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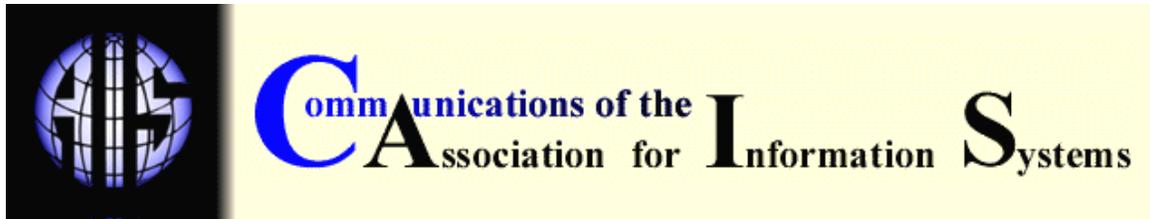
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KNOWLEDGE ACQUISITION THROUGH CASE STUDY DEVELOPMENT: A STUDENT RESEARCHER PERSPECTIVE

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ABSTRACT

Educators are increasingly incorporating the development of research case studies as a course assignment in graduate and executive degree courses. Each student (or student group) develops a research case study that provides theory-based explanation and discussion of how a real organization managed a business issue related to the course. In the process, the student gains a deeper understanding of business theories and their applications as well as current business issues and their interactions with internal and external organizational forces. While a significant amount of literature is written on developing case studies for full-time academic researchers, little is done to provide guidelines to student researchers, who face unique issues and constraints in this research-based learning process. This paper introduces case study research method and offers a roadmap to student researchers.

KEYWORDS: case study research method, learning techniques, teaching assignments, student researchers, qualitative research

I. INTRODUCTION

Most of the graduate and executive degree students in business schools are working professionals. They regularly face complex business problems and decision-making situations that demand swift resolutions. To diagnose and solve these problems or make critical decisions, these students must be able to select and apply appropriate business theories and concepts. They have to become knowledge workers in the true sense by embedding this cyclical process of learning and application in their behavior rather than treating the process as a specialized activity [Nonaka and Takeuchi, 1995]. As most of these problems and situations span functional and organizational boundaries, these students must be able to work in groups with other professionals. In essence, they have to create a learning organization, "where people continually expand their capacity to create the results they truly desire...and where people are continually learning how to learn together" [Senge, 1990, p. 1].

We, in academia, should prepare our students for this new challenge. We should educate them so that current and future corporations become learning organizations. Learning should not stop at the gates of business schools. As Charles Handy [1989, p. 142] articulates, corporations

should increasingly resemble universities and colleges, whereby employees continuously learn from a methodical analysis of every business decision and outcome. Incorporating the development of research case studies by students as an assignment in business courses is of significant help in this effort.

Case study development, as discussed in this paper, calls for students to select complex, emerging business issues and write research case studies on how organizations have handled those issues. In these case studies, students describe company background along with its structure, decisions, timeline of events, and/or performance as they do in developing teaching case studies or other typical course assignments. But more importantly, they identify and apply theories and concepts they studied in their course to explain the solutions (or decisions, or events) chosen by the subject organizations or to find better solutions. Unlike teaching case studies, research case studies require explicit discussion and application of theories and analysis of business situations from the viewpoints of theories. In the process, students not only learn those theories but also how to apply them in real business problem-solving and decision-making situations. As this methodical approach to learning is ingrained into students' work styles, it increases the likelihood of their success in applying the right theories to the right problems to find more appropriate solutions long after they graduate. Having recognized this potential, an increasing number of instructors now include case study development as part of course work (The importance of case study development in business education in general and information systems (IS) education specifically is discussed in more detail in Appendix I).

Case study development is a well-established and widely-used research method in social sciences and in management fields [Tellis, 1997]. IS researchers also recognized it as one of the most important ways in which IS theories are developed or confirmed [Klein and Myers, 1999; Pare and Elam, 1997; Trauth, 2001]. Detailed procedures and methodology for developing research case studies with special reference to the IS field have also been outlined [Benbasat et al., 1987; Cash and Lawrence, 1989; Klein and Myers, 1999; Lee, 1989; Trauth, 2001; Walsham, 1995; Yin, 1993]. However, most of the literature is aimed at full-time academic researchers; almost none focus on case study research as a learning tool in graduate and executive degree programs.

Students in the role of researchers face unique issues. They are neither full-time nor purely academic researchers, but are researchers-in-training and in most cases limited to applied research. Their focus in developing a case study as a part of a course is not on developing a new theory or confirming an unconfirmed theory. Their primary objective is to learn to apply a theory to a business problem or event in order to develop a better understanding about the theory and the problem or event. However, these student case studies are still research case studies analogous to analytic generalization discussed by Yin [1993] in which a developed theory is used as a template against which the evidence of the study is compared. Students also face uncompromising constraints such as a short and inflexible time frame, limited resources, little or no exposure to the research process, and the specific learning objectives of the course. In addition,, student researchers often lack the level of motivation and training of an academic researcher, since doing research is not their primary job.

Therefore, students need a roadmap specifically developed for them to guide them in developing research case studies and increase the rigor and relevance of these studies within the constraints. This paper identifies specific activities that students should perform and pitfalls they should avoid in developing case studies. It specifically targets graduate and executive degree students in business schools. The author believes that case study development as discussed in this paper may not be an equally effective learning tool in most undergraduate business programs.

The paper is organized as follows. Section II introduces case study research design to students and provides an overview of the research process including the major activities involved. Section III discusses the issues related to the selection of a research topic and a subject organization. Section IV discusses various sources of data and methods of data collection. Section V discusses issues and techniques involved in data analysis and interpretation. Section VI provides crucial tips on case study write-up. Section VII outlines a detailed twelve-week schedule to carry out these activities within a standard academic semester. The last section (Section VIII) offers concluding remarks and some cautions.

