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Possibilities for cross-fertilization between interpretive approaches and other methods for analyzing information systems

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Abstract
This paper explores possibilities for cross-fertilization between interpretive approaches and other approaches for performing the initial analysis of an information system as part of an effort to redesign and improve it. The paper presents a hypothetical situation concerning the analysis of a loan approval system in a large bank. It assumes that ethnographers observed three systems analysis projects that applied different approaches in three identical banks. It uses hypothetical accounts of the three analysis efforts to propose likely differences in the process and in the results. These differences illustrate possible opportunities for cross-fertilization that might make each approach more powerful and reliable. The paper concludes that the most likely direction for cross-fertilization is from interpretive approaches to the other approaches. An earlier version of this paper was presented at the First International Workshop on Interpretive Approaches to Information Systems and Computing Research, SIG-IAM, Brunel University, July 25–27, 2002, to motivate discussion about the applications, strengths, and limitations of interpretive approaches and to help in the further development of systems analysis methods.
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Introduction

This paper's goal is to encourage dialogue that might lead to cross-fertilization between interpretive workplace studies and various analysis and design methods used in most system projects. Cross-fertilization of this type could reap benefits for IS practice and for interpretive researchers who want to have more impact. The need for improving IS practice is apparent from the appalling rate of disappointment and failure (e.g., Standish Group, 2001) encountered by information systems and IS projects. Insufficient user involvement, techno-centric analysis and design efforts, and inadequate understanding of the ramifications of proposed changes are among the commonly cited reasons for disappointments. Adaptations and innovations based on interpretive approaches might ameliorate problems in all of these areas. From the other side, it is a shame that interpretive approaches have little impact on most real-world systems and projects. Perhaps there is some way to maintain important benefits of these approaches, while incorporating enough prior structure to make them less expensive, less time consuming, and more applicable for

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practical design applications rather than for *status quo* analysis directed at research audiences.

To provide a broad perspective, this paper compares three approaches for performing the initial analysis in a system-related project. One approach is interpretive; a second represents a traditional IS approach; a third is intermediate between the other two. Lacking empirical comparisons of different analysis and design approaches in real-world settings and recognizing that methodologies may not be followed strictly even when they are well documented, this paper uses hypothetical case studies of three similar projects to compare the three approaches. The hypothetical cases attempt to provide richer comparisons than feature analysis of abstract, idealized guidelines for the different approaches. Although hypothetical cases obviously are not representations of observed reality, they can serve to motivate exploration of possibilities, and that is this paper's purpose.

Three approaches

The three approaches that are compared are the interpretive workplace studies (IWPS) approach, traditional information system design (TISD), and the work system method (WSM).

Interpretive workplace studies Proponents of different research streams that use interpretive methods have engaged in passionate controversies for years. To gloss over methodological distinctions between various interpretive approaches, this paper assumes that aspects of ethnomethodology, workplace studies, and interpretive methods are combined into an analysis approach called 'interpretive workplace studies' (IWPS). Methods resembling IWPS are rarely applied in systems practice today. If efficient, reliable forms of IWPS could be created, they might be combined with existing analysis and design methods to generate new approaches that balance the social and technical more effectively and that therefore generate better design recommendations leading to more successful organizational implementation.

Traditional information system design Current forms of information system design involve varying degrees of integration and iteration between the design effort and production of software. Because this paper focuses on methods for developing basic understandings needed to create an initial design, typical IS design methods are represented here as 'traditional information system design' (TISD), whereby typical systems analysts produce a functional specification that is an input to the detailed design.

Work system method Still being developed, the work system method (WSM) provides guidelines for developing a preliminary understanding of a system in an organization whether or not IT plays an essential role in that system. WSM is designed to be more broadly applicable and less detail-oriented than techniques for specifying detailed software requirements, yet more prescriptive than soft systems methodology (Checkland, 1999) in guiding the analysis and providing a rich vocabulary that motivates exploration of important issues.

IWPS, TISD, and WSM are summarized and exemplified in the hypothetical accounts that follow. The characterizations of these approaches are necessarily simplistic for the sake of brevity. However, when these hypothetical accounts were presented at the First International Workshop on Interpretive Approaches to Information Systems and Computing Research, SIG-IAM, Brunel University, July 25–27, 2002, the general response was that the three approaches differed in significant ways and that the differences seemed plausible.

More should be said about WSM because some of its basic ideas will be used to organize each of the hypothetical accounts. WSM is motivated by an attempt to formalize and extend the concept of 'work system,' which has been used occasionally in the sociotechnical literature but not defined or developed in a formal sense. (e.g., Bostrom & Heinen, 1977a, b; Davis & Taylor, 1979; Mumford & Weir, 1979; Trist, 1981; Pasmore, 1985; Taylor & Felten, 1993) As explained in Alter (2002a, b, 2003), WSM combines static and dynamic views of a system. The work system framework (WSF) is a static view of how a system operates during a particular time interval when its structure and form are not changing. Even a rudimentary understanding of a work system and its significance covers the WSF's nine elements: work practices, participants, information, technology, products and services, customers, environment, infrastructure, and strategy. The work system life cycle model (WSLC) is a dynamic view of how systems evolve over time through multiple iterations of four phases of planned change (initiation, development, implementation, operation and maintenance) interspersed with unplanned adaptations that may occur during any phase. Information systems, projects, and supply chains are special cases of work systems, and therefore should inherit vocabulary, analysis methods, and success factors that apply to work systems in general. Because each of this paper's three examples describes a project, and hence a temporary work system, the nine WSF elements will be used as a checklist to assure comparability of the examples.

