Chapter 1

Initial Investigation

This chapter presents the activities related to the first stage of the systems development life cycle (SDLC).

REASONS FOR INITIATING INFORMATION SYSTEMS DEVELOPMENT PROJECTS

Information systems development projects may be initiated for a number of reasons, which may be categorized as either problems or opportunities.

Identifying Problems

1. **User Complaints**: Users of information systems may communicate their displeasure with the functionality of their information systems directly to the systems analyst.

2. **Top Management Concerns**: Users may communicate their dissatisfaction to their senior management who, in turn, may pass the concern to the senior management or the systems analyst.

3. **Scouting**: Systems analysts, through their involvement with users may encourage the user to initiate a project request in order to officially commence work on an information system that may resolve a business problem.

4. **User Surveys**: Information systems departments may distribute questionnaires among users in order to determine if any general or specific problems can be identified within the user community.

5. **Audits**: Internal audit departments or external auditors may identify a situation with an information system that should be rectified.

6. **Analyzing Performance Trends**: Early detection of information performance problems may be identified by continually monitoring the performance of the information system. Typical problems are identified by an increase in the relative effort required of the user to operate the information system effectively. Potential problems may be identified
through symptoms, such as a bottleneck in processing transactions or a decrease in throughput.

Identifying Opportunities

Information systems development projects may be initiated because of an opportunity to apply a new idea or technology.

Idea.
1. Integration of Business Areas: Separate areas of the organization may be coordinated because of a revised approach to conducting business.
2. Strategic Advantage: The application of a new or revised information system may provide the organization with an advantage over its competitors.
3. New Regulation: A new requirement may be imposed upon an organization by the implementation of a new law or the adoption of a new accounting practice.

Technology. These days technology is changing rapidly. New technology permits greater processing speed, faster information retrieval, reduced cost per item of data, and improved security. All of these advantages may lead to the initiation of an information systems development project.

THE PROJECT REQUEST

The project request, submitted by the user or the systems analyst to the steering committee (see below), is a critical element in launching the information development project. The request is a formal way of stating the problem or opportunity to be addressed.

INITIAL INVESTIGATION

The initial investigation is conducted in order to gather more information about the problem or opportunity and to decide if the current situation warrants a solution that would require the development of an information system. The two major areas for investigation are the environment and the direct problem.

The Environment. There are a number of aspects that will affect whether and how the project will be conducted.
1. **Information System Policy Alternatives:** The systems analyst must be aware of policies such as centralization versus decentralization, charge back, vendor selection, outsourcing, and information systems development standards. All of these policies may indirectly affect a project.

2. **The Steering Committee:** This ongoing committee consists of top management who make business-type decisions about which information systems development projects to initiate and whether or not a project should proceed from one stage to another. Also, this committee may give direction to the project team.

3. **The Project Team:** This ad hoc team will consist of representatives from the user area, systems analyst(s), and any necessary technical resources that may be required as the information systems project proceeds through the SDLC stages.

**Investigation of the Problem.** When conducting investigations into this initial problem, systems analysts must be aware that they are outsiders and may be treated with distrust. It is important to be able to deal with people and to develop trust and commitment to the task at this early stage of interaction with the user.

The systems analyst may conduct a direct investigation through interviews, questionnaires, or observation. A thorough knowledge of these fact-finding techniques will help the systems analyst obtain a detailed understanding of the problem situation.

The systems analyst may also carry out indirect investigation. The systems analyst may refer to existing documentation such as procedural flowcharts in order to trace information flows. Also, records may be reviewed to determine what data are captured and used throughout the information system.

The information gathered in this initial investigation will be used now to determine the likelihood that solving the problem will be beneficial to the organization. Project feasibility will be tested in four ways.

- **Operational feasibility** investigates whether there will be sufficient support for the project from management and users.
- **Technical feasibility** determines if the necessary technology exists and is capable of providing adequate service.
- **Economic feasibility** represents a general determination of whether the resulting benefits will exceed the anticipated costs of the solution.
- **Schedule feasibility** determines if the resulting solution can be implemented within a time frame that will prove beneficial to the organization.