II. CASE STUDY RESEARCH DESIGN

Case study research is a method to examine a phenomenon in its natural settings [Benbasat, 1984]. Figure 1 shows a general flow of major activities involved in case study research. The length of an ellipse suggests the amount of time the researcher generally needs to allocate to the activity. Some of these activities may overlap one another and be simultaneous; some activities may depend on the successful completion of other activities. Activities are categorized in four groups and discussed in detail in the next four sections

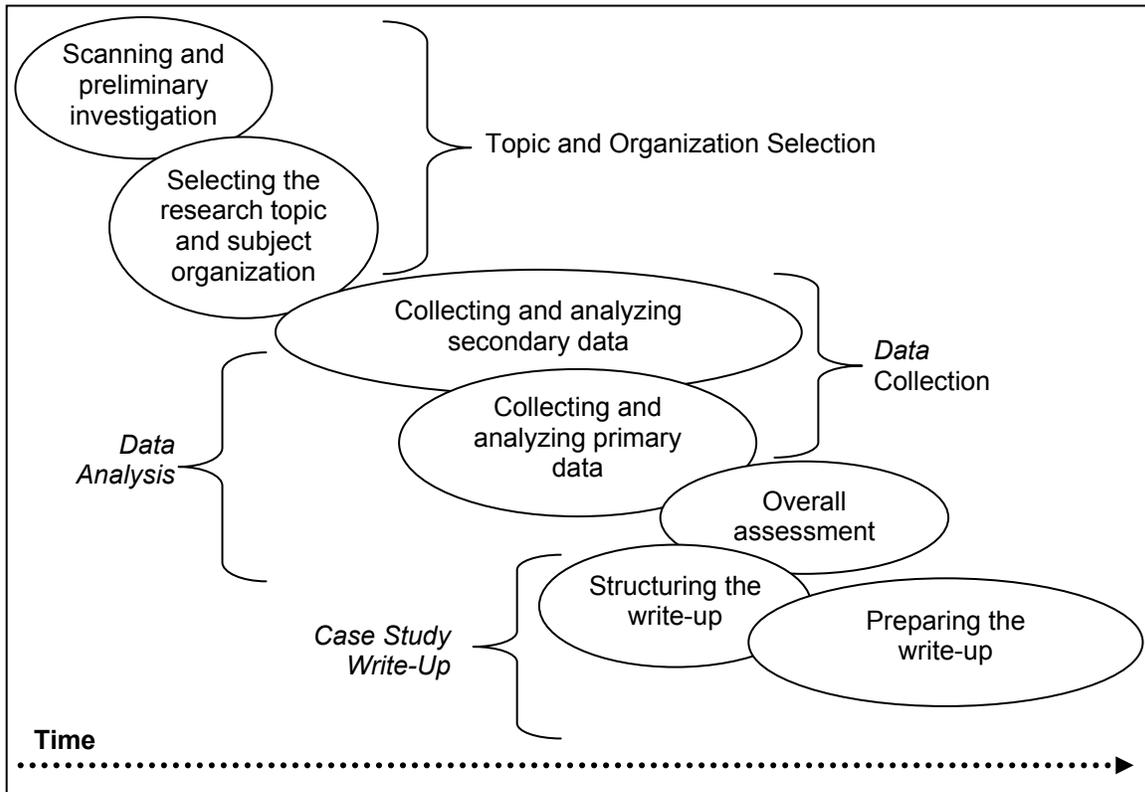


Figure 1. Major Activities in Case Study Research

Like all other research methods, case study research has inherent problems that can make it less rigorous and diminish its power of interpretation. However, if these problems are properly addressed, case study research can be an ideal vehicle for gaining a deeper understanding of implicit and explicit business processes, and of the roles of people and systems in organizations [Campbell, 1975; Dukes, 1965; Hamel et al., 1993; Lee, 1989; Stake, 1995].

Case studies are inherently flexible. Many case studies fail because researchers do not properly organize the research process, not because of uninteresting research topics or unavailability of necessary information. Failure to anticipate and plan for the activities involved in the process can lead to:

- not looking hard enough at critical information during observations,
- omitting a key analysis in the write-up, or,
- in the worst case, complete breakdown of the process.

Developing a detailed plan and a schedule for the study helps students understand the entire process prior to carrying it out. It enables students to *a priori* identify and methodically address all critical issues in the right sequence at the right time. The plan also helps to avoid the time crunch and stress that may develop toward the end of a semester.

RELIABILITY AND VALIDITY

Student researchers should also understand issues related to the reliability and validity of case study research to improve the quality of their case studies.

Reliability assures that the particular research technique, applied repeatedly to the same object, would yield the same result each time [Babbie, 1989]. Because the contexts in which case studies are prepared are constantly changing organizations, assuring reliability is a challenge. Using a proper case study protocol and following systematic research design procedures helps achieve higher reliability [Johnston et al., 1999; Yin, 1994].

Validity refers to the degree of confidence in the study results by researchers and managers [Davis and Cosenza, 1993]. It deals with reducing errors in research design and measurement to make the results more accurate and usable. Among various types of validities, four validities relevant to student case studies are: Internal, external, construct, and content validity.

1. Internal validity is the degree to which the findings of the study are relied upon as being correct [Davis and Cosenza, 1993]. It primarily concerns case studies involving causal or explanatory interpretations, whereby alternative interpretations are ruled out [Cook and Campbell, 1976; Yin, 1994]. It requires researchers to use their understanding of the theory and familiarity with the context to interpret results. Internal validity may be a problem for student researchers because their knowledge of theory and context is limited. However, it is not a grave issue because

- the overriding purpose is learning, through instructor feedback and even mistakes, and not theory building and
- most student case studies are exploratory, descriptive, or applied, in which case internal validity is less critical.

2. *External validity* refers to the validity with which a causal relationship can be generalized across times, settings, and persons [Campbell and Stanely, 1966; Davis and Cosenza, 1993]. In all case studies, because the context of a study is often unique to the subject organization and all circumstances may not repeat themselves, the study findings may not apply to other organizations or other industries, leading to low external validity.

3. *Content validity* refers to the degree to which all aspects of the concept are studied [Davis and Cosenza, 1993]. Content validity is a challenge in student case study development because students are operating in a very short time frame and with limited exposure to the background literature.

4. *Construct or theoretical validity* is the degree to which the measurement scale represents the concept being measured [Davis and Cosenza, 1993; Kirk and Miller, 1986]. In case study research, construct validity refers to the relevance of the questions asked during the interviews and other data collected from internal and external sources. Student researchers must be very careful in data collection, because they generally do not have the ability, experience, or training to ask appropriate questions and to access and collect the right data.

