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# Pitfalls in Analyzing Systems in Organizations

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**ABSTRACT**

Despite the availability of elaborate methods for defining data and business processes, huge amounts of time and effort are wasted on system projects that produce disappointing results. An important contributing factor is the difficulty business and IT professionals experience when they try to describe, evaluate, and/or analyze systems in organizations even at a cursory level. Between 1997 and 2003, the author's information system courses for evening MBAs and EMBAs required students to write two group papers that present a business-oriented analysis of a real world system in an organization and propose preliminary recommendations for improvements. If these working students are representative of the types of business professionals who are involved in systems in organizations, it is plausible that the major types of pitfalls demonstrated by their papers are representative of common pitfalls that contribute to disappointing results with systems. An examination of 202 group papers submitted by evening MBA and EMBA students between 1997 and 2003 revealed pitfalls in 9 categories related to system and information definition, performance measurement, treatment of personal and organizational issues, susceptibility to techno-hype and jargon, inadequate critical thinking, and difficulty applying abstractions and formal methods. This paper illustrates these pitfalls using examples from student papers. Assuming that typical business professionals encounter the same types of pitfalls, both MBA programs and analysis and design methods should provide concepts and techniques that help in identifying and minimizing the related problems.

**Keywords**: Pitfalls in analyzing systems, Systems analysis by business professionals, Information system education, Introductory information systems course

## 1. IMPORTANCE OF SYSTEMS ANALYSIS PITFALLS

Why is the success rate of system-related projects so abysmal? Every other year the Standish Group publishes a new study showing that fewer than a third of IT-projects are completely successful and many are complete failures. (e.g., Standish Group, 2004) One frequently encounters claims that a substantial percentage of CRM projects or ERP projects or outsourcing projects are partial or total failures. New technologies encounter surprisingly long assimilation gaps. (Fichman and Kemerer, 1999)

One of many reasons for these problems is that business professionals are often ineffective in communicating with IT professionals, identifying system-related problems, determining system requirements, and implementing systems in their organizations. Starting around 1992 I decided that my introductory IS courses should address these problems by focusing on how business professionals can think about systems for themselves. Just as they can memorize IT-related jargon, students can easily memorize the steps for analyzing a system and can discuss those steps in the abstract. It is much more challenging for them to use those steps in an open-ended situation that has not been pre-digested as a published a case study. My IS courses address this challenge directly because I believe that the ability to start analyzing systems from a business viewpoint is the most important thing MBA and EMBA students can learn from an introductory IS course.

As a way to think about systems, my courses teach students about the work system method (Alter 2002; 2006), which focuses on the work system whose performance is to be improved as a result of the analysis. Examples of work systems include a firm's systems for hiring people, finding sales prospects, designing products, manufacturing products, and developing an annual plan. The work system method is organized around nine elements that can be used to describe any work system. The first four are components of the work system, including the work practices, participants, information, and technology within the system. Five additional elements round out a basic understanding of any system in an organization: the products and services produced, the customers, environment, infrastructure, and strategy.

## 2. DATA AND METHOD

To accomplish the goals of these introductory courses, each course required students to write two group papers. The first paper developed and justified tentative recommendations for system improvements based on a preliminary analysis of a real world system in an organization. The second focused on processes through which real world systems change or are supported. Starting in 1997 I began requesting that students submit electronic versions of their major papers. This helped in the continuing development of ideas for understanding and analyzing systems from a business viewpoint.

This article is based on examples culled from 202 group papers submitted between 1997 and 2003. Over 90% of these papers concern a real world system at a group member's employer. Thus, the papers were not attempts to assemble material from the Web or to analyze an existing case study. The use of group papers had many effects. Students working together sometimes clarified each other's ideas and generated better analyses than would have appeared in individual papers. However, management of writing and reviewing processes was often haphazard in student teams. Some papers did not hang together well due to poor writing skills, inadequate review, and/or interpersonal conflicts within the teams.