An initial investigation report is prepared at the end of this stage to document the specific problem and what has been determined through the initial investigation. This report represents closure to a reported problem.
and allows management, through the steering committee, to make a decision about the allocation of scarce resources to the resolution of a business problem.

The result of this initial investigation will be a recommendation to either take no action, resolve the problem through personnel changes (either reassignment or training), or continue with a subsequent stage of the SDLC.
THE SOUTHWEST UNIVERSITY FOR PURSUING EXCEPTIONAL RIGOR (SUPER) SCHOOL OF MANAGEMENT UNDERGRADUATE ADVISING CENTER

Laurie Schatzberg

Background

The mission of Southwest University for Pursuing Exceptional Rigor (SUPER) is to serve the educational needs of the citizens of the State of New Mexico. Toward that end, SUPER (1) develops and offers comprehensive educational programs at the associate, baccalaureate, masters, and doctoral levels in a wide range of academic and professional fields; (2) conducts research and engages in other scholarly and creative work activities to support the educational programs and to create, interpret, apply, and accumulate knowledge; and (3) contributes to the quality of life in New Mexico by providing selected services to the public that are part of, contribute to, or originate from the uni-

This case was prepared by Laurie Schatzberg, University of New Mexico, as the basis for class presentation and discussion rather than to illustrate either effective or ineffective handling of an administrative situation.
versity's teaching and scholarly activities. Institutional values include excellence, integrity, academic freedom, caring, industry, and diversity. Fifty thousand (50,000) students attend SUPER, an urban university in a region in which rich cultures have developed in concert for centuries. SUPER is situated on the banks of the Rio Grande in Albuquerque, a city which is both the demographic and geographic center of the state.

Undergraduate academic advising is partly decentralized at SUPER. For the first 2 years, most students are advised by University College advisers, who help students plan their college programs and keep students apprised of their progress toward meeting preadmission requirements to SUPER's several academic and professional schools (Architecture & Planning, Arts & Sciences, Education, Engineering, Fine Arts, Law, Management, Medicine, Nursing, and Pharmacy). When a student is admitted to the school of his/her choice, the student's advising record is transferred to that school, which then assumes responsibility for advising.

SUPER School of Management (SSM)

There are about 1,500 undergraduates and 800 MBA students enrolled in the SUPER School of Management (SSM), which is fully accredited by the American Assembly of Collegiate Schools of Business (AACSB). SSM is an upper-division school within SUPER, meaning that undergraduate students complete their first 2 years of courses before they are admitted to SSM. This case is focused on undergraduate advising, and all future reference to “student” will refer to “undergraduate student.” Since students complete their first 2 years at a variety of institutions, the SSM Advising Center admission process must address a host of institutional and student needs.

Students may complete the required preadmission course work at SUPER, at other schools in New Mexico (contractual agreements guide intrastate transfer of credits), or at other schools worldwide. The minimum admission requirements are listed below. However, fulfillment of these minimum requirements does not guarantee admission to the SUPER School of Management.

SSM Minimum Admission Requirements

1. Minimum scholarship index of 2.5.
2. Competence in written communication evidenced by a C+ or better in SUPER's English 102, or achieving a score of 32 on the English portion of the ACT, or a score of 600 or higher on the verbal SAT.
3. Minimum grade of C+ in each of the specific requirements (see Appendix I) included in the preadmission course work.
4. Completion of 62 semester-hours of preadmission work (see Appendix I).

All SSM students complete an upper-division management core of courses (see Appendix II) before pursuing a concentration. Students may choose zero, one, or two concentrations to focus more sharply on their studies: accounting, finance, international management, management information systems, management of technology, marketing, organizational behavior/human resources, operations management, or strategy. Requirements for each concentration are given in Appendix III.