The following sections discuss in detail the activities involved in case study development, the actions students should take to increase reliability and validity, and the pitfalls they should avoid to improve quality of their case studies.

III. SELECTING THE RESEARCH TOPIC AND ORGANIZATION

For student researchers, selecting the right topic is vital to achieve personal and course objectives. Generally, the most appropriate research topic [Benbasat, 1984; Benbasat et al., 1987] is the one in which

- research is in the formative stage,
- the experiences of the participants (or subjects) are important, and

- the context of action is critical.

However, students may select a topic that interests them and about which they want to learn more. Research questions related to the topic selected will become the central focus of the study and drive the process of inquiry and learning. Providing contributions to the current knowledge base is secondary and should be viewed as a byproduct of the process.

Instructors, in some cases, may provide a list of possible topics or assign a specific topic. If not, students should initially select two or three research topics from the key concepts covered in the course. Contemporary topics are preferred because they bring relevancy and provide a firsthand look at the emerging trends in IS. The topics should also be defined broadly. All case studies involve unique and non-replicable events [Lee, 1989]. Broader research topics that have parallels in other organizations and industries make the implications transferable to other contexts and settings (different organizations, situations, or people) and improve external validity. To identify emerging and broad topics, students should scan current news reports and articles in trade publications associated with the topic or in typical IS-focused publications such as *CIO*, *ComputerWorld*, *InformationWeek*, *Datamation*, and *eWeek*. The instructor may also provide a list of leading publications related to the topic. As topics are identified, students should develop a familiarity with each topic before making their selection. A student researcher is not expected to become an expert in the topic selected. However, familiarity with a topic and interest in the study of a topic are the key success factors.

HISTORICAL TOPICS

Students should avoid historical topics. Those topics are difficult to carry out, because the relevant contextual set up including organizational structure, processes, and individuals change and detailed information is not easily available [Gentile, 1990]. Locating and interviewing individuals who are no longer with an organization and accessing relevant but old information sources can take up significant amount of time and resources, both unavailable to student researchers. Students should also try to avoid a politically charged and highly controversial topic. Unless such a topic is a part of the student's learning objectives, it can divert attention away from the actual learning objectives.

CASE STUDY TYPES

The topic selected will largely define the type of case study the student will develop. Case study types are:

- Exploratory, explanatory, and descriptive cases [Yin, 1994];
- intrinsic, instrumental, and collective cases [Stake, 1995]; or
- decision-focus, compare-and-contrast, demonstration, implementation, case series, quantitative, mini (for specific application/example of a particular issue), and summary cases [Gentile, 1990].

Instead of going into the details of these types and understanding the differences among them, students should focus on building their case studies around at least one of the four following situations, identified by Yin [1994].

- Describing real-life interventions. Examples: An unusual method of system development or implementation, an unprecedented case of IT adoption or diffusion in an organization, IT-enabled business process innovation, a unique IT-enabled solution for a business problem.
- Describing the real-life context in which the interventions have occurred. Examples: Organizational restructuring, introduction of a disruptive technology, dramatic change in the competitive position.
- Explaining complex causal links in the interventions. Examples: The impact of a specific information system on productivity, profitability, competitive position, industry structure or employee morale, the role of individual and organizational factors in the

adoption of IS innovations, an unanticipated relation between IS and business changes.

- Exploring those situations in which the interventions being evaluated have no clear set of outcomes. Examples: E-business and profitability, IT investment decisions, impact of the Internet on the competitive environment, some unusual or puzzling effects of an IS.

Appendix II provides a list of good case studies that students can use as reference points in developing their own case studies. Given the time and resource constraints, students should focus on case studies that are:

- single (involving one research object or one decision or event in one organization) and
- holistic (involving one “unit of analysis;” e.g., a system, a process, individuals within the organization, project groups, functional divisions, overall organization, the supply chain of the organization, alliances of the organization, the industry, culture, or society depending on the research topic).

Single, holistic case studies are more appropriate for applying and testing a well-formulated theory on a specific unit [Yin, 1994], which is a purpose of this exercise. Students should avoid multiple (involving multiple research objects for comparison or to replicate observation) and embedded (involving multiple units of analysis-subunit within unit) case studies. However, in class discussion, after case study projects are complete, the instructor should try to combine similar student cases to find logical replications of findings among them. This analysis helps students transfer findings of their case studies to other settings. To achieve this goal, case study write-ups need to be submitted a few days in advance of the last class or the case studies need to be presented in the last class, followed by discussion.

IDENTIFYING ORGANIZATIONS

Once the topics are selected, identify one or two organizations per topic that are interesting to study. For practical purposes, identify organizations that are located within one hour of driving. IS research topics require access to the internal functioning of the subject organization. Gaining this access is not easy; it demands proper planning [Yin, 1993]. For students, it is extremely useful to have an acquaintance in the organizations identified, if not directly, through friends or the instructor. Such a relationship can significantly reduce the time required for establishing a rapport with the organization. Students may choose to select their own organization for the case study but they (1) must make sure that they are in compliance with the organization’s confidentiality policy and (2) must always receive the explicit pre-approval of the immediate supervisor. This disclosure helps students because they will be able to freely discuss the study with work colleagues and managers who may provide valuable contributions, and avoids the dreadful consequences of an undisclosed study.

A list of the organizations identified should be prepared, listing the organizations that are more likely to give permission for the study at the top. Select the organization that is first to give permission and start the study immediately. The acquaintance in the target organization should be contacted to request pre-approval from the manager who has the authority to approve the study project. The process may be initiated by a telephone call, but should be followed by a formal detailed written/email request. The follow-up request helps the organization clearly understand the objective and scope of the study. The request should:

- Clearly describe the purpose and process of the study.
- Identify all student members of the research team and the instructor of the course.
- Identify the types of people needed for interview for the study.
- Identify the type of internal information (memos, logs, etc.) necessary for the study.

- Clarify the amount of time, efforts, and expenses, if any, required on the part of the organization.
- Describe the benefits to the organization for the participation.
- Provide an assurance of full confidentiality in confidential matters.