Audience

This paper addresses issues of significance to audiences including IS practitioners, interpretive researchers, and IS researchers in general.

IS Practitioners interested in developing better analysis and design methods might use this paper's hypothetical accounts to ask themselves and their colleagues:

1. To what extent do current analysis and design methods miss important issues that are likely to be revealed by less techno-centric methods?

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2. How could ideas from IWPS and WSM be combined with current analysis and design methods to generate better recommendations without incurring excessive costs or delays?

Interpretive researchers recognizing the limited practical application of interpretive approaches in real-world systems analysis, design, and development may be interested in making these methods more practical. This would call for making these approaches less expensive and time consuming, possibly by incorporating ideas from other approaches. Interpretive researchers might use this paper's hypothetical accounts as a starting point for asking themselves and their colleagues:

1. What are practical, economical ways in which interpretive approaches can have greater impact?
2. How might ideas from other approaches be combined with interpretive methods to retain important advantages of those methods while also being practical to use as an integral part of systems analysis and design?
3. Based on the published literature and wisdom in the field, in what ways could more extensive use of interpretive approaches introduce bias into the results of systems analysis and design efforts?

IS researchers have produced many studies of system development efforts that succeeded or failed (e.g., Markus & Keil, 1994; Brown & Vessey, 2001; Dalcher & Tully, 2002). However, little research has addressed the question of how analysis and design methods affect the IS team or the design recommendations they produce and follow. This paper suggests that these methods may lead to biases or blind spots in design recommendations that are produced. Issues for IS researchers include:

1. Does the literature provide evidence that design methods affect the nature and substance of recommendations, rather than just the details that are documented?
2. How could one use quasi-experiments, meta-analysis of published cases, or other techniques to characterize the impact of design methods in documented real-world situations?

Using a hypothetical situation to compare WSM, IWPS, and TISD

To explore similarities and differences between WSM, IWPS, and TISD, assume that each of these approaches is to play a significant role in a feasibility study and preliminary design for a new work system or significant improvement in an existing work system that relies extensively on IT. (WSM and IWPS could be used regardless of whether IT is involved, but TISD would not be used if IT were not involved.)

Each approach is to be applied in one of three identical situations in which a commercial bank's top management wishes to improve the efficiency and effectiveness of the bank's system of approving applications for commercial loans of between $1,000,000 and $10,000,000. They know that various banks around the world use a variety of approaches for approving loans. These range from largely interpersonal processes such as extensive discussions with loan committees through partially automated processes based on numerical and statistical methods, and in some cases, neural network technology. They are under pressure to improve the bank's productivity and profitability, and want to assure that changes in the existing methods will actually succeed.

Each bank has established a task force to perform the analysis and recommend either changes in the current system or establishment of a fundamentally different system. In each situation a management committee will review the analysis and recommendation based on technical, organizational, and economic feasibility. Upon approval of a recommendation, another team will perform the detailed technical design of databases, programs, and networks.

The leader of each task force is a trusted and experienced bank employee known for open mindedness, strong management and interpersonal skills, and proven ability to plan projects and execute projects. Each leader has decided that that project should be influenced by the concepts and principles of a methodology and that one project participant should be designated the 'methodology leader' responsible for helping shape the specific methods used in the project. In the three different cases, the methodology leaders choose WSM, IWPS, and TISD, respectively.

Assume further that each project will be observed by ethnographers who will produce an account of each project. These ethnographers will avoid allowing their knowledge of IWPS to taint their interactions on the projects and their accounts of what happened. In addition, assume that highly abbreviated versions of the accounts will reflect the comparative strengths and shortcomings of the three methods.

Each of the next three sections focuses on how the ideas of WSM, IWPS, and TISD shape the hypothetical analyses and on the reactions and observations of several participants in each case. Each section starts by applying the nine elements of the work system framework to organize a summary of the approach used in each project. Each section also contains subsections identifying key points in the recommendations and important issues that arose in trying to use each approach. Subsequent sections compare the methods applied in the cases and suggest possibilities for cross-fertilization between the methods.

The hypothetical WSM-based design project

In an initial meeting, the methodology leader explained the work system framework and used its nine elements to summarize the current work system for approving or denying loan applications. She emphasized that this initial discussion was based on a just a few hours of background discussions and that this very preliminary understanding of the loan approval work system was

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being presented mostly as an example for explaining the basic ideas in WSM. Project participants would use WSM ideas to analyze the loan approval system and to explain their understanding. The team would certainly correct omissions and misunderstandings in the preliminary view. It might conclude that a broader or narrower view of the system would lead to deeper insight about how to improve performance in this area.

Applying the WSM approach

The *strategy* for this project emphasized genuinely participatory design. It attempted to assure that all participants had an organized method (WSM) for thinking about the system and an enhanced ability to communicate through the organized use of familiar terms. Their analysis effort generated individual and mutual understanding of the situation and jointly understood recommendations.

This analysis occurred during the initiation phase of a new iteration in the life cycle of a system that had previously evolved through several incarnations. The *customers* for this effort included managers with direct responsibilities related to the system, the business and IT professionals who would be involved in the development and implementation phases, current and future system participants, and other stakeholders. The *products* of this effort included an agreement about the boundaries of the system, clarifications of the strengths, recent performance, and shortcomings of the system and its components, high-level recommendations concerning desired changes, and an overview of the project plan for development and implementation phases for the changes.