SSM Undergraduate Advising Center—Under New Management

The SSM Undergraduate Advising Center has begun a new era. The program manager has left the organization after being selected
for a terrific job elsewhere at SUPER. That this manager was offered such a good position also suggests that, despite its problems, the Advising Center maintains a solid reputation. Thus, while there are clear areas for improvement, the center is highly valued.

The SSM dean recently filled the program manager position with Rosalinda Goldstein, a dynamic change agent. Rosalinda earned a BBA from the University of Pennsylvania and an MBA with a concentration in marketing from SSM, and has 10 years' experience in career counseling at a small private school in upstate New York. Ms. Goldstein was eager to move back to Albuquerque for this position.

Ms. Goldstein is determined to preserve the strengths of the Advising Center while moving quickly to improve customer service. She expects to implement powerful computer-assisted services to enable the staff to become more productive and offer higher-quality services to (potential and current) students, alumni, faculty, and administration. Ms. Goldstein is keenly aware of the need to please customers with proactive measures and is also intrigued by much of what she reads in the popular press about customer-oriented systems.

Ms. Goldstein has met her staff members and, in general, is favorably impressed with their motivation to help students and their general willingness to change their operations; they seem to understand that such change will require their learning new skills and, perhaps, new ways of working with customers. She has also taken a software and hardware inventory (see Appendix IV). She is sure that some efficiencies can be gained from a serious analysis and redesign of work flows—even if no computer-assisted functions are added. However, she is willing to invest in software, hardware, and training to bring the Advising Center to a new level of professionalism and campus leadership.

After a series of meetings with some current SSM students and alumni, a few lower-division students, her staff, interested faculty, and the dean, Ms. Goldstein's initial conclusion is that the most important priorities for Advising Center improvements are to (1) enable students to have on-line read and update access to their respective advising records; (2) train the staff with more in-depth advising knowledge about specific concentrations; (3) use and encourage e-mail communications; (4) replace the paper transfer of advising files with electronic transfer; and (5) develop prerequisite verification and notification procedures to accompany the class registration procedures. To accomplish these priorities, Ms. Goldstein understands that she must enlist the cooperation and support of her colleagues at University College, other SUPER schools, and other educational institutions.

SSM Undergraduate Advising Center—Many Views

After meeting with representatives of each of the Advising Center constituencies, Ms. Goldstein compiled her assessment of their concerns and priorities for working with the Advising Center. These notes will also provide background for the consultants she hires to lead their systems development initiatives.

Advisers' View

The SSM Undergraduate Advising Center provides several services to students, and as the SSM has grown in enrollment, advisers find themselves stretched to their limits. For that reason, they are eager to modernize their operation. Jerry Wolf, Florence Lee, and John Zinn are the full-time advisers. Jerry has a cautious attitude toward using computers. He has used e-mail and some basic PC tools, but is somewhat anxious
about his work becoming dependent upon good computing skills. Florence, on the other hand, is eager to become more computer-capable and welcomes the thought of using new computer-based tools on her job. She expects to use new skills to become more competitive in the job market. John Zinn loves working with computers, and would enjoy helping to develop new applications for the Advising Center, although he lacks any formal training in systems development. He is an SSM grad who went on to earn a degree in career counseling.

Al Newman is the receptionist/scheduler. He maintains a calendar for scheduling all appointments for students to see their counselors. Students come into the office personally to set up appointments. Most appointments are for 15 minutes. Al is quite capable, but is discouraged from providing specific information to students on the phone or when they drop by. He is somewhat frustrated by this limited role, since he is kept well informed of requirements. On occasion, he answers students' questions anyway. Joan David is the work-study student this year. She runs errands, does filing, and often serves as a campus courier between the Advising Center and the registrar or University College. She is a music major and is quite personable, often chatting with students as they wait for their appointments. She is also quite bright and will "unofficially" inform students on the ins and outs of the SSM. Students have come to trust her insights, and see her as an excellent ambassador for the school.