During the study, researchers will invariably find interesting but irrelevant topical diversions. Focusing on the original objectives and topic are crucial for the successful completion of the study. Student researchers, who are constrained by time and learning objectives, have little latitude to explore diversions. In addition, the quality of data collected and questions asked in interviews depend on how well students maintain focus. A lack of focus may lead to poor data and flawed interpretations and may reduce construct validity of the study. Students, just like professional researchers, should not try to 'kill many birds with one case' [Gentile, 1990]. There will be other times, other studies, and other courses to address those diversions.

IV. COLLECTING DATA

PRIMARY AND SECONDARY DATA

Two types of data are collected for case studies: Primary data and secondary data. Primary data are the data collected specifically for the study and directly by the researcher. Secondary data are originally generated for a different purpose but are useful for the study. Data come from two sources: Internal sources and external sources. Internal sources are internal to the subject organization and require permission of the organization to access and reveal them. External sources are external to the subject organization and generally in the public domain. Figure 2 shows a matrix of data types and sources.

		Sources of Data	
		Internal	External
Type of Data	Primary	<ul style="list-style-type: none"> • Interviews and Q&A sessions with operational, managerial, and support personnel in the subject organization. • Direct, unobtrusive observations of actions, behavior, interactions, processes, and details. 	<ul style="list-style-type: none"> • Interviews with independent, outside experts. • Interviews with customers, suppliers, competitors, regulators, and unions of the organization. • Survey of experts or other relevant external entities.
	Secondary	<ul style="list-style-type: none"> • Documentations (official letters, memos, internal company reports, internal white papers, annual reports, SOP manuals, IPO prospectus, minutes of meetings, press releases, etc.) • Digital records (Web sites, on-line store, databases, intranet, groupware-based discussions, extranet/EDI, etc.) • Archival records (organizational charts, process charts, service records, maintenance records, performance records, personnel records, market research reports, financial and accounting records, etc.) • Physical Artifacts (devices, computer hardware, network configurations, tools, product samples, models, etc.) 	<ul style="list-style-type: none"> • Newspapers and magazines articles • Reports of independent agencies, government agencies, industry association, voluntary industry groups, etc. • Organization-specific and industry-specific reports from research and consulting companies. • Statistics from government sources.

Figure 2. Matrix of Data Types and Sources

Data collection is the most intense and time-consuming phase of case study development. Proper planning of this phase is critical to collect all necessary data with high efficiency. Conducting an exhaustive search of the literature and data sources and discussing it with the instructor, or soliciting an expert opinion before actually collecting data, will strengthen the study and improve content validity [Davis and Cosenza, 1993]. Relying on a few data sources, biased or selective data collection, and limited pooling of available information can create barriers to learning [Garvin, 2000].

TRIANGULATION

Utilizing triangulation in this phase will significantly increase accuracy, validity, and reliability of the study [Denzin, 1984; Stake, 1995; Tellis, 1997; Yin, 1994]. Triangulation refers to the convergence of evidence or various interpretations on one meaning [Bonoma, 1985; Stake, 1995; Yin, 1994]. Four types of triangulation are [Denzin, 1984].

- data source,
- investigator,
- theory, and
- methodological triangulations

In data source triangulation, the researcher looks for the data to remain the same in different contexts. Using multiple sources of data, multiple methods of data collection (e.g., interviews, personal observation, surveys.), establishing patterns in the data, and having the case study reviewed by the key informants can ensure this triangulation and increase construct validity [Yin, 1994].

In investigator triangulation, several researchers examine the same phenomenon. Most student case studies are group projects; encouraging the active participation of all group members in data collection helps to achieve this triangulation.

In theory triangulation, the researcher interprets the same results from different viewpoints. Encouraging other viewpoints in the interpretation of collected data and developing a willingness to accept them as well as periodic discussions of the interpretations with the instructor ensure theory triangulation.

In methodological triangulation, one research method is followed by another to increase the confidence in interpretations. This type of triangulation is not as important for student case studies.

INTERVIEWS

Interviewing key people is an important way to collect primary data. Interviews can be structured, open-ended, or focused [Tellis, 1997].

Structured interviews use a detailed and developed set of questions like surveys. They are used to collect directly related, critical pieces of information.

Open-ended interviews involve requesting elaborate comments on certain events, decisions, or solutions. They are used to gather intricate information and opinions.

Focused interviews are short and direct. They are primarily used to confirm data collected from other sources.

Before the interviews, students should develop a preliminary list of questions. Developing such a list in consultation with the instructor will significantly improve construct and content validity. Most of these questions should be framed to obtain necessary information that is not available from secondary sources, while some questions may be needed to reconfirm critical information. Do not waste the interviewees' time with questions that are irrelevant or can be answered by secondary data. When possible, provide the questions to the interviewees prior to the interviews to give them time to prepare. Spontaneous questions may confuse interviewees and lead to vague or insufficient answers. Remember, case study research is not investigative journalism.

ADDITIONAL DATA COLLECTION CONSIDERATIONS

Case studies invariably involve multiple endogenous and exogenous factors affecting the issue under observation. Some of these factors may not be of interest to the researcher, are distracting, or may even taint observations. Unfortunately, these factors cannot be controlled for because either they have already happened or the researcher does not have the authority to intervene. Student researchers must learn to block out irrelevant factors and focus on the central issues during data collection.

Case study researchers must be unbiased by preconceived notions, able to ask good questions, able to accurately interpret the responses, be flexible and adaptive to changing situations and schedules, and be a good listener [Yin, 1994]. These skills are usually developed and ingrain over a period of time through experience. Having little or no experience in case study research, students have to make conscious efforts to acquire and employ these skills.

During data collection, students should [Benbasat et al., 1987; Yin, 1994]

- keep a case study record log,
- maintain a chain of evidence and
- be meticulous in record keeping.

Human error in information collection and record keeping leads to confusion and inaccurate analyses in the future. Documenting the procedure of data collection and discussing it with the instructor to identify potential flaws will also improve study reliability [Kirk and Miller, 1986].

V. ANALYZING DATA

Academic research case studies are mostly either inductive case studies in which a theory is built from the instance(s) or the interplay of inductive and deductive analyses when the construct is well understood. In contrast, student research case studies are deductive case studies in which inferences about a particular instance are made from a general theory. Student case studies compare what the theory predicted and what was actually observed or how well an existing theory explains the solution, decision, or events. Therefore, data analysis is a relatively continuous process in student case studies.