The goal of examining these papers was to identify major types of pitfalls that business professionals encounter when they try to analyze systems from a business viewpoint after preliminary training in thinking about systems in organizations. The years of business experience of the authors of specific papers was not recorded, but at least half of the students had five or more years of business experience based on their admission to an EMBA program. Less than half of the regular MBA students had five years of business experience.

The analysis to compile the pitfalls was informal. I started by identifying what I believed were the major categories of pitfalls based on my experience teaching IS courses. Many of such pitfalls were apparent in project proposals that student teams submitted before doing their research. My detailed feedback about these proposals often helped the teams recognize and avoid likely pitfalls. I did not save my responses to the original proposals, but I believe that most teams would agree that the initial feedback helped them write more successful papers.

I looked at all 202 papers to identify representative examples of expected pitfalls and to find other types of pitfalls. Many papers were very good and illustrated no obvious pitfalls; some of the others illustrated little more than inattention and poor writing. The original submission of this article contained 30 illustrative examples from 25 papers. Many examples were removed due to space limitations. Only a single example will be shown to illustrate each of 9 common pitfalls encountered by these early-career business professionals, most of whom are not IT professionals.

The student papers that constitute source data for this article are the result of assignments that were revised from semester to semester to maximize student learning. These changes made it impractical to use structured procedures that might have been useful if the source data had came in a consistent form. Students knew I would keep electronic copies. Also, they were instructed to avoid topics that they were not willing to discuss in class presentations. The examples cited here are disguised to avoid identifying specific companies.

## 3. MAJOR CATEGORIES OF PITFALLS

This section identifies 9 types of pitfalls and includes a representative example of each. The types of pitfalls include: failure to define the system, viewing technology as the system, confusing system set-up with system operation, difficulty identifying the information in information systems, aversion to using measures of performance, reluctance to mention organizational and personal issues, susceptibility to techno-hype and jargon, inadequate critical thinking, and difficulty applying abstractions and formal methods.

Someone else examining the 202 papers might have responded to specific examples differently and might have found other categories of pitfalls. Nonetheless, the paper's findings should contribute to the IS field's understanding of difficulties encountered in analyzing systems, confusions and pitfalls encountered by business professionals, and expectations about what can or should be learned from introductory information system courses. Most important, the discussion of pitfalls should contribute to thinking about what can be done to help business professionals understand systems in organizations.

### 3.1 Failure to Define the System

In many student analyses of systems, as in real life, defining the work system is a difficult and contentious part of the analysis. This was especially for true student teams with extensive business experience. In general, the work system should be the smallest work system that exhibits the problem or opportunity that launched the analysis. If it is much larger, the analysis will be unnecessarily complicated. If it is smaller, the analysis may ignore important issues that must be addressed. A number of more experienced student teams reported spending hours arguing about the scope of the work system before finally reaching agreement, and some of those teams had to change the scope after gathering more information during the analysis.

Although the work system method specifically requires users to define the system being analyzed, student papers sometimes bounced back and forth between several overlapping systems without clarifying which one was the subject of the analysis.

*Example - Tracking pharmaceutical sales representatives:* A pharmaceutical company developed an information

system for tracking physician visits by sales representatives. The student paper switched back and forth between a work system for providing information and service to physicians and a work system for recording information related to those visits. Neither system was defined clearly even through they had different scope, different customers, different measures of performance, and encountered different types of problems. For example, measures of performance related to serving physicians concern the efficiency and success of sales work. Measures of performance for the tracking system concern the efficiency and accuracy of information collection.

**3.2 Viewing Technology as the System**

Using a work system approach helps in recognizing that from a business viewpoint the headline is the system of doing the work rather than the technology that is used. In too many cases, systems that use IT are viewed as IT systems. (e.g., a *Harvard Business Review* case study "The IT System that Couldn't Deliver," (Reimus, 1997))

*Example - Data warehouse in a finance department:* A student paper focused on a data warehouse acquired to provide a finance department convenient access to operational and accounting information captured in an ERP system and several other information systems. The paper said the steps in the business process included extracting data from the ERP system, filtering and aggregating the data, copying data from other information systems, and using the information for financial analysis. The paper noted that the technology was rarely used in any significant way. The analysis would have been much more effective if it had started from specific finance work systems such as closing the books each month and performing specific types of financial analysis. Starting from the goal of improving those work systems would have led directly to identification of shortcomings of the data warehouse that could have been fixed by changing its configuration. Focusing on the data warehouse as the system left the link between finance work and operational problems in the data warehouse unclear; it was difficult to decide whether the student recommendation would solve anything, or whether the result would be a more efficient data warehouse that still would be used rarely.