There are two types of counseling responsibilities: direct student advising and related support functions. The Advising Center staff is proud of its ability to meet with each student during the semester but is frustrated by the many hours spent in repetitive types of activities. And, while staff members understand the need for much of the data they generate, they feel overwhelmed by the volume of manual lists and reports they must create. They are certain that accuracy is not high, since they often find errors in their own work when they revisit student files.

The reporting and data analyses are done with very rudimentary tools (calculator and word processor) and result in a significant amount of redundancy, inconsistency, and inaccuracy. The advising discussions with students are generic. Since most of the discussion time is devoted to the selection of courses toward students' majors and tracking progress toward graduation, there is little opportunity for systematic personalized advising. Advisers' major tools for helping students select courses are the SUPER catalog that includes both SUPER and SSM BBA requirements, and their own memories. There has been no attempt to automate routine functions.

Student Advising. Rosalinda, Jerry, Florence, and John divide up the counseling load alphabetically: Rosalinda advises students whose surname begins with the letters A–D; Jerry advises students with surnames E–K; Florence advises students with surnames beginning L–R; and John advises students with surnames beginning with S–Z. Advising consists of (1) a scheduled meeting with each assigned student each semester to review and update the advisement summary (see Appendix V); (2) occasional meetings to discuss problems that arise during the course of a semester; and (3) graduation checks to verify that students who expect to graduate in a given semester are actually eligible to do so (see Appendix VI).

Support Functions. Related support functions include (1) manually updating the SSM advisement summary (Appendix V) and grade point averages (GPA) for current SSM students when grades are posted by the SUPER registrar [Note: SSM maintains
not only the students’ overall GPA, but also the GPA earned for all management and economics courses; at the end of each semester, the former is copied from registrar information, while that latter is computed with a calculator after official grades have been received from the registrar; (2) evaluating and making decisions regarding admission applications; (3) coordinating and cooperating with SUPER University College and the other SUPER schools; (4) developing a variety of reports concerning the demographics of applicants, current students, and graduates; and (5) conducting appropriate SUPER, community, and statewide outreach activities to stimulate and maintain awareness and interest in SSM undergraduate programs.

**Students’ View**

Students view the SSM Advising Center as the place to go for help in developing their plans of study and for information they might need on an ad hoc basis. To meet with an adviser requires an appointment and appointments are usually available within 48 hours of a request. For quick questions, students often get answers from Al or from Joan. While students know that only SSM advisers are *authorized* to advise them, they also know that Al and Joan have a reputation for being accurate and for knowing what the limits of their knowledge are. E-mail is not formally encouraged as a means of communication, but students do occasionally use e-mail to try to get quick “official” answers from advisers. Response time and thoroughness in e-mail queries is inconsistent.

Students like being assigned a specific adviser and generally feel that they are given clear instructions and choices. Since there are so many courses, possible concentrations, and combinations, advisers often are not able to answer detailed questions about courses that might relate to specific student interests. For answers to such questions, students are referred to a faculty member in the subject area, often needing another appointment.

Students view the “work” conducted during an advising session with mixed feelings, especially since they need appointments to have these meetings. The initial part of such a meeting is spent with the adviser checking off boxes or filling in spaces on a form based on a student’s intentions or completed work. Then the adviser summarizes “what’s left” and answers remaining questions. Students often say that they could do much of this without the adviser. Moreover, they might be considering several options that they’d like to evaluate on a “what if” basis. Given the nature of the work as currently designed, students are somewhat reluctant (and implicitly discouraged) from asking advisers to work out alternative plans for them. Further, students leave each session with their own notes and “to do” lists, as the Advising Center has no standard form for them to monitor their own progress and plans between advising sessions.

**SSM Administration’s View**

The SSM deans call upon the Advising Center to provide a host of data and reports intended for the accrediting body (AACSB), SUPER administration, potential students (in high schools and in lower-division courses), and the legislature. Semiannual reports are tedious to compile since the data is not in an electronic form. Examples of reports generated include: enrollment by concentration, gender, and ethnicity; and admission and graduation statistics by concentration, gender, and ethnicity. Ad hoc reporting is rarely possible and spontaneous queries are unanswerable because of the manual data management process.