First, students have to continually check for the sufficiency of data to avoid the under-collection or overloading of data. Are the collected data sufficient to answer the research questions? For which aspects of the research topic is the data sufficient? Which aspects require additional data and from which sources? Second, students must continually assess credibility (internal validity), dependability (reliability), conformability (objectivity), and transferability (external validity) of data [Hirschman, 1986; Johnston et al., 1999]. Are the data credible? Are they logical? Is the evidence internally consistent? How much can we depend on a specific data source? To what degree do the data reflect the bias of the people interviewed? Do they provide a balanced picture? Does the evidence support or refute the theory? Is there any prejudice or judgmental error? Have other firms or industries been looked at that might be experiencing similar issues?

The overall assessment of evidence requires distinguishing analysis from interpretation. Analysis is a more precise and clearly defined activity and relies on carefully specified procedures, whereas interpretation is a free-wheeling and sense-making activity that relies on intuition, emotion, and past experience [Wolcott, 1994]. Thus, analysis represents the scientific, rigorous side of research and interpretation represents the humanistic, relevance side.

ANALYSIS TECHNIQUES

In data analysis for case studies, due to the qualitative nature of data, statistical techniques are used only in rare cases. However, various qualitative and some quantitative data analysis techniques are helpful to student researchers [Campbell, 1975; Eisner and Peshkin, 1990; Lee, 1989; Miles and Huberman, 1994; Stake, 1995; Todd and Benbasat, 1987; Wilson and Woodside, 1999; Yin, 1994]. They include:

- *Categorical aggregation or content analysis.* Code and categorize data based on issues and sub-issues to create classes or groups for direct interpretations.
- *Matrix of categories.* Tabulate categories based on relationships (e.g. decisions with events, actors with roles, managers with decisions, events with outcomes, etc.)
- *Checklist matrix.* For each critical situation or event, tabulate information along various dimensions such as examples, the importance of the event, and why it is important.
- *Information ordering or information arraying.* Arrange information about various events and outcomes in a specific order such as a time line of events, time-ordered matrix, or other temporal schemes to find causal effects.
- *Data displays.* Create flowcharts, process maps, activity records, cognitive and decision-making maps, and other data displays to examine data and to map concepts and context.
- *Frequency of events.* Tabulate the frequency of the occurrence of events to examine their complexity and relationships possibly using means, variances, and cross tabulation.
- *Protocol analysis.* Analyze written and recorded verbal protocols and computer logs. Scan protocols to support or interpret other information (e.g., user activities). Tabulate the frequency of the items of interest (e.g., lag time between two actions or the amount of system usage). Develop a flow chart based on the log (e.g., of an internal workflow or decision-making process).
- *Proposition analysis.* Develop theoretical, verbal propositions and analyze evidence based on these propositions using the rules of formal logic.
- *Correspondence and degree-of-freedom.* Logically compare an observed pattern with a predicted pattern and identify the degree of match.
- *Time-series analysis.* Find trends in primarily quantitative data such as sales, specific costs, or profit measured over a period of time, and trace changes over time to explain any dual patterns.
- *Priority assignment.* Place higher priority on the direct interpretations of events and lower on the interpretations of measurement data.

OTHER DATA ANALYSIS CONSIDERATIONS

Experimental or quasi-experimental studies, such as laboratory experiments, field experiments, or field studies are designed to hide details and interpret only aggregates, whereas case studies are designed to bring out details [Stake, 1995]. Students should identify concealed patterns relating to the theoretical proposition in the context and data of the study and establish a clear chain of evidence. Such pattern-matching will enhance the internal validity of the findings [Campbell, 1975; Yin, 1994].

Students should analyze the collected data and see their fit with the theory on which they focused. They should not discard any data even if the data are conflicting; rather they should try to find alternate explanations or record the data as unexplainable instances. While all theories must be logically consistent, they also have to be falsifiable (that is, define conditions under which they are not true) [Lee, 1989]. Seemingly conflicting and unexplainable data points may lead to further exploratory studies and the development of new theories.

Case studies generate more variables than data points, making it difficult to develop controlled deductions and eliminating the use of statistical controls and techniques to interpret the relationship between two events [Lee, 1989]. Therefore, interpretations depend on the interpretive power of the researcher, who may be susceptible to improper interpretation or self-delusion, especially in the case of a student researcher. Minimizing personal bias and errors in interpretations and assumptions can improve reliability [Yin, 1994]. Investigator and theory triangulations (discussed in Section IV) also improve the quality and validity of data analysis and interpretation.

Past experience and in-depth knowledge of the domain significantly affect interpretations; student researchers generally lack both. To improve the relevance and quality of interpretations, student researchers should ask themselves the following questions:

- Have we addressed the most significant aspect of the study?
- How strongly can we conclude that the theory is the only explanation for the event or results?
- Have we looked at all major interpretations in the analysis?
- Are missing any piece of critical information?
- Do we know of any similar instances in other companies or industries?

VI. THE CASE STUDY WRITE-UP

Each case study write-up has its own unique structure, but some features are common to all case studies. They all require an

- introduction,
- background or contextual information,
- a case story, and
- conclusion [Gentile, 1990].

INTRODUCTION

The opening paragraph in an introduction should develop a strong, 'first impression' by explicitly, sometimes dramatically, narrating the research issue, inviting the reader to read the full case. The rest of the introduction provides the rationale for the study, positions the case in time, identifies the major actors, identifies the organization, and provides an overall view of the situation.

BACKGROUND

The background includes contextual information about the topic, organization, actors, industry, and other critical internal and external elements, often in a historical sequence to help chronological organization. The background should be kept concise and relevant; too much background information will make the case write-up unnecessarily long.

CASE STORY

The case story is the main focus of the case. It is not the history of the company or of the people involved but the description and interpretation of the research issue under study. It involves linking a theory to analyze the issue methodically and to provide explanations. It lays out evidence that supports or refutes the theory.

CONCLUSIONS

The conclusion focuses on the problem and suggests alternative solutions. It identifies decision points and provides options, other plausible explanations, missing links, unexplained instances, implications, and considerations. It should also include a discussion of similar patterns in other firms with the same and different characteristics such as industry, size, and markets. Generalization across the settings may increase the study's external validity and make the findings more interesting.