**3.3 Confusion between the System in Operation and System Set-up**

Over the years, a number of paper proposals contained confusions about the difference between a system in operation and a system being built or set up for operation. This type of confusion is revealed through business processes that start with building technology, maintaining technology, or performing set-up activities, and that also include other steps related to value added business tasks. Both types of activities are important, but when they are treated as a single work system, measures of performance sometimes become confused and the recommendations may include anything from improvements in processes for doing technical maintenance work through improvements in performing customer-facing processes. In many cases, initial feedback about project proposals clarified this issue for students, but in one paper the issue remained:

*Example - Providing Web access to existing industry magazines:* A magazine publisher wanted to decide whether it could use the Web to serve the customers that have previously been served through paper periodicals. The analysis combined two systems with totally different operational issues, measures of performance, and participants. First, the magazine's editorial and marketing staff collected information, wrote product reviews, and generated revenue through sponsorships, advertising, and subscriptions. Second, Web site users logged on, found information related to products and other aspects of their industries, and in some instances made purchases. The paper combined the two systems into one, but focused primarily on goals that the publisher might pursue. A more effective analysis might have viewed the customer's use of the proposed Web site as part of a work system (as was done in Petrie's (2004) Ph.D. thesis on ecommerce). Also, the analysis might have been more specific about how the customer's efforts to obtain value could be evaluated and improved. For example, that analysis might have asked whether the customers actually want the types of information provided in the magazines and whether some form of genuine computer interaction, as opposed to data retrieval, might provide more value for some of the products reviewed in the magazines.

**3.4 Difficulty Identifying the Information in an Information System**

Many of the MBA and EMBA students who wrote the papers seemed to have relatively little propensity or ability to identify the information used or produced by the systems they analyzed. Despite being written after demos of relational databases and several in-class exercises involving the use of ERDs, many student papers contained with vague statements such as the information is outdated, historic data is required, and the data in the system is manufacturing data.

*Example - Financial analysis at a clothing manufacturer:* The finance department of a clothing manufacturer consolidated sales forecasts from various regions to produce a combined sales forecast for the firm. The student analysis attempted to suggest ways to do this work more efficiently. However, from the analysis it was unclear why the forecasts were being produced and whether the forecasts were at the SKU (stock keeping unit) level or at some aggregated level. My comments to the student team included the following: "Many of the confusions in reading the paper might have been cleared up if it had said something like the following: ..... The forecast is by product line and extends five months into the future by month. There are 27 product lines, each of which is sold in 14 regions. Finance consolidates forecasts from each of the regions to create revenue forecasts for the next five months. These forecasts are unrelated to determining what will be produced by SKU in the next five months because that is determined in the annual production planning cycle. ..... The previous four or five

sentences may be completely wrong, but something of that general form would have helped clarify about what the system is trying to do and why your recommendation would really create an improvement."

**3.5 Aversion to Using Measures of Performance**

MBA and EMBA programs include extensive coverage of managerial and financial accounting, the need for performance measurement in process improvement, and the use of balanced scorecards. Nonetheless, over the years most student papers seemed to reflect a strong aversion to mentioning measures of performance. Even when the instructions invited students to estimate metrics that were not readily available or to note that seemingly proprietary performance data had been modified for purposes of writing a paper, students often omitted that information and attempted to justify recommendations based totally on qualitative concerns and vague generalizations. I eventually began to require that student papers include several tables listing estimated or actual values of important metrics and estimating the extent to which their recommendations would affect these values.