Recently, there is an interest to determine course-load patterns, time-from-
admission-to-graduation trends, concentration-changing patterns, incoming computer skills and resources, and success rates as a function of students’ lower-division preparation. None of these analyses is practical to consider at this time, and yet the insights that these types of queries could bring would be invaluable for positioning SSM resources to best match student needs. While the deans cannot anticipate all their reporting needs, they feel quite certain that if good data were available it would help them. Furthermore, they are beginning to recognize that the lack of such good data is a clear hindrance to the SSM progress. It is a new awareness, since they had previously felt that investing in systems to support a “support” function should not be a high priority.

SSM Faculty’s View
The faculty of SSM functions as “shadow” advisers and, as a whole, invests a large amount of time meeting with individual students to refine their study plans. Such individualized tailoring has not been a formal or explicit function of the Advising Center, but seems absolutely necessary to enable students to get just the right courses to support their individual talents, interests, and career plans. Most faculty members feel that some level of advising is appropriate, but that their time should be reserved for truly unique situations beyond what the Advising Center staff can handle. Given the resource mix of the Advising Center, then, the faculty believe that the threshold for “ask a professor” is currently too low. That is, they would support automation to do the routine tasks, and training the Advising Center staff to conduct more appropriate advising sessions. Faculty advising would then be limited to those situations that require faculty insights.

SSM faculty members would also like to see additional services. They specifically want some type of course preregistration logic developed such that only students who have met all the prerequisites for a given course would be able to register for that course. Currently, prerequisites are checked (or not) manually and the issue is largely left to professors’ announcing at the beginning of each semester that students who have not satisfied prerequisites will not get credit for the course if they are caught. This service might be a candidate for implementation either by the SSM Advising Center or universitywide by the registrar.

University College View
The staff of the University College is reasonably satisfied with interactions with the SSM Advising Center. Using campus mail, University College sends student files to the SSM Advising Center twice a semester on behalf of the students who have declared that they will apply for admission to the SUPER School of Management. The paper files contain student demographic information and a listing of all courses taken or transferred toward the degree. The listing includes the semester and year in which the courses were taken as well as the grades earned.

As a courtesy, the SSM Advising Center informs University College of the disposition of each student whose file they have received. There are several possible outcomes: (1) student never actually applied, (2) student applied and was admitted, (3) student applied and was not admitted [reason will be stated], (4) student applied and was given a probationary admittance [conditions will be stated], or (5) other [specifics will be stated]. Since the requirements for admission to SSM are well documented, most students who apply meet the minimum qualifications and, if space permits, they are admitted. See Appendix VII, Admission Tracking Card.
Potential Customers’ View
Lower-division college students and high school students considering a business education are all potential customers. These potential customers are not well served by outreach activities, since the Advising Center staff is largely involved in daily student advising meetings. Many potential customers are not even aware of the opportunities available through SSM, and make their education and career choices without seriously considering a management education at SUPER School of Management. Potential students who do seek to learn more about business education possibilities are often unable to schedule appointments with an adviser (since advisers give priority to current students). Clearly, goodwill is lost in this process, as are some good students. There is no way to determine the exact cost of these failings.

SSM Undergraduate Advising Center—
The New Beginning
Ms. Goldstein wants to hire a small team of systems developers to guide the process of change. She is interested in working with a team of excellent systems analysts and communicators who can demonstrate early on that they understand the environment, the issues, and the constraints under which the Advising Center must flourish. She expects a thorough, though rapid, analysis and design cycle and an implementation plan.

Teams who complete the milestones that accompany this case will develop and use a combination of skills: technical systems analysis, information modeling (using DFDs, ERDs, and a dialogue chart), business communication, and group project management. The result will be a comprehensive project repository, a functioning prototype of the new Advising Center system; and, for the users, system documentation and help files, and documentation for any new procedures, and training, implementation, and maintenance recommendations.