WRITING THE CASE

Although different students in the group project may take the lead on writing different sections of the case, all sections must reviewed and confirmed by all students in the group. In the final version, one student should act as an editor and combine the various sections in such a way that they flow better. Before submitting the final case study, students may want to have this version peer-reviewed by a few fellow students to find any errors in judgment and/or in the flow. The writing style of the author-editor is an important element in guiding the reader.

The write-up should be concise, direct, clear, objective, and in the past tense [Gentile, 1990]. It should be divided into sections and subsections to help the reader assimilate quickly. Tables, figures, and appropriate charts (organizational charts, flow charts, process

representation, timeline, etc.) should be used for the material that is best presented in those formats.

In writing a case study, the researcher comes across many pitfalls that may weaken the case study, including [Gentile, 1990]:

- *Lack of focus.* Without a clear, explicitly identified focus, the reader loses the mental anchor around which the case is developed.
- *Insufficient integration of theory.* Theory-based explanations are necessary for connecting theory with practice. Without them the case becomes a simple narration of historical events or procedures.
- *Lack of audience.* Like any book, article, or story, each case should target a specific audience. For student researchers, the target is generally the fellow student.
- *Too little or too much detail.* Building a story for the readers require including sufficient and relevant information and excluding unnecessary and distracting details. This is a delicate balancing act that can be achieved only if the researcher has a clear understanding of the study.
- *Assumed familiarity.* Jargons and issues common in the organization or industry must be defined properly because some readers may not be familiar with them.

AVOIDING PLAGIARISM

Plagiarism is a concern in student projects. Plagiarism includes using ideas, thoughts, and writings of other person as one's own. Most universities and publishers have strict policies against plagiarism. In the write-up, original authors should be given credit through the use footnotes or endnotes with full citation. This approach may require permission from the copyright holder in commercial uses but generally not in student case studies.

REFERENCES

There are many styles for citing references. IS students may use the publication style of the Association for Information Systems [Gray and Ein-Dor, 1999]. You can download the AIS Publication Style as Word document from <http://cais.isworld.org/style.asp>.

VII. RECOMMENDED SCHEDULE

Figures 3 (for the semester system) and 4 (for the quarter system) show the recommended schedule of common activities. However, each case study may also include additional unique activities. The schedule identifies the activities according to those controlled by the study team and those partly controlled by others. The schedule also suggests deadlines for critical activities to complete the study within the semester.

VIII. CONCLUDING REMARKS

This paper describes a method and guidelines to assist students in developing case studies. It will help students obtain more value out of the project and improve the quality of their case studies. These guidelines should not be applied in a mechanistic way to each and every case study, but they should be adjusted to fit individual circumstances; instructors can be of great help in this process. No research method or guidelines can replace the common sense, experience, and interpretive power of the researcher.

Developing case studies is hard work. Since it involves self-learning, there is sometimes a frightening lack of right answers [Bonoma, 1989]. A relatively high degree of self-motivation and personal initiatives are required of students to maximize learning. However, when compared to other methods of instruction, case study development provides additional value in the education of IS students. It succeeds when done methodically with proper periodic checks and controls and fails when done superficially without strict procedural guidelines.

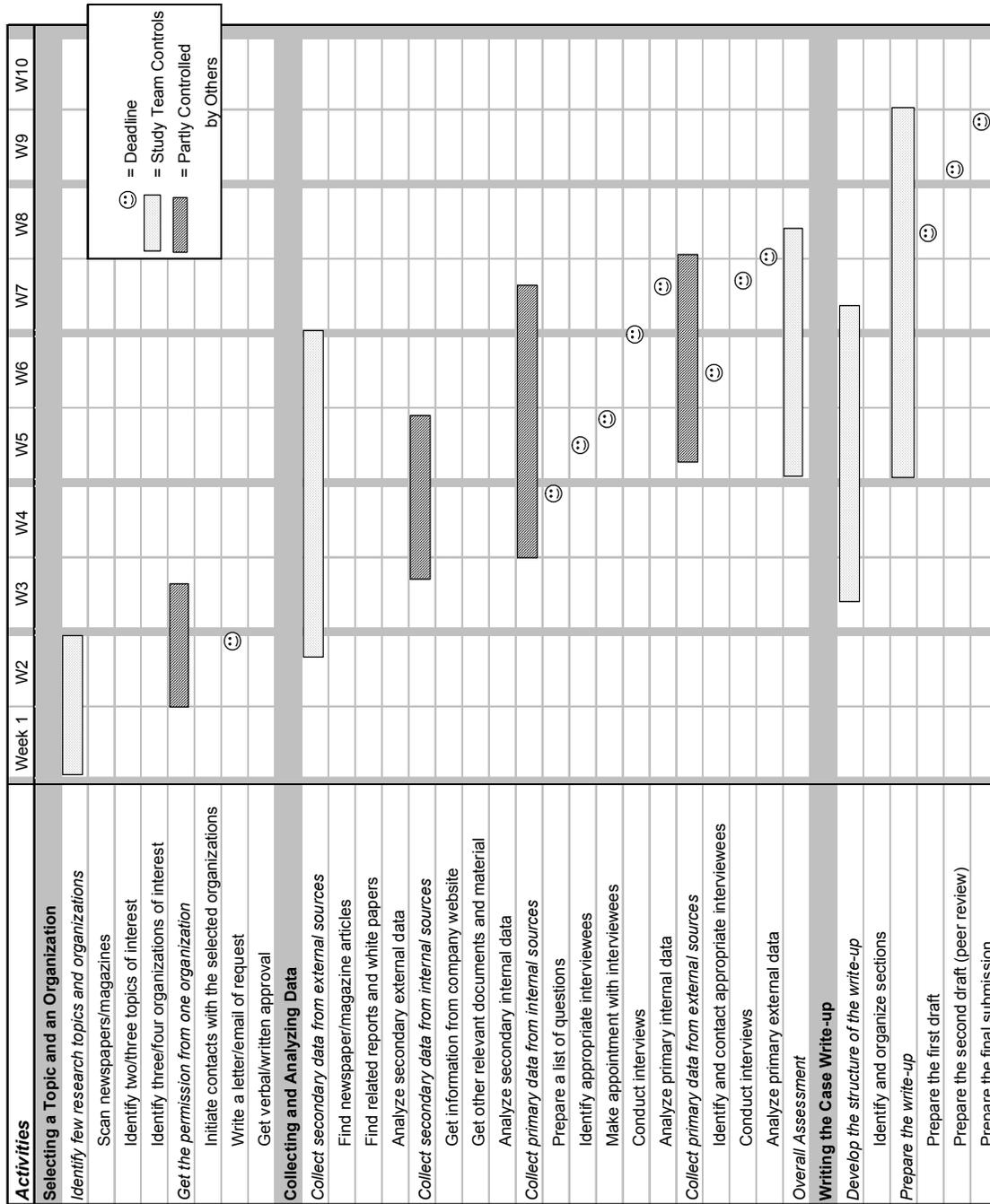


Figure 3. Recommended Schedule (for the semester system)