The *work practices* for the analysis and preliminary design included interviews, collection of documentation, and meetings to launch the project, track progress and problems, and develop a well-justified recommendation. Different parts of the analysis were performed and reviewed by different individuals or groups, who applied WSM ideas at whatever level of depth made sense for their involvement in the project. The analysis started with defining the problem (or opportunity) as the need to create noticeable positive impact on the bank's financial results by improving the loan approval system. The team's attempt to summarize the nine elements of the work system took much more time and involved more discussion than had been anticipated. The team was surprised by the amount of disagreement concerning constraints that would limit possible changes and system strengths that should not be undermined.

The analysis followed WSM guidelines calling for iterative explorations of different aspects of the situation based on the initial problem statement, the details of the situation, and work system characteristics, performance variables, and principles that apply to each work system element. Examples of the characteristics include the degree of structure, rhythm, and complexity of work practices. Examples of performance variables include efficiency, consistency, and speed. Examples of principles include please the customer, do the work efficiently, and serve the participants. These explorations revealed many issues that were not included in the original problem definition, and also a large number of possible changes that might improve some aspect of work system performance. The team members saw some situations in which several work system principles pointed to the same improvement possibilities, and other situations in which several principles pointed in directions, such as when pleasing the customers in particular ways would require doing the work less efficiently or imposing unwanted stress on the participants.

The effort to produce a recommendation involved a round of negotiations that attempted to meet the original goals, did not cause too many other problems (as revealed by the exploration of the various elements), and seemed to be practical organizationally, technically, and economically. To eliminate possible overemphasis on issues related to IT, the recommendation separately identified work system changes that did and did not involve changes in information systems that support the work system.

The *participants* in the analysis and preliminary design included business and IT professionals who were assigned to work on the project plus other stakeholders who cared enough about the situation to offer their views. The *information* used in the analysis included the problem statement, existing documents, data from existing information systems, items included in written WSM guidelines, observations of loan approval meetings, viewpoints of various stakeholders, and summaries of disagreements that occurred at various times in the analysis. The only *technology* or *infrastructure* used in the analysis was personal computers and office software. The relatively high level of trust in the surrounding *environment* made it possible to use WSM not only to clarify personal views, but also as a common denominator for communication and collaboration. Most participants believed that significant personal, social, and organizational issues were discussed rather than hidden, although a number of social and personal issues were difficult to deal with publicly.

Recommendation generated by the WSM effort

The initial problem/opportunity involved the need to approve loan applications more efficiently and effectively. The analysis unfolded by exploring problems and opportunities related to each element in the work system framework. Attending to inherent characteristics and performance variables for each element led to identifying a large number of technical, procedural, and interpersonal problems in the current work system. Some problems might be addressed through information system changes, but others were unrelated to information systems:

- need for better loan decisions (attaining lower default rates through increased use of databases and formal models to increase consistency),

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- need for clearer documentation of reasons for disapprovals (resulting in less dissatisfaction by loan officers and loan applicants),
- need for more effective communication between loan officers and the loan committee (resulting in greater internal harmony),
- reduction in the amount of distrust directed toward the loan committee by the loan officers (requires management attention and follow-up),
- need for more appropriate incentives (reducing incentives to push through potentially bad loans and to refuse potentially good loans),
- better follow-up on disapproved loans (providing more effective re-application guidelines),
- modifications of the current loan scoring model (to eliminate both bugs and design flaws),
- consideration of a neural network approach if the bank was willing to compile the necessary database of past loan requests.

Issues in trying to use WSM

Several participants noted that the accessibility of WSM generated a stronger feeling of participation than they had experienced in previous analysis efforts. In a discussion of whether WSM had been effective, one project participant said,

> In other projects the IT people came in like police investigators, asked us a bunch of questions, and treated us as though we were stupid when we didn't understand the significance of something they were asking. Using a common framework in this project made it much easier to separate the business issues that we could talk about and the technical issues that the IT people needed to solve.

Another participant concurred:

> In this project I had the feeling that everyone was responsible for understanding what we were doing even though people in different roles had to look at different things in different degrees of detail.

Some of the initial hopes for WSM proved overly optimistic. According to one participant,

> The methodology leader seemed to have a pretty high impression of this WSM thing, but it didn't matter how many times she repeated herself about the work system being the system of doing the work, some people still thought the system was the loan analysis software we use or even the computer network we use.' Also, I found it annoying when she kept correcting us by saying that work systems have participants rather than users. Big deal. This seemed like a bunch of school stuff instead of getting the job done.

Several other participants would have preferred a more passive role and to some extent supported the previous comment:

> We have a lot of a work to do. Getting so involved in this project took us away from dealing with several important loans. We don't want the IT group to foist their work on us. They should do their work by coming here, figuring out what is needed, and giving us the tools we need to do our work.

A participant who will be responsible for a major software development effort was also had reservations:

> I think WSM helped a lot with the general level of communication about what we were trying to do. But I do think the methodology leader has an unrealistic view of what it takes to develop a system. This WSM stuff absorbed extra time that I just don't have. I feel behind schedule, even at this early point in the project. Regardless of how we handle the new loan scoring model, and regardless of the degree to which we will automate loan decisions, we still have to figure out exactly what data will be used, how it will be collected and maintained, how the model will use it, and what the outputs will be. I don't think the methodology leader recognizes how extensive that effort will be.

The project leader voiced satisfaction with many aspects of WSM, but believed it did not help with some key issues:

> WSM helped us attain a higher level of participatory analysis and design because it provided a vocabulary that technical and non-technical people could use. It helped us communicate in a reasonably organized way without feeling as though we were in a straightjacket. It also helped us identify secondary problems and opportunities that would have been ignored. What it didn't do was to highlight some key issues related to competence, fears of being made redundant, and negative beliefs about certain individuals and their motives. Some influential people oppose what we are doing, and think this is mostly a new CEO's effort to appear decisive. The reality is that we are going to have to increase the number of loans we process and decrease the number of people who do that work. I think we skirted around a lot of that, and I wouldn't be surprised if some of our established loan committee members try to undermine the new scoring models, assuming our IT people are really competent to build them, which I somewhat doubt.