*Example - Tracking of demonstration inventory for electronic equipment:* An equipment manufacturer provided demonstration models to customers but didn't track the demonstration models effectively. These models were often shipped through standard shipping channels without a designation that these were on loan and were not being sold. This generated inaccurate sales, inventory, and financial data that was used by other information systems. Although the analysis provided an estimate of the amount of incorrectly classified inventory, the analysis did not present metrics describing other aspects of the problem, such as the amount of time and effort that is required for reconciliations, the positive or negative impact of providing so much demonstration equipment, and any impacts on real revenues and commissions. Attention to metrics in other areas might have led to a powerful recommendation, such as a system that would charge the sales organization for demonstration equipment. Instead, the paper's recommendation seemed toothless. It proposed an Equipment Request Form (ERF), a written procedure for filling out the ERF, in-service training on the formal procedure, and education about the need for the procedure.

**3.6 Reluctance to Mention Organizational and Personal Issues**

Although work systems rely on the human participants who do the work, many student papers tended to emphasize technology and business process issues when explaining performance problems and recommending directions for performance improvement. Students seemed reluctant to mention organizational and personal issues.

*Example - Travel reservations at a large consulting company:* The goal of a new travel reservation system was to provide a Web-like interface that would encourage consultants to make reservations themselves, thereby eliminating contractors who served as an in-house travel agency. Three years after implementation, new online capabilities were being used extensively by around 50% of younger consultants and less than 10% of senior consultants. The analysis mentioned the relative age and billing rates of different groups of consultants, and it called for additional encouragement and training. It did not observe that these low adoption rates after three years indicated that senior consultants did not want to use the new Web interface and would continue avoiding its use as long as they had options.

**3.7 Susceptibility to Techno-hype and Jargon**

Even after the Internet bubble burst, the IS field remains rife with techno-hype and jargon. Terms such as CRM, ERP, EAI, and data mining set up expectations that may be unrealistic. In too many situations, textbooks do little to puncture inflated hopes. To the contrary, they sometimes promote images that barely fit current reality. Despite repeated attempts to warn students about exaggerated expectations from techno-hype, a number of papers encountered problems in this area.

*Example - Mobile wireless panacea for medical care:* A student paper argued that mobile wireless technology and PDAs would streamline patient care in hospitals, would drastically reduce the amount of time nurses devote to record keeping, would reduce error rates, and would improve communication. Although aspects of these benefits will surely occur to some extent, the students seemed swept away with hype about a wireless future. Their paper mentioned "being able to electronically access data anytime, anywhere." It claimed, "there is little end-user training required to use this technology." It stated that the use of "standard operating systems like Microsoft's Windows 2000" on laptops "reduces and, in most cases, eliminates any custom application or integration development needed to access existing network applications." The paper ignored many difficult issues that bedevil American medical care, including lack of nurses, difficulties with the details of different insurance schemes, ambiguities in coding of information about medical conditions and treatments, difficulties integrating information and processes across different departments, reluctance to change traditional work practices, difficulties with privacy and security, and difficulties dealing with downtime and bugs in computerized devices and systems.

**3.8 Inadequate Critical Thinking**

Although many student papers made cogent arguments that used concepts and information effectively, many shortcomings of other student papers seemed as much due to inadequate critical thinking (e.g., Paul and Elder 2002; Wikipedia 2006) as to inadequate understanding of IS concepts. This is a difficult issue at the MBA and EMBA level because the students are college graduates who presumably have learned about critical thinking and careful writing in their high school and undergraduate work. Unfortunately, wishful thinking doesn't solve this widespread shortcoming in educational background. Table 1 lists common types of pitfalls related to various aspects of critical thinking. The examples following Table 1 illustrate how these pitfalls appeared in several papers.

