The Case SIS Project: An Enterprise System in Higher Education[1]

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In 2006, Case Western Reserve University (Case) initiated the acquisition, customization, and implementation of a new student information system (SIS). The Case SIS Project was intended to integrate the capture and management of all student information and student-facing administrative functions across the university's distinct schools. Key functions supported by the platform include admissions, financial aid, course selection and enrollment, grading, degree tracking, and transcript management. The initial roll-out of the system was completed in the Fall 2008 semester, and additional phases will be rolled out over the course of the 2008-2009 academic year.

Background

Case Western Reserve University is a mid-sized private university located in the Mid-western United States. The university serves nearly 10,000 students (4,200 undergraduate, 2,147 graduate, and 3,490 professional students) across nine (9) distinct schools. Traditionally, each of the schools managed its own student records, with some aggregation of basic student information in the university's legacy student information system, ISIS. Furthermore, different administrative functions were managed using a collection of distinct software applications. The Case SIS Project was undertaken in an effort to integrate these various data sources and functions across the entire university.

Case SIS was the third phase of a broader ERP installation process. The university had selected Oracle's PeopleSoft platform as the ERP package. In 2005 and 2006, the university had rolled out the first two installations of the platform, covering the Financial and Human Capital Management modules. The Case SIS was the final major installation necessary for the achievement of a comprehensive enterprise-level information system.

The Case SIS Project Structure

Several distinct roles and responsibilities were identified at the initiation of the Case SIS Project.[2] An executive steering committee and executive sponsor position were established to provide oversight of the entire initiative. The university's Vice Provost for Undergraduate Education was given the position of executive sponsor. The executive steering committee was made up of the leading financial and administrative officers of the university as well as the lead members of the project team.

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[1] This case was prepared for discussing typical challenges associated with complex ERP development initiatives. The case does not make any judgments of the appropriateness of the described practices.

[2] An organizational chart for the SIS Project is provided in the Appendix. Names have been removed to comply with guarantees of confidentially offered to informants.

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Leadership of the internal project team consisted of a Project Director, three project leads (i.e., covering Functional, Technical, and Project Management domains), multiple functional leads, and a training team. Functional leads for the project reported to the Functional Project Lead. The Functional Leads were responsible for coordinating the input of multiple functional subject matter experts (SMEs). The project's Technical Lead oversaw the work of a team of technical experts who were responsible for the primary requirements elicitation and specification processes. In addition, the technical experts were tasked with supporting the data mapping, system testing, and data conversion processes. The Technical Lead also managed a team of technical support personnel were responsible for the development and implementation of the system applications. Specifically, the technical support team was assigned to provide database and network administration, application support, data warehouse development, and portal support activities. Finally, the Case Training team was tasked with the design, scheduling, and delivery of training programs to all university user groups. This role included the responsibility for the identification of training needs; the development and maintenance of all training materials, job aids, and tutorials; the management of help-desk functions; and the formulation of a communication strategy to guide the dissemination of all enterprise system information to university stakeholders.

In addition to the internal Case Project Team, the university engaged the services of a consulting firm that specializes in enterprise system implementation within the higher education marketplace, CedarCrestone. The consulting team adopted a structure directly mirroring that of the Case Project Team. The CedarCrestone Project Manager was appointed to oversee all project management functions in conjunction with the Case Project Director. Similarly, CedarCrestone provided consulting personnel to fill the roles of Functional and Technical Consultants, supporting the efforts of their Case counterparts. Finally, a CedarCrestone Account Manager worked directly with the executive steering committee and made regular recommendations to the Case Project Director and the CedarCrestone Project Manager.