The hypothetical IWPS-based design project

The second design project used the IWPS method. It had a different path and generated different results.

In an initial meeting the methodology leader explained that typical approaches for creating and improving systems in organizations often focused too much on what the computer does and too little on what people do and how they communicate with each other and coordinate their work. Accordingly, several team members had been trained to use IWPS methods. These team members would spend several weeks observing how loan officers compile the information needed for loan approval and how the loan approval process actually occurs. They would return to the design team with observations about the setting. These would be presented in a written summary account and in group and individual discussions. The team members not trained in IWPS methods

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would spend little time with loan officers or loan approval committees, and would initially focus on collecting samples of loan documents, understanding how all computerized aspects of the process currently operated, and on interviewing managers and other stakeholders. Several would do research on neural network models and how these have been applied to repetitive decision processes.

Applying the IWPS approach

The *strategy* for this project tried to combine two streams of inquiry and analysis. The traditional stream included collection and analysis of documentation, computerized data, and stakeholder views and goals. The second stream involved brief, but careful field work by two trained ethnographers who recorded key interactions and produced an interpretive summary of work practices, worldviews, and social relations.

The use of the ethnographers was consistent with comments by Button & Dourish (1996), 'Arguably, to date, the most widespread and successful approach to incorporating ethnomethodological input into the design process is for the design process and designers to *learn from the ethnomethodologist*.' … [Returning] 'from the field brimming with detailed observations and an analytic framework within which to organize them, the ethnomethodologist works closely with the designers. … From the designers' perspective, the ethnomethodologist serves as a proxy for the users in the field – or, perhaps more accurately, a proxy for the field setting itself. … A second, less common approach is to learn from ethnomethodological accounts of work settings, but this requires that the designers be 'sufficiently well-versed in ethnomethodology to be able to read the ethnomethodologist's account of a work setting.' Button and Dourish's description of these two approaches was a launching point for their call to move from design critique to design practice by developing a new 'technomethodology.' In our case study, however, the technology leader was only aware of the previous approaches and decided to use them.

As in the WSM case, the project's *customers* included managers with responsibilities related to the system, business and IT professionals who will be involved in the development and implementation phases, current and future system participants, and other stakeholders. The *products* were a bit different, however, because the analysis now included an interpretive account of how the loan officers compile loan approval packages and how the loans are actually approved.

The *work practices* operated through parallel streams of inquiry. A meeting to discuss the initial IWPS analysis and review other information gathered showed a surprising degree of divergence in the findings. The IWPS analysis revealed frustrations felt by both loan officers and loan approval committees. It contained surprises about details of each function and about perceptions of how the loan officers and loan approval committees interacted. One result of the meeting was considerable doubt about the practicality of building neural network models to replace parts of the current loan approval methods and about the potential acceptance of such models if they could be built. After a two-week delay to verify some of the findings, the project continued along its initially intended path and produced its recommendation.

The *participants* in this project included the IWPS analysts, business and IT professionals assigned to work on the project, and other stakeholders who cared enough about the situation to offer their views. The relevant *information* included the written IWPS accounts, the understandings in the heads of the IWPS researchers, and the documentation, computerized information, and other stakeholder information and goals that had been gathered.

No particular *technology* or *infrastructure* other than word processors and personal computers was used in performing the design work. The relatively high level of trust in the surrounding *environment* facilitated effective use of IWPS. Most participants believed that significant personal, social, and organizational issues were discussed rather than hidden, although a number of social and personal issues were difficult to deal with publicly.

Recommendation generated by the IWPS effort

The patterns of interaction between the loan applicants, loan officers, loan committees, both as individuals and as groups, revealed issues related to inconsistent motives, incomplete analysis, and workarounds that bypass or undermine the bank's formal controls. Loan officers received bonuses based on the approved loans they obtained, and therefore felt incentives to exaggerate the creditworthiness of loan applicants and to downplay future market conditions and management turmoil that may lead to bad loans. The loan committees placed great weight on a loan officer's reputation when evaluating borderline loans; some claims about a loan officer's reputation seemed related to long-term personal or business relationships with loan committee members. Several loan committees had experienced interpersonal discord related to absorption of members of a previous committee that had been eliminated.

Under these circumstances an attempt to automate the loan approval process would probably reinforce incentives to misrepresent client data on loan applications. The best approach is to maintain the current organization and provide additional software tools that make it easier to verify the data, assure that all loan applications are scored in a reasonably consistent manner, and demonstrate that loan approvals are fair to all. Follow-up should include periodic IWPS-based reviews of the entire loan approval process to determine whether alignment between the various groups is improving.

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Issues in trying to use IWPS

Most of the loan officers and members of the loan committee either said little about the IWPS aspects of the design effort or viewed the participant observation efforts positively. Some expressed surprise that a participant observation method was being used and that 'people sent by the IT group' were willing to spend so much time at their work sites. As one loan officer said,

> Every other time I have been involved with IT people in this bank they ask what information I need or what problem I am having, take notes, and then seem to disappear for months unless the problem could be solved quickly by re-setting a few computer parameters. In this case, the analysts stayed with us for two weeks and really seemed to understand some of the challenges we face.

A loan committee member and loan officer separately expressed concerns about ethnographic methods and about the jargon the IWPS experts used when they talked to each other.