| *Aspect of critical thinking* | *Common pitfalls* |
|---|---|
| Defining the problem, issue, or question | Failure to clarify exactly what problem or opportunity is being pursued.<br>Example: "We will analyze system X" [but won't start with a problem or opportunity that guides our analysis.] |
| Identifying assumptions, values, and point of view | Arguing based on values and opinions without being aware that information is lacking.<br>Example: "People need to have upbeat personalities in order to contribute." [but some people with pessimistic personalities may also contribute] |
| Gathering information and evidence | Failure to gather or consider important information.<br>Example: "The sales training was a great success" [but sales results remained inadequate] |
| Evaluating the quality of the evidence | Repeating quotations from individuals or published material without evaluating the source or the underlying incentives.<br>Example: "The company produces the highest quality products at the lowest costs." [The CEO may have said so, but that doesn't make it true.] |
| Using concepts, and frameworks to shape the information and evidence | Recitation of facts without shaping them in a way that helps in interpretation.<br>Example: "The process has 47 steps. Step 1 is …. " [without listing every step one can say that the process is *over-structured*, participants have no *autonomy*, and management is *complacent.*] |
| Drawing inferences and interpretations | Failure to explain the significance of information presented.<br>Example: "Company X has a tradition of excellent service." [but information presented seems to contradict that tradition] |
| Searching for alternatives and possibilities | Arguing for one option without ever mentioning other possibilities.<br>Example: "We recommend that company X buy an ERP system." [but we seem not to have considered less expensive measures that might be more practical] |
| Drawing conclusions or recommendations | Substituting opinions for carefully supported recommendations<br>Example: "We believe the manager should be replaced.' [but we haven't explained exactly why the facts justify that conclusion] |
| Presenting a complete argument | Ignoring factors that most readers might wonder about.<br>Example: "The error rate is 22%." [How could an important and highly visible system have such a high error rate? Does anyone care?] |
| Avoiding internal contradictions | Saying X in one location and saying something that contradicts X somewhere else.<br>Example: The organization's greatest resource is its people, but the resistance to the new information system sometimes resembles sabotage. [If the people are so great, perhaps they could have used negotiation instead of sabotage.] |

**Table 1: Common problems related to critical thinking**

*Time reporting system at a professional services firm:* A student paper presented internally inconsistent views of a system's success. My comments questioned the paper's logic, saying, "On the one hand, the information gathered is very important for billing and for long-term revenue growth. Senior management likes the system, thinks the information is important, uses the information, etc. On the other hand, people who enter the information fake it at least to some extent. The degree of the faking is not estimated. What is the basis for [the paper's statements that] the system operates at "an impressive level?" What is so impressive? What are the implications about the degree to which senior management really cares about this information? Without direct knowledge of the situation, it sounds to me as though they care very little about it and are quite willing to live with faked information as long as the faking is within reason and within budget, and as long as the company is able to produce high quality results and maintain client relationships."

### 3.9 Difficulty Applying Abstractions and Formal Methods

Many topics covered in business courses related to systems are abstractions related to concepts such as system, information, and process, which themselves are abstractions. Formal methods such as DFDs and ERDs involve the creation of abstractions using particular symbols and rules. Teaching abstractions and formal methods to non-technical MBAs and EMBAs often takes a surprising amount of time and effort. Possible reasons for these difficulties include lack of appreciation or interest in formal methods and preference for concrete examples rather than abstractions.

In introductory IS courses most MBAs and EMBAs quickly grasp the way an ERD describes the logical structure of a relational database, but without substantial practice they often have difficulty creating meaningful ERDs. The earlier group papers in the sample contained at least five examples of DFDs and ERDs that demonstrated a poor understanding of what these techniques try to

accomplish. Around 2000 I concluded that attaining good results with these techniques would have required three or four times the amount of class time that I believed the topic deserved. I decided to cover ERDs in database examples and classroom discussions but to stop asking the students to produce ERDs in their group papers.

In contrast to ERDs, an example of a comparatively simple abstraction is the work system framework that forms the basis of the work system method (Alter, 2002; Alter 2006), various versions of which were used in the student papers. The first step in using the work system method is to summarize the situation in terms of nine elements mentioned earlier. The challenges of defining a system were discussed in several previous sections, but even applications of the individual terms in the model are sometimes problematic.