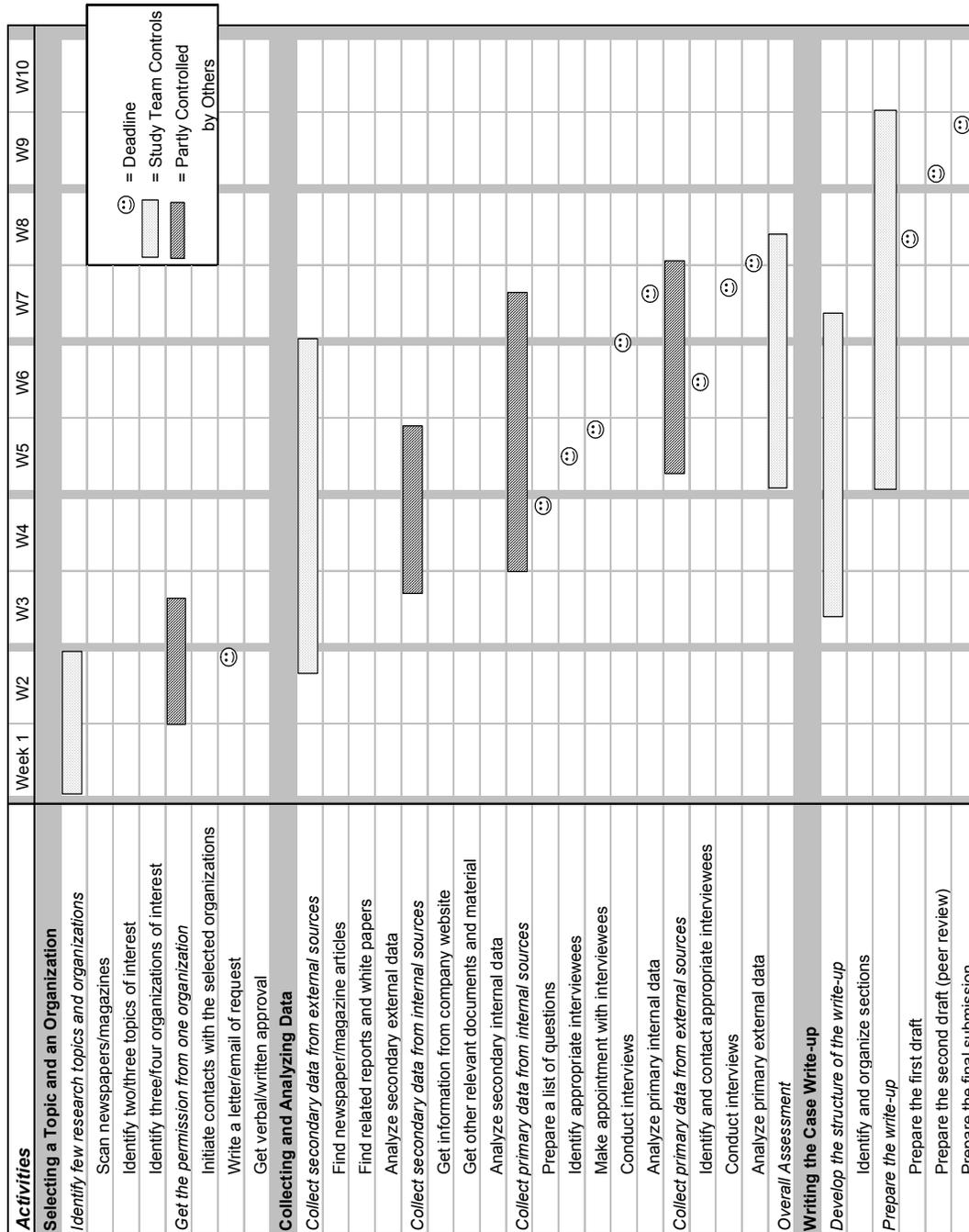


Figure 4. Recommended Schedule (for the quarter system)

Finally, this paper should not be seen as an attempt to set standards for developing case studies by student researchers, but an attempt to define and organize key activities involved in case study research as they relate to student researchers. While there may be other methods for student case study development, this method and the schedule proposed in this paper were used successfully by the graduate and executive degree students of the author and of his colleagues. They have been revised and refined through repeated use in over 8 semesters and 16 courses.

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EDITOR'S NOTE: The following reference list contains the address of World Wide Web pages. Readers who have the ability to access the Web directly from their computer or are reading the paper on the Web, can gain direct access to these references. Readers are warned, however, that

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APPENDIX I. THE IMPORTANCE OF CASE STUDY DEVELOPMENT

Learning takes place in three stages: acquiring, interpreting, and applying information [Garvin, 2000]. Textbooks, lectures, reading articles, and class notes help in the first two stages, but the third stage requires doing in addition to thinking. Instructors of IS courses in graduate and executive degree programs use published teaching cases in their curricula to capture the third stage. Many papers discuss using teaching cases in classroom education [Bonoma, 1989; Huff et al., 1996; Rangan, 1996; Szpiro and Neufeld, 1998]. Teaching cases offer students an inside view of an IS issue in a real business situation and are helpful, but they have limitations. They do not contain explicit discussions on relevant theories. They depend heavily on the instructor's ability to teach cases and the student's ability to recognize the underlying patterns and connections with theories in short class time. Even then, students receive a secondary view from the case writer's perspective and less than sufficient contextual information to be able to transfer the case to their own situation.