> At lunch I asked one of those guys about how they were going to bring their observations back to the IT group. He started telling me about open and axial coding of interactions, but I didn't really understand what he was getting at. I asked him whether he was interested in whether we were making good loans and he said that he had no way of determining that. But that's really the point, isn't it?

> Those guys try to act friendly, but I think it is just an act. I think they were trained to observe the natives off in some jungle somewhere and now they are observing us instead. And you should hear some of the jargon they use when they talk to each other. I overheard one of them talking about going to a conference and 'explicating' our situation using something called actor-network theory. I think he said that the existing loan scoring software was like an actor in this situation and that it might be replaced by something I think he called a neuronal network, but for that to happen it would be necessary to inscribe a new pattern of behavior in the actor-network by translating something about the interests of the other actors. That sounded even stranger than the time the IT guy came here and said he wanted my help in defining an entity-relationship diagram.

The use of IWPS created some dissension in the project team. Several IT analysts thought that the IWPS side of things was basically a diversion:

> I like talking to users as well as anyone else does, but the idea of spending weeks doing their work seemed a bit posh to me, especially while we were slogging through all that documentation and data without much help. And then they came back with all those excuses about how things just couldn't change. I don't think those guys really did much. We probably could have found out the same amount in a few days, and then we wouldn't have fallen as far behind schedule.

> We have been through this before. If you actually want to change something you don't spend all your time talking to people about how they have done things for the last 15 years. Yes, you certainly need to find out what the users are doing, but after that you build something, get them to use it, and then fix it. Otherwise what they tell you is either what they have done traditionally or how they imagine a computer might help them. And usually they aren't very good about imagining.

The project leader believed some aspects of the IWPS effort had been helpful, but wondered whether it was effective from a team viewpoint and whether it might have resulted in a more limited recommendation than another approach might have produced.

> Those IWPS guys were really good in some ways. They came back with a lot of issues a typical IT professional wouldn't even notice. But sending them to sit with users and keeping the rest of the team away from users annoyed other team members. The IWPS guys always claimed they knew users better than anyone else, and therefore we should focus our recommendations on issues they were fascinated by, which were mostly about interactions and relative power of loan officers and loan committees. Although they learned a lot of useful things by putting so much energy into understanding the soap opera and the politics, I am not sure about their commitment to create new ways to do things and eliminate the existing cronyism. Also, I don't think those guys really understand the power of the latest technology, and I wouldn't be the least bit surprised if we miss the boat by not letting the technologists get closer to the users.

The hypothetical TISD-based design project

The third design project used the TISD method. Its path and results differed from those of the other two projects.

In an initial meeting, the methodology leader explained that many projects go awry because they proceed with inadequate rigor and because they never verify that the information system requirements are complete before the programming effort begins. Accordingly, the project would proceed by producing a highly structured set of deliverables whose accuracy and completeness would be verified by extensive formal reviews. The first deliverable would be a feasibility study outlining the main features of the new system and confirming its economic, organizational, and technical feasibility.

Applying the TISD approach

The *strategy* for this project emphasized the need to gather factual information and user perspectives needed to produce a well-supported feasibility study. The project's *customers* included managers with responsibilities related to the system, business and IT professionals who will be involved in the development and implementation phases, current and future system participants, and other stakeholders. In addition to the shared understanding developed by the effort of doing the analysis, the *products* included a high-level project plan and a formal feasibility study that covered technical, economic, and organizational feasibility of the recommended changes.

The *work practices* emphasized gathering information that would help in improving the computerized aspects of the system. Much of the effort, including a three day

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JAD (joint application development) meeting, was devoted to identifying strengths and weaknesses of the current computerized capabilities and deciding what needed to be scrapped and what should be improved.

The *participants* included business and IT professionals who were assigned to work on the project and also stakeholders who cared enough about the situation to offer their views. The TISD method put the IT professionals in a privileged position of owning and understanding the methodology and being able to control the information collection and analysis because it had to feed the tools and methods used to organize and support the programming process. The relevant *information* was all the documentation of the current information system, user's views of its strengths and weaknesses, the existing computerized data, and additional interview notes about goals and opinions of various stakeholders. The initial analysis and design effort made more use of *technology* and *infrastructure* than the WSM and IWPS efforts. The corporate network provided access to data in databases, and the bank's software development tools provided access to documentation of existing software and operational procedures. The team assumed that the specifications they would produce would be entered, stored, and accessed through the firm's software development tools. The relatively high level of trust in the surrounding *environment* permitted the effective use of TISD for its own purposes. However, many participants believed that its emphasis on computerized processing meant that significant personal, social, and organizational issues were never discussed, and that some issues remained hidden because no one wanted to discuss them.

Recommendation generated by the TISD effort

The recommendation called for more effective information processing starting from the loan officer's compilation of the applicant's financial and market data and extending through the creation of the loan approval request and the final decision. Downloading data electronically from various financial data sources and merging it into electronic templates would increase the efficiency of the early stages of data collection for a loan application. A decision model would help the loan officer negotiate with the borrower. With the information in electronic form, the loan approval package could be organized in several different forms depending on the type of loan. The loan-scoring model would be enhanced based on the data that would now be available in electronic form.

Issues in trying to use TISD

Neither the loan officers nor the representatives of the loan committee believed they were adequately heard in the TISD efforts to gather information.

> They basically locked us in a room for three days and almost didn't let us come out to breathe until they had the outlines of a new computer system.

> No one wanted to mention the rumor that half of us are doomed to be replaced by some kind of automatic decision model. Why bring that up with the people who might be able to build that model? Better that they try to do something to support our current work methods. That way more of us may be able to hang on for a few more years.