Requirements Processes in the Case SIS Project

The determination and management of requirements on the Case SIS project reflect a diversity of efforts by different segments of the project team. The project team members did not adopt a single formal approach to the elicitation and specification of functional, technical, and non-functional requirements. Rather, the processes that the team employed to capture and manage requirements emerged and evolved over the course of the project. Furthermore, the processes and artifacts employed were often the product of collaborative development by multiple members of the project team. The core requirements processes employed are outlined in some greater detail:

Preliminary Requirements Determination. Prior to the initiation of the project, several fundamental functional and non-functional requirements had been established. In large part this was the reflection the vendor selection that had occurred a couple years earlier. Since the university had selected PeopleSoft as the ERP platform for implementation and completed the installation of two of the core three primary modules, the relevant vendor platform was established well in advance of the project's onset. Thus, a large number of the requirements for the development effort were embodied in the PeopleSoft system – both the SIS module itself and the existing Financial and Human Capital Management components. In addition, several additional high-level requirements were determined

during initial project planning by the project team leadership through interaction with the executive steering committee. In large part, these requirements reflect assumptions about the development and maintenance environments necessary to support an effective implementation effort. In the Project Charter document developed at the initiation of the project, these preliminary requirements are categorized as Technical, Functional, Financial (i.e., budgetary), and Personnel.

Interactive Design and Prototyping. The central effort at requirements elicitation and specification pursued in the early stages of the Case SIS project was called the Interactive Design and Prototype (IDP) process. The IDP process was an effort to inform key stakeholders around the university community about the functionality of the PeopleSoft system and to elicit statements of need for customization or modification of the processes embedded in the platform. Thus, IDP was at its core a gap analysis effort. The IDP process consisted of focus group discussions or JAD-style sessions scheduled with every one of the over 100 distinct functional offices on campus.[3] Initiated by the Functional Leads (Case and CedarCrestone) and functional subject matter experts, the IDP sessions included the Technical Experts and focused on the input of office personnel regarding the appropriateness of the out-of-the-box PeopleSoft system for their business functional environments. The result of each session was a text-based IDP document articulating the desired modifications to the system. Initially scheduled for a sixth (6) month period, the IDP phase of the project lasted for approximately nine (9) months, forming the core of the initial requirements effort.

Ad Hoc Specifications and Team Walkthroughs. Throughout the duration of the project (and continuing through the initial rollout of the Case SIS platform), additional requirements were identified and explored by the project team leadership. In general, this ongoing requirement identification was initiated by the project's Functional and Project Management Leads. Through communication with the prospective users of the system, the need for a functional or technical change to the system in development was identified. Based on these conversations, the Functional or Project Management Leads would draw up a preliminary specification document. The format for the specification document evolved over the course of the project, but specifications were generally text-intensive. The primary graphical component of the document was the frequent use of screen shots from the development environment. These screen shots were often manually altered to convey the desired change of the users, without reference to the underlying data structure – this was considered the purview of the technical experts and support team. Very little formal modeling of was used in the specifications.

Team consensus around new specifications and change requests was achieved through project team walkthroughs. The walkthrough process was introduced roughly halfway through the timeline of the project under the recommendation from one of the CedarCrestone consultants. The walkthroughs were attended by the leadership of the project team, including the Project Director; Functional, Technical, and Project Management Leads; the CedarCrestone Project Manager and lead functional and technical consultants; and training team representatives. No prospective users, functional SMEs, or technical

[3] We use the phrase "JAD-style sessions" to convey the idea of engagement between the design team and user representatives around process design questions. However, the IDP sessions were clearly oriented toward the identification of gaps rather than a broader design effort.

experts were in attendance during walkthrough sessions. During the walkthroughs, the developer of the specification document would guide the participants through a detailed discussion of the document. Any questions or concerns would be raised and debated by the entire project team. The walkthroughs generally resulted in one of three outcomes: 1) the specification was accepted and the Technical Lead took responsibility for scheduling the relevant technical modifications, 2) the discussion raised sufficient problems with the current status of the specification that decision was made to revise and resubmit the document for later review by the team, or 3) the specification was tabled for discussion during a later phase of the development effort.