*Example: System for granting credit to customers.* An analysis of how a small manufacturer granted credit to its customers identified commercial credit reports as the product of the system. Those commercial credit reports were the products of organizations in the business of producing those reports, but for the work system of granting credit, the credit reports should be treated as information used within the work system.

## 4. DISCUSSION AND CONCLUSIONS

This paper cited 9 types of pitfalls encountered by teams of evening MBA and EMBA students attempting to analyze real world systems in the organizations they work in. At least half of these students had five or more years of business experience and are therefore reasonably representative of the types of individuals who may need to make decisions about systems in organizations or who may serve as user representatives on committees devoted to building or maintaining systems in organizations. As a representation of the categories and extent of the difficulties that typical business professionals encounter the examples presented here are actually just the tip of the iceberg. All of these examples come from students who are ambitious enough to study for an MBA, who are part way through a course in information systems, and who have received some form of feedback about likely problems related to a proposed topic for a group paper. Typical business professionals attempting to understand a system by themselves or attempting to collaborate with IT professionals do not have the same advantages, but still face the same pitfalls and perhaps others.

The examination of 202 papers began with a set of categories for pitfalls; examples in all of the categories were found. The specific categories included difficulty defining systems in organizations, difficulty identifying the information in an information system, difficulty using measures of performance, reluctance to mention organizational and personal issues, susceptibility to techno-hype and jargon, inadequate critical thinking, and difficulty applying abstractions and formal methods. From the outset I was certain that I had encountered all of these difficulties in the original proposals for topics, but I was not sure whether my feedback to the teams about likely problems would filter out certain categories of pitfalls that therefore would not appear in the final papers. Pitfalls in each category did appear, but my impression is that the frequency and severity of the pitfalls was somewhat reduced. Notice how only some of the pitfalls are addressed either in typical information system courses or in systems analysis and design texts.

*Difficulty defining systems in organizations:* Systems analysis authors almost always say that it is necessary to define a system before analyzing it, but this is easier said than done. It is interesting that the most experienced student teams tended to report longer and more contentious debates about the identity and boundaries of the system they should analyze to produce recommendations related to a real world problem or opportunity. The less experienced student teams sometimes seemed not to realize why this was an important issue. In both cases, as the student teams progressed with the analysis they often found that the original definition of the system was inadequate. In some cases they even redefined the problem they were trying to solve.

*Difficulty identifying the information in an information system:* Information system courses and systems analysis methods also place substantial emphasis on databases and data definitions. The findings from this study indicate that MBA and EMBA students who can have seen demonstrations of relational databases may still tend to be vague about data requirements and may have difficulty using ERDs to describe the data requirements of a new situation.

*Difficulty using measures of performance, reluctance to mention organizational and personal issues, and susceptibility to techno-hype and jargon:* Information system courses and systems analysis methods often do not put much emphasis on measures of performance, full engagement with human and organizational issues, and vulnerability to techno-hype and jargon. Formal analysis methods for IS provide rigorous techniques for defining data but provide sketchy guidance or none at all for dealing with human and organizational issues. Information systems courses and systems analysis methods usually promote the use of measures of performance, but guidance about which measures of performance to consider is often sketchy at best. (In contrast, the work system method used by the students who wrote these papers encourages them to consider at least several measures of performance for each work system element.) Information system courses may or may not warn students about techno-hype and the excesses of jargon; in some cases the courses themselves seem to promote techno-hype by implying that the newest and greatest technology is important for success or that the ability to use fancy jargon is impressive.

*Inadequate critical thinking and difficulty using abstractions:* Issues about critical thinking and difficulty in using abstractions and formal methods are especially troublesome because they fall outside of the purview of the IS field, yet are a major determinant of whether students produce logical papers with well-supported recommendations. There were times when I wondered whether half or more of the quality of most papers is the result of good critical thinking rather than of mastery of specific system-related topics. It is easy for professors to avoid this issue by grading through tests or other exercises that have a demonstrably correct answer and therefore do not exercise critical thinking to the same extent. I prefer to use open-ended assignments in my courses because I believe these assignments are more representative of challenges students will face in their jobs.