Several of the analysts on the TISD team were also dissatisfied.

> Those loan officers just aren't systems people. All they want to do is charm customers into taking out loans and then charm the loan committee into approving the loans. They don't want us to do much of anything because they don't want to change and don't want to be more rigorous about loan approvals.

> I often feel that the bank's loan people just want us to go away. Working with them is very frustrating. Often it seems as though they just don't understand how powerful IT can be and how much it can help them.

The project leader saw considerable value in the control provided by the TISD approach, but believed it focused too much on developing computer-related artifacts and staying schedule, and not enough on solving business problems.

> After seeing a number of projects become a total morass, it is a bit refreshing to run a project with carefully specified plans and intermediate deliverables. On the other hand, even at this early stage in the project the schedule and the deliverables have started to take on a life of their own. I had to complain several times when project participants acted as though getting a signoff was more important than making sure we had really addressed the issues. Also, I don't think we have seriously considered the personal and interpersonal problems that will undermine almost any computerized system we can come up with.

Comparison of WSM, IWPS, and TISD as applied in the hypothetical cases

The foregoing summaries of hypothetical analysis and design efforts illustrate that differences among three approaches could influence the questions asked, the information collected, the personal relationships within the analysis and design team, and the recommendations produced. Obviously, different authors would have constructed different stories for these hypothetical situations, but this approach still might provide a mechanism for describing likely differences between the three approaches.

Figure 1 represents WSM, IWPS, and TISD as slightly overlapping areas in a two dimensional space. IWPS focuses on social rather than technical issues and adds value by providing discipline-based data collection, data analysis, and documentation methods. TISD provides

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discipline-based tools and methods focused on the technical side of system development. In contrast, WSM tries to provide broadly applicable frameworks and terminology that encompass the social and the technical, but are not as extensive in either the social or technical realm as IWPS or TISD, respectively.

According to the hypothetical accounts, WSM focused more on viewing the entire situation as a system, used measures of performance for different aspects of the system, and emphasized effective communication among project participants. IWPS focused more on the details of work practices and on interpersonal issues, was less concerned with what was being produced, and seemed less inclined to support significant changes. TISD focused more on computerized aspects of the system and viewed participants as users of technology.

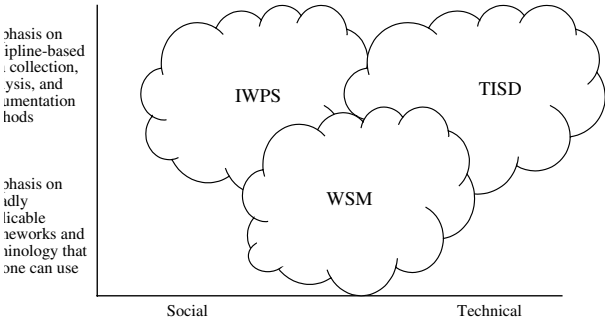

Figure 1 Relative emphasis of IWSP, WSM, and TISD approaches.

Differences among the approaches were also reflected in different impacts on the organization performing the analysis. WSM was more participatory. The IWPS approach put the interpretive analysts in a privileged position with regard to both the participants in the situation being analyzed and the participants in the analysis and design effort. TISD placed the IS analysts in a privileged position regarding the computerized aspects.

Table 1 extends Figure 1 by identifying strengths and shortcomings revealed in the hypothetical situations. If these characterizations are reasonably accurate, the strengths of each method might be sources of cross-fertilization to the other approaches, and the shortcomings might be areas in which cross-fertilization is desirable. If the characterizations are not reasonably accurate, then the characterizations could be clarified, Table 1 could be revised, and a new set of strengths and shortcomings could be used as the basis for possible cross-fertilization.

Table 1 Strengths and shortcomings of WSM, IWPS, and TISD

Method	*Strengths*	*Shortcomings*
WSM	• organized way to think about a system from a business viewpoint • reasonably usable by typical business professionals (if they have the patience to do an analysis) • incorporates insights from sociotechnical systems, TQM, and TISD • provides a vocabulary and problem solving method • plausible way to use general principles that are easily understood	• possible confusion from trying to support both superficial and detailed analysis from same starting point • difficulty establishing the meaning of terms quickly and making sure terms are used consistently • likelihood of overwhelming users by encouraging them to look at too many different aspects of a situation
IWPS	• recognizes the importance of rich description of local culture, organization, and conditions • path to deep, situated knowledge based on participant observation • generates instructive stories about specific systems • likely to uncover issues missed by techno-centric methods	• usable mostly by privileged outsiders, not by typical business or IT professionals • possible difficulty consolidating knowledge crossing systems in various organizations • requirement for excessive time and effort by the analyst • ossible lack of interest by the IWPS community in transforming research concerns to practical methods
TISD	• organized method(s) for building computerized systems • first order explanation of common problems and confusions in building systems • supports models for governing system development efforts • rigorous methods for evaluating quality and completeness (e.g., database techniques such as ERD) • automated tools that support system development efforts (e.g., CASE in its various forms)	• focus on IT project success rather than organizational success • focus on computerized aspects of the information system, downplaying other aspects of the work system being supported • treatment of anything outside of the original scope as a distraction, thereby discouraging learning and experimentation • temptation to place schedule and completion of deliverables ahead of business realities

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Example of possible cross-fertilization: how IWPS ideas might enhance the scope and power of WSM

Table 2 and Figure 2 focus on WSM in an abbreviated example of the type of analysis that might lead to cross-fertilization between different approaches. Table 2 shows that the current version of WSM covers both idealized and realistic views of systems in operation and systems in change. The idealized view emphasizes what is supposed to happen, that is, how a system is supposed to operate or how it is supposed to change over time, whereas a realistic view emphasizes ways in which reality differs from the ideal. The static view looks at the system in operation during a particular time period, whereas the dynamic view looks at how the system's form or operational characteristics change over time.