Training Requirements and Business Process Modeling. As noted above, the training team represented a subset of the project team responsible for the determination and resolution of training requirements of prospective system users. Training requirements were determined through several sources. First, many of training requirements were outlined in the documentation of the PeopleSoft platform. Secondly, the IDP process served to highlight several of the idiosyncratic training requirements of various users across the university. Finally, the training team identified a range of additional requirements through the mapping of business processes of various business units across the nine schools. Perhaps surprisingly, business process mapping was not undertaken at the initiation of the project. Rather, it was first begun by one of the CedarCrestone consultants working with the internal Case training team. After the departure of that consultant from the project, the task of business process mapping was adopted by members of the training team. The business process maps were developed outside of the development platform using Microsoft Visio. The process maps turned out to be a critical asset, supporting not simply the identification of specific training requirements but also functional requirements that had not emerged in the initial IDP exchanges with prospective users.

Forum Participation. Throughout the duration of the project, the members of the project team subscribed to and participated in an online user forum called the Higher Education User Group (HEUG; www.heug.org). The HEUG is an international organization comprised of colleges and universities using enterprise application software developed by Oracle. The stated purpose of the organization is "to facilitate sharing of ideas, information, and experiences among its members." This is achieved through online forums and discussion boards, where members can raise questions about the management of various issues and offer advice to other institutions on the implementation and management of PeopleSoft and other Oracle platforms. During the course of the Case SIS Project, the HEUG site consulting regularly. Members of the project team reported that the HEUG repeatedly served as a source of insight regarding required modifications to the platform (e.g., from institutions with similar legacy system conditions) as well solutions to challenges raised by functional stakeholders within the university. In this way, the HEUG functioned as both a source of novel requirements and the technical resolutions to existing project requirements.

Requirements Challenges

As of the development of this project summary, the installation of the Case SIS platform is generally considered a successful development and implementation effort, although the rollout of additional functionality remains. Nevertheless, several challenges were identified regarding the management of

project requirements. Several of these challenges reflect widely cited concerns with information systems development and implementation projects. Despite significant efforts at user involvement throughout the Case SIS effort, project team members complained of breakdowns in the communication with prospective users. In several offices across the campus, access to the time and effort of system users was limited. As a result, many functional requirements of the platform went unidentified until the system was almost ready for the move to production.[4] Similarly, a breakdown of communication between members of the project team (e.g., between technical and training team personnel) was cited as a source of continued frustration. While the introduction of the walkthrough process had ameliorated this challenge considerably, project team members reported that a failure to communicate substantive changes to the system continued through the first phase of the installation.

Other challenges were more specific to the context of the university's effort. The consulting staff, which represented a crucial source of guidance and insight to the internal team, experienced significant turnover during the course of the project. Dozens of CedarCrestone consultants were engaged at various parts of the effort, but only one representative of the consulting firm remained on the project from kickoff through preliminary installation. The impacts of this high rate of turnover were substantial. Several of the consultants were central to the identification and management of system requirements and their departure was viewed as a source of significant process and knowledge loss (e.g., the business process mapping effort discussed above resulted in repeated effort because of inadequate communication and management of the process artifacts). As one informant noted, "Consultants were constantly moving on and off the project, and a lot times when someone left their knowledge of the issues left with them."

The fundamental complexity of the project was also seen as a source of concern in the management of requirements. Because of the diversity of stakeholder groups (e.g., schools, offices, faculty, students) involved on the project, the project team felt that it was exceedingly difficult to arrive at a set of requirements that effectively met the needs of all users. Furthermore, prioritization of these diverse requirements was difficult, because there was no clear basis for discerning between the needs of different schools or offices. Naturally, all users saw their own needs as paramount and the Functional and Project Management Leads struggled to satisfy all groups. Furthermore, the challenge of prioritizing requirement engendered tension on the project team. An illustrative comment emerged during one of the requirements walkthrough as one of the lead consultants remarked in exasperation, "As far as I can tell, we've spent about six months pouring over minutiae because some of us don't have the ability to say 'No!'."

