. Create Oracle database to hold Coeus
  - 2.6. Install Coeus 3.7 (3.8 delayed until January, 2002)
    - 3.2.1. Install Coeus 3.5
    - 3.2.2. Upgrade to Coeus 3.6
    - 3.2.3. Upgrade to Coeus 3.7
  - 2.7. Install backup software
  
3. Analysis Complete by mid Feb.
  - 3.1. Become familiar with Coeus structure – tables, procedures, PL/SQL coding style, Powerbuilder interface
  - 3.2. Create PTS to Coeus field mapping
    - 3.2.1. Identify field mapping
    - 3.2.2. Create procedure to export PTS data
    - 3.2.3. Create procedure to import PTS data into Coeus
  - 3.3. Identify components of modules to be implemented
  - 3.4. Identify compliance and business rules
  - 3.5. Identify routing rules
  - 3.6. Gather information together to complete Coeus 12 Step Program
  
4. Begin Dialog with Input Groups Complete by end Feb.
  - 4.1. Establish and hold preliminary meeting with Faculty Advisory Committee
  - 4.2. Hold meeting with business managers
  
5. Create Human Resources Data Feed Complete by end Jan.
  - 5.1. Identify needed fields (4.1 and 4.2 may be done in Analysis section 2.1)
  - 5.2. Identify tables to be fed
  - 5.3. Create script
  
6. Production Installation Complete by mod Feb.
  - 6.1. Remove Coeus 3.7
  - 6.2. Install Coeus 3.8

7. Populate Coeus Complete by end Mar.
  - 7.1. Complete Coeus 12 Step Program
  - 7.2. Import PTS data into Coeus
  
8. Implement Security (in consultation with Network Manager) Complete by mid Mar
  - 8.1. Security of hardware and operating system
  - 8.2. Security of transmissions
  - 8.3. Security of data
  
9. Create Oracle User Accounts Complete by mod Mar.
  - 9.1. For all team members
  - 9.2. For all testers
  - 9.3. For faculty group
  
10. Create Oracle Client Auto Download Procedure Complete by mod Apr.
  - 10.1. Investigate methods
  - 10.2. Create script
  - 10.3. Place on DRI internal web
  
11. Test 3 mos. for tasks 11-14
  - 11.1. Create dummy proposals and go through entire process from proposal development to award close-out
  - 11.2. Verify all chose components of modules are implemented and correct
  - 11.3. Verify accuracy of all imported PTS data, as well as all other data input
  - 11.4. Verify human resources data feed
  - 11.5. Test routing processes and procedures
  - 11.6. Test all other aspects of the system
  
12. Meet with Input Groups
  - 12.1. Meetings to view and/or try-out implementation should not occur until initial testing complete.
  - 12.2. Schedule meetings to demonstrate Coeus and allow hands on exploration with both the Faculty Committee and the business managers.
  
13. Feedback
  - 13.1. From testers
  - 13.2. From faculty group
  - 13.3. From business managers
  
14. Tweak
  - 14.1. No major changes – only minor adjustments to fit DRI’s business rules and needs.
  - 14.2. Go back to Test

15. Train

15.1. Develop training classes – content and materials complete by end May

15.2. Train the trainers complete by 1<sup>st</sup> June

15.3. Schedule the training

15.4. Hold the training last 2 wks of June

16. Final update of Coeus with PTS data last wk of June

16.1. Update Coeus

16.2. Disable PTS

17. Coeus in Production July 1, 2001

18. Success Party

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