Figure 2 shows some of the possible directions for importing ideas and methods that could enrich WSM without changing its basic nature as an organized and reasonably rigorous systems method any business or IT professional should be able to use in the initial analysis of a system in an organization. Direction #1 involves finding concepts and methods that are related to various theories of communication, decision making, group formation, and other personal, interpersonal, or organizational topics not directly associated with IWPS. For example, ideas from the Myers–Briggs psychological-type literature have implications for different types of tools that people with different psychological types might prefer. Even if no one in the situation has ever been tested for psychological type, a designer might use the ideas from that well-developed literature to visualize different

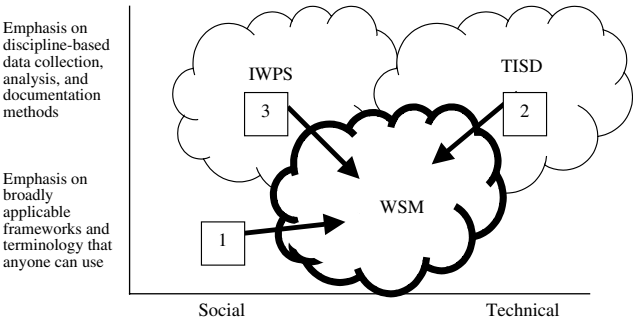

Figure 2 Possible directions for finding ideas and methods that could enrich WSM.

Table 2 Main frameworks, methods, and ideas included in the current version of WSM

	Static view: System in operation during a particular time period	*Dynamic view: System changing over time*
Idealized view: System or project as it should be according to the manual or plan	• Work system framework (elements of a work system)	• Work system life cycle model (combining continuous and discontinuous change)
	• Work system characteristics, performance variables, principles	• Work system phases and idealized deliverables for each phase (including several possible paths for developing or acquiring the software)
	• Initial version of fundamental concepts of work systems, stated in terms of elements, subelements, and related characteristics, performance variables, phenomena, actions, and other properties	• Recognition of advantages and disadvantages of different methods for building and maintaining information systems
	• Inheritance of concepts and generalizations from work systems in general cases to more specific special cases of work systems	• Inheritance of concepts and generalizations from work systems in general to projects in general, and to specific types of projects.
Realistic view: System or project as it actually operates	• Recognition that different people playing the same role in a business process may do their work differently	• General recognition of unplanned events and interventions, diffusion of innovation, emergent phenomena, path dependence, need for system adaptability, existence of assimilation gaps, and so on.
	• Recognition that many aspects of the work practices and information in most work systems are not codified.	• Recognition that the goal of system development projects is to produce work systems that operate successfully, not just to produce information systems that operate in accordance with specifications.
	• Recognition of workarounds that are inconsistent with the business process as it is defined in a manual.	
	• Work system characteristics including formality of exception handling and error recovery	

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ways that tools might be used within an information system.

Similarly, direction #2 might bring ideas from TISD that might be restated, simplified, or included in a computerized tool that would make them at least somewhat usable by typical business professionals who were never trained as programmers. A prime candidate in this regard would be an easy way to help non-programmers summarize non-trivial data requirements without knowing the nuances of entity–relationship diagrams. Similarly, research on workflow technology might provide effective, semi-standardized terms related to launching and controlling steps within a definable workflow pattern (e.g., Stohr & Zhao, 2001) In addition, research on applying speech act theory (e.g., van Reijswould *et al*., 1999) might provide other terms for conceptualizing business processes. Finally, various diagramming tools such as flow charts and data flow diagrams might provide other insights or methods for understanding business processes.

As for direction #3, ideas that might be absorbed into WSM from IWPS literature and practice involve 'the observer' and every one of the nine elements in the work system framework.

Observer: The work system framework does not currently contain a slot for the observer, but this could become the tenth element because similarities and differences between the views of different observers are so important for understanding how a system operates and how it might change.

Customer: Current WSM terminology distinguishes between internal and external customers and includes generic steps in the customer experience for a product or service. The IWPS literature might provide ideas for describing customer satisfaction from the viewpoints of the customer, other stakeholders, and other observers.

Products and services: Current WSM terminology distinguishes between several types of products and services received or used by customers, and identifies typical performance variables perceived by customers. The IWPS literature might provide better ways to discuss social products, such as the coordination resulting from a planning process, the mutual understanding of a system defined by an analysis process, or the feelings of harmony resulting from social maintenance activities.

Work practices: WSM currently assumes that the work practices within a work system may be viewed as business processes or in terms of other sets of ideas such as communication or decision making. WSM also identifies characteristics of work practices (such as degree of structure, complexity, and rhythm) and performance variables (such efficiency, consistency, and speed) that are important for describing how well work practices operate and identifying possible directions for change. The IWPS literature might provide a rich infusion of concepts for describing activities and coordination within an amorphous business process such as the rapid flow of activities in a control room (e.g., Suchman, 1993). It might also provide concepts for describing the reality of how well defined business processes actually operate.

Participants: Work system participants can be discussed as individuals, as groups, as roles, as holders of jobs, as users of technology, and in other ways. Characteristics of groups include statistical characteristics (age, diversity, skill level) and emergent characteristics (cohesiveness, interdependence). The IWPS literature might provide useful categories for describing work system participants, their roles, and their motives.