Finally, the project also confronted a diversity of legacy systems for integration. In addition to the university's legacy student information system, each school possessed a slew of applications for managing its various functional activities. Considering the function of admissions as an example, various schools managed this activity using different vendor applications, the university ISIS system, or even homemade Access databases. This diversity made it difficult to arrive at manageable set of

[4] Indeed, a number of requirements issues failed to surface until the platform went into production during the fall semester.

requirements for the conversion of admissions records and the development of a unified business process going forward. This complexity was duplicated for each of the functional activities that needed to be brought into the scope of the Case SIS platform. In the view of several project team members, requirements reuse was severely limited as a result.

Conclusion

The Case SIS Project provides a useful example of the issues and challenge encountered by systems implementation teams on a daily basis. Based on the study of prevailing requirements practices discussed during the first *Design Requirements Workshop* (Hansen, Berente, & Lyytinen, 2007), we can say that the Case SIS team is not unique in the idiosyncratic agglomeration of processes and artifacts that they employ to manage functional, non-functional, and technical requirements. Furthermore, the relatively limited adoption of formal modeling and other requirements specification approaches by the team represents both a challenge and opportunity for researchers in the requirements domain. Employing the framework from the first workshop, a number of relevant questions emerge for requirements research:

- *What does the Case SIS Project reveal about the importance of **a focus on business processes**? Why might these have been belatedly addressed in the SIS process?*
- *Does this case inform our understanding of the desire for **systems transparency**?*
- *In what ways are the requirements and requirements process of the Case SIS system **distributed** – socially, structurally, and temporally?*
- *The Case SIS project is a clear example of the use of **packaged ERP software**. What challenges and opportunities arise from this facet of the initiative?*
- *What insights does the project offer regarding the **fluidity of design**?*
- *Is the Case SIS emblematic of the **independent complexity** we see in today's development environments?*