**4.1 Implications for Action**

Assuming that the categories of pitfalls illustrated here are common, what should be done about them? The first thing to do is to make sure that typical MBA courses about information systems address these pitfalls. Table 2 identifies possible approaches related each pitfall. Some suggestions are basic, and may not seem as exciting as talking about the strategic uses of information technology, the impacts of technology on society, or the latest hot technologies. However, focusing on basic topics such these may help the students acquire or extend what is probably most valuable for them, an ability to participate fully in the analysis, design, implementation, and operation of IT-reliant work systems in organizations.

The individual suggestions in Table 2 address particular issues but do not directly address the larger question of how business professionals should be able to avoid these pitfalls and should be able to understand systems more completely, perform a preliminary analysis of a system by themselves, and communicate more effectively with IT professionals. Each of these topics should be the subject of future research because the stakes are so high in terms the unacceptable rate of system-related disappointments and system failure.

| *Category of pitfall* | *How an MBA course might address this pitfall* |
|---|---|
| * Failure to define the system;<br>* Viewing technology as the system;<br>* Confusion between system in operation and system set-up | • Provide exercises in defining systems. For example, give the students a situation and a problem or opportunity. Ask them to identify two possible views of what the relevant system is, and to explain why one view might be preferred.<br>• Provide numerous work system examples illustrating that the technology is not the work system.<br>• Provide examples illustrating the difference between system in operation and system set-up. |
| Difficulty identifying the information in an information system | • Provide examples of relational databases within Microsoft Access or another DBMS. View the ERD.<br>• Allow the students to perform transactions to modify the data on pre-existing database examples; perform queries and ask the students about the role of the database's structure |
| Aversion to using measures of performance | • Provide examples of situations in which many different measures of performance might apply. Ask the students to identify several plausible measures of performance for different elements of a system, and then compare the answers.<br>• Ask the students to identify three or more important measures of performance for work systems they have encountered in their lives. |
| Reluctance to mention organizational and personal issues | • Provide examples that illustrate why systems in organizations are more than just technology, information, and business process.<br>• Provide numerous examples in which system participants might have personal incentives contrary to the goals of management<br>• Ask the students to identify systems they encountered in which system participants might have personal incentives contrary to the goals of management |
| Susceptibility to techno-hype and jargon | • Provide examples showing that the same jargon term can mean many different things to different people at different times.<br>• Provide examples that make fun of overblown jargon. One I use is called "Hyper-competitive global empowerment-speak." |
| Inadequate critical thinking | • Present examples such as those in Table 1 and encourage students to think about those examples as they write their papers<br>• Provide a refresher about critical thinking at the beginning of an MBA program or in a communication class. |
| Difficulty applying abstractions and formal methods | • Demonstrate abstractions and formal methods using realistic examples<br>• Ask students to criticize examples of DFDs or ERDs that may contain incorrect descriptions (e.g., is the 1:1 relationship between professors and offices correct?)<br>• Consider the possibility that most business professionals will not find highly abstract methods very useful in their own work. |

**Table 2: How typical MBA courses in information systems might address common pitfalls**

The underlying question might be viewed as a methods and quality control issue. Assume that business professionals lack the types of training that IT professionals have. Assume they are not uniformly skilled in critical thinking. Assume they have many unrealistic beliefs about technology. Even with these assumptions, it might be possible to help them by providing organized methods that guide them toward better understanding and better analysis. Such methods might incorporate paper or computer-based tools for producing preliminary definitions of systems. They might incorporate system principles in a way that would help in identifying issues and in recognizing that changes in one part of a system could affect other parts of the system. They might incorporate system development and system implementation principles that would help in identify likely pitfalls in the process of creating or improving a system. Whether business professionals (or MBA or EMBA students) would seek such knowledge or methods is debatable. However, given the importance of systems in organizations, the unacceptable rates of disappointment and failure, and the pitfalls that business professionals currently encounter, progress in these directions is of great importance.

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