In contrast, case study development as a learning tool emphasizes all three stages of learning. It provides students with a first-hand view of the business problems and decision-making situations under study. It provides perceptions and sensory information, which are building blocks of knowledge, as are the innate ideas and principles presented in textbooks and lectures. It is experiential learning because the students are directly involved in the observation,

analysis, interpretation, and application of both theoretical knowledge and practice. Experience-based learning puts the learner at the center of the learning process promoting independent thinking, creativity, judgment, and innovativeness, and making learning personal and more powerful [Bonoma, 1989]. It capitalizes on what John Dewey calls the “intimate and necessary relation between the processes of actual experience and education” [Dewey, 1938, p. 20].

Case study development can:

- strengthen students’ understanding of business theories and concepts, as they apply theories in real business situations.
- train them in how to separate useless information from the information relevant for decision-making.
- help them build strong writing skills, which are increasingly important in today’s virtual, networked, and global organizations where the majority of communications take place through written memos and emails.

The development of case studies by students can be a useful learning tool in IS education. Too few teaching cases are published in IS. In many IS areas (such as IS investment decision-making, portfolio approach to IS management, open source software development, leadership and innovation practices in IS, global IS policy, the issues of security, privacy, and ethics in IS, and global IS development outsourcing), good, recent cases for learning are not available. This shortage reduces IS educators’ ability to connect theory with practice. Even with existing cases, little contextual information is available on specific IS projects undertaken by organizations because IS is typically an internal function. It is difficult for IS educators to relate those cases to similar situations in other organizations. Case study development by students can help reduce this gap in IS education as students choose topics that are not covered by published teaching cases.

IS practices evolve rapidly together with the advances in information technologies (IT) making existing published cases quickly obsolete. Due to their short life span as a learning tool, IS educators must constantly look for new and more relevant case studies. When knowledge is constantly changing, it requires active engagement in the change process to learn [Brown and Duguid, 1996]. Case study development, by design, guarantees active involvement and study of recent and relevant IS issues. It also helps students understand “why” and “how” rather than just “what” in emerging IS areas [Yin, 1994].

The ability to manage information and knowledge more efficiently and effectively is becoming the key determinant of business success as we progress further into the information economy. As the trustee of information, IS’ role is changing from a mere supporter to an important enabler; IS moved from a support function to a strategic function. Case study development enables student researchers to critically observe specific business situations requiring IS solutions in context and to study their complexity [Yin, 1994]. The process helps students gain a deeper understanding of major internal and external factors affecting these situations and cultivates a multidimensional, interdisciplinary view necessary to develop more effective and strategic IS solutions.

To become effective IS managers or technology managers, IS students must develop professionalism, project management skills, and team skills [Dickson and DeSanctis, 2001]. However, IS students are traditionally so enamored with the technical aspects of IT that they tend to ignore the management aspects of IT. Case study development provides IS students with a real, but less-punishing, environment within which they can learn management skills, with the instructor acting as a coach. Case studies are built around the concepts of metaphors and simulation [Shapiro, 1988]. In developing a case study, a particular set of IS problems demanding specific IS management skills serves as a metaphor and the students learn those skills through the simulation-type experiences.

An important purpose of education is to provide students with access to a social system or network that fosters relationships and teaches students to deal with the complex social structure [Brown and Duguid, 1996]. Case study development requires IS students to interact with people in other business organizations or in other divisions within their own organizations. Through these interactions, they develop a network of relationships that helps them beyond the

course or the assignment. Case study development also requires business organizations to become involved in an academic activity, thereby narrowing the divide between the university and its locale

Case study research is well suited to capture knowledge and practices of practitioners and develop IS theories [Benbasat et al., 1987; Pare and Elam, 1997]. Research case studies developed by IS students can help identify novel, relevant, and pressing IS issues demanding research-based solutions and new theory. Thus, they can become the stepping-stones for future, rigorous academic research case studies in IS. More IS theories may emerge from the follow-up academic studies by using the case-based theory building roadmap proposed by Eisenhardt [1989] and current IS theories may get stronger support or refutation. This outcome should contribute significantly in advancing IS research.

Finally, case study development introduces students to the rigor of academic research. Being exposed to the academic research process that provides intellectual satisfaction, graduate and executive students may choose to pursue a doctoral degree in IS, select academic research as the second career, or continue to collaborate closely with IS researchers while working in industry upon the completion of their current degree. These outcomes can be a great boon to IS research, an adolescent field compared to other business research fields.

APPENDIX II. SOME GOOD RESEARCH CASES

Case study development, as discussed in this paper, refers to developing research case studies in which a specific IS theory is applied to an IS/business situation and the discussions on the theory are interlinked with the information collected from various sources about the situation. The following list of research cases can serve as good examples for students in developing their own cases. However, it is presented with a caveat. These cases were developed by academic researchers; students are not expected to have this degree of rigor or theoretical depth.

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Cox, S., R. Dulfer, D. Han, U. Ruiz, and S. Alter (2002) "TDG Engineering: Do We Really Need Another Upgrade?" *Communications of the AIS*, (8)17, pp.232-250. (By students)

Cross, J., M. J. Earl, and J. L. Sampler (1997) "Transformation of the IT Function at British Petroleum," *MIS Quarterly*, (21)4, pp. 401-423.

Garcia, M., J. Gelbard, B. Huston, R. Jackson, W. Kuefer, G. Lauber, et al (2002). "The Perils of Ignoring "Systems 101": Recovering from Mishaps at Two Small Companies," *Communications of the AIS*, (8)24, pp. 347-359. (Multiple cases by students)

Hackney, R. and N. McBride (2002) "Non-Implementation of an IS Strategy Within a UK Hospital: Observations From A Longitudinal Case Analysis," *Communications of the AIS*, (8)8, pp. 130-140. (A long-term case)

Jarevnppaa, S. L. and D. Leidner (1998) "An Information Company in Mexico: Extending the Resource-Based View of the Firm to a Developing Country Context," *Information Systems Research*, (9)4, pp. 342-361.

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Stoddard, D. B. and S. L. Jarvenpaa (1995) "Business Process Redesign: Tactics for Managing Radical Change," *Journal of Management Information Systems*, (12)1, pp. 81-107. (Multiple cases)

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Case studies that received SIM (Society for Information Management) Paper Awards in the past years. Available on <http://www.simnet.org>.

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