Figure 1. Generalized Distribution of Requirements in the Case SIS Project

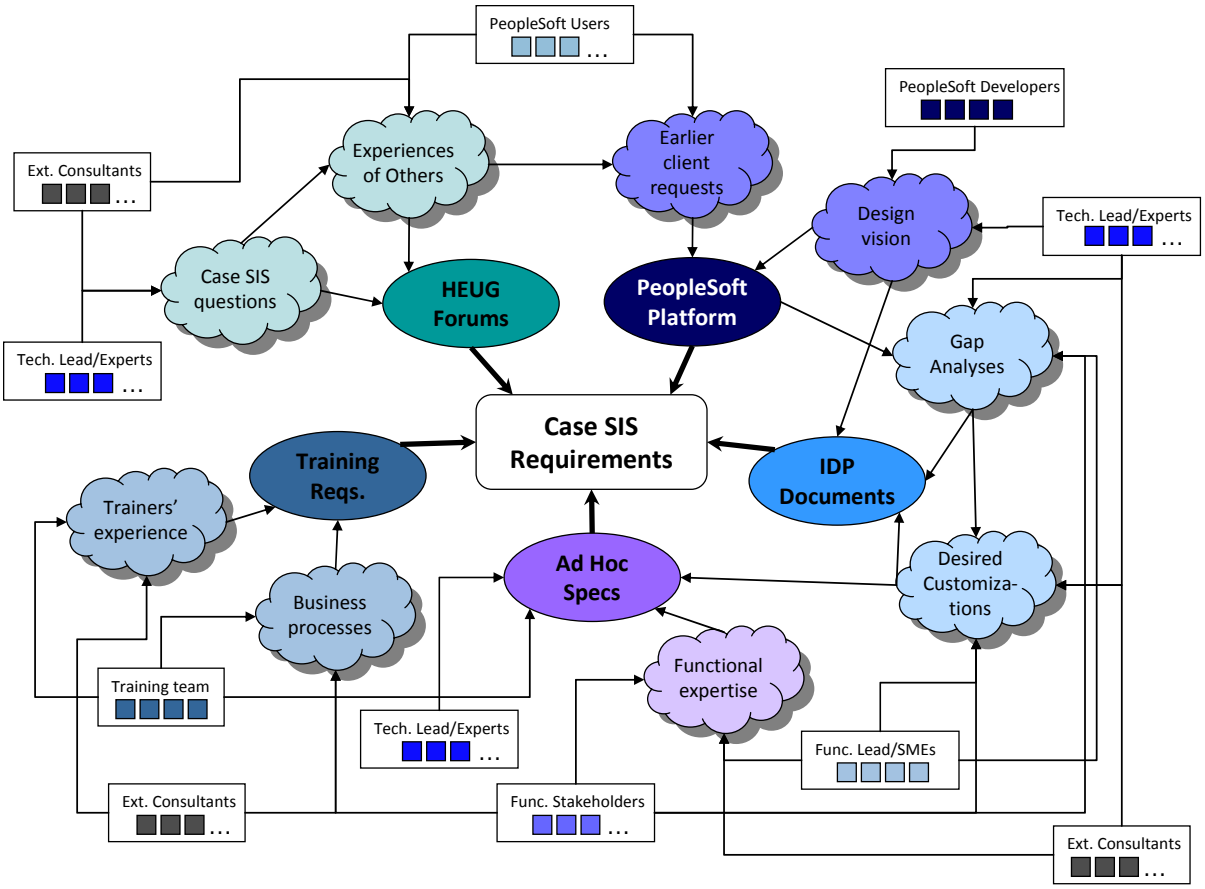

Figure 2. Timeline with Relevant Primary Requirements Processes

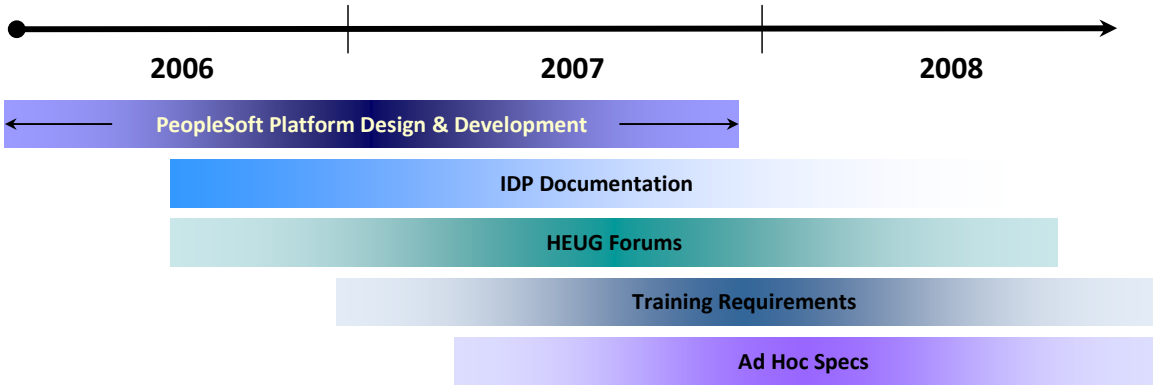

Table 1. Requirements Types by Source Process

Requirements Types	Requirements Source Processes				
	PeopleSoft Platform	*IDP Documents*	*Ad Hoc Specs*	*Training Materials*	*HEUG Forums*
Functional	✓	✓	✓	✓	✓
Non-Functional	✓	✓	–	–	–
Technical	✓	–	✓- Limited		✓- Limited
Compliance	–	✓	✓	–	–
Training	✓	✓- Limited		✓	✓- Limited
Testing	✓	–	✓	–	–

Appendix. Case Student Information System Organizational Chart