Information: WSM describes information characteristics, quality, and usefulness using terms such as type of information, accuracy, precision, age, timeliness, completeness, and accessibility. TISD provides entity relationship diagrams and other ways to identify information in computerized databases. WSM currently recognizes the difference between codified and non-codified information and between explicit and tacit knowledge. The IWPS literature might provide a richer view of the non-codified information and tacit knowledge in the everyday world, especially as regards situated information and knowledge about social relationships and informal hierarchies that affect system operation.

Technology: WSM's terms for technology are currently rather limited. General IT terms such as computers, networks, and software are easy to use and very general, but are not particularly interesting at this point. Specific technical terms such as TCP/IP, OOP, and ebXML are too arcane for typical business professionals to understand technically. The IWPS literature might help bridge this gap by providing concepts for describing how work system participants view both the technologies they do use and the plausibly applicable technologies they don't use. It might also provide ways to talk about the realities of experimentation and adaptation that occurs in the diffusion and acceptance of technology in an organization.

Infrastructure: WSM views infrastructure as human, technical, and informational resources that are shared among many work systems. The IWPS literature might provide ways to distinguish further between infrastructure and completely contained work system components.

Environment: WSM currently treats the environment as the organizational, cultural, competitive, technical, and regulatory environment within which the work system operates. The IWPS literature might provide useful concepts for describing how the surrounding environment affects work system participants and work system operation.

Strategy: WSM currently treats strategy as the rationale under which a work system operates. The IWPS literature might provide ideas for describing how work system participants and other stakeholders understand the strategy (and tactics) embodied a work system, and how they understand changes in the strategy and resultant changes in work system operation.

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Conclusion: is it possible for interpretive approaches to become more effective, economical, and practical?

This paper provided a way to explore possibilities for cross-fertilization between interpretive methods and other methods for performing the initial analysis when trying to improve a system in an organization. It compared three hypothetical situations to show how differences between analysis approaches could generate differences in the results of the analysis. These differences revealed strengths and shortcomings of the three approaches that have implications for cross-fertilization. As an example, the literature generated by the IWPS approach might provide characteristics and performance variables that can be used in WSM, and might provide examples that evoke useful work system principles.

The effort to develop WSM further by identifying and absorbing concepts from the IWPS literature is completely consistent with WSM's goal as an organized, reasonably rigorous systems analysis method that business and IT professionals can use in the early stages of a project or at any time when it is important to think about a system in an organization. The main criterion for adding or rejecting ideas from IWPS or other sources is whether those ideas would add to WSM's power without detracting from its usability by business professionals, whose many other responsibilities take precedence over their mastery of specialized research skills.

In contrast, it is debatable whether ideas from WSM, TISD, or other sources could or should be incorporated into IWPS approaches. To date, the IWPS community has focused primarily on research rather than on practical applications such as developing or modifying systems in organizations. Despite potential usefulness of non-IWPS models and concepts for understanding a particular system and its context, several questions might lead to ignoring or rejecting ideas from WSM or other sources:

- *Blank slate or not?* Given their focus on situated knowledge and practices within particular social systems, IWPS practitioners trying to avoid pollution or bias from other situations might find concepts and frameworks from prior sources detrimental to their work.
- *Acceptance of system-related theories?* Prasad (1997, p. 109) says, 'Ethnographers are almost unanimously opposed to any form of grand theorizing. … For an ethnographer, grand theories conceal far more than they reveal because, in their zest for developing generalizable knowledge, they miss the local interpretations and cultural context that ultimately constitute such knowledge.'
- *Legitimacy of design as a goal?* Anderson (1996) mentions claims that 'ethnography tends to be inimical to change, or at least design-induced change'. … Grudin & Grinter (1995, p. 137) find this 'conservatism' to be a corollary of ethnography's fine tuned attitude to the detail of practice. Any intervention, so the ethnographers seem to argue, is bound to be devastating for existing practice.'
- *Only for highly trained outsiders?* Urquhart (1997, p. 155) says, 'grounded theory method also requires that the researcher demonstrates theoretical sensitivity by being well grounded in technical literature as well as from personal and professional experience and in collection and analyses of the data.' Although most successful business professionals are at least reasonably intelligent and diligent, most do not combine 'theoretical sensitivity' with grounding 'in technical literature.'

Despite these reasons for rejecting ideas external to IWPS, the potential benefits of better system analysis methods in system development situations might encourage IWPS practitioners to adopt ideas from WSM and other approaches in an attempt to create efficient, reliable, broadly applicable sociotechnical methods.

Filling in blank slates takes too long to be practical in real-world projects. Conscious use of ideas from WSM and other approaches might help IWPS practitioners do their work more efficiently by identifying topics that must be covered to understand a technology-reliant system in an organization and by outlining factors that typically affect system operation and success. Use of these ideas might also help in communicating IWPS insights to project members and work system participants who may have little familiarity or sympathy for IWPS concerns or methods. In other words, regardless of the traditional goals and interests of the IWPS community, some adaptations to improve the fit of IWPS approaches with the goals and culture of system projects might increase the impact of IWPS approaches on system-related practice.

About the author

Steven Alter is Professor of Information Systems at the University of San Francisco. He earned a Ph.D. from MIT and extended his thesis into one of the first books on decision support systems. After teaching at the University of Southern California he served for eight years as Vice President of Consilium, a manufacturing software firm that went public in 1989 and was acquired by Applied Materials in 1998. His research for the last decade has concerned developing systems analysis concepts and methods that can be used by typical business profes-

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