The Work Mapping Technique

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ABSTRACT

Staff often feel disempowered during systems development exercises, despite the best efforts of systems designers to consult with them. This has, in the past, lead to situations where systems delivery does not address the needs of the work area, or where staff have not readily accepted the new systems. This paper describes a technique developed in a major public sector agency in Australia to better involve staff in systems development.

Keywords: participation, participatory system design, trade union, union advisory unit, work mapping

A large public sector agency in Australia is undertaking major renovation of its business systems and computing hardware. As an essential prerequisite to this modernisation program, the organisation and the union to which the majority of its staff belong (including systems development staff) signed a technological change agreement, known as the Modernisation Agreement. The Agreement provides an industrial democracy framework for union involvement in the modernisation process. Modernisation projects must include union nominees as part of their project teams. The role of the nominee includes ensuring compliance with the Modernisation Agreement and with union policies and principles, and flagging any potential issues of contention. One resource to assist union nominees is a union advisory unit which provides independent research and advice.

The implementation of the Modernisation Agreement has changed the quality of the power relationships between staff and the public agency management. The union role has been legitimised in settings where it once would have been problematic. Focussing particularly on systems design, a range of developments is of interest. The union has taken an active role in a review of the 'official' systems design methodology, providing substantial input into defining the checkpoints and boundaries of the methodology as it fits into work design and the staff ultimately affected by the introduction of new systems. The acquisition of new systems development products and the conduct of systems

development projects has been impacted by the presence of union nominees who have been supported by the union advisory unit's work.

One of these systems development projects developed a technique called work mapping because it perceived a need for more informed participation from staff during system design than was possible with existing consultative processes. The technique draws upon some elements of socio-technical systems methods. The union nominee on this project invited the union advisory unit to become involved in an evaluation of the technique. Following this evaluation work mapping has been used extensively throughout the organisation and in other settings, including in the Union's own work design and system support needs.

Work mapping is a technique that enables staff to work together to develop analytical models of their work and work environment. Work mapping can be used to identify potential productivity improve-ments, simulate impacts of proposed changes to work processes, practices, technology and/or work environment and for the design of work and technological systems.

In work mapping workshops staff develop detailed models of their current work in their own language using symbols they develop themselves. These models are simulated, (using boxes, paper cups and other available materials) to validate them and come to agreement on their content. Following validation participants conduct a problem analysis of the model and identify potential solutions, including systems design and develop new models incorporating these potential solutions. These new models are then simulated and validated and action plans are developed to inform and enable further contribution to the work maps and problem analysis from their fellow staff and to allow further research on potential solutions.

Work mapping produces maps of work which are rich with information about work processes, work practices and the work environment, including decision making points, management interventions, computer support, local culture and values, volumes, timing, errors and resources such as staff, time, equipment, accommodation, and training. It contributes to enabling staff to manage and influence change because they own the maps and information

contained in them, rather than the information becoming the sole property of a project or business analyst and because they develop the skills to examine proposals for change and suggesting alternatives.

Two characteristics of these maps are especially important: they are in the language of the people doing the work and they describe work in an holistic manner, not just in terms of particular aspects such as data flow. In addition, staff acquire a technique to analyse their work and develop analytical skills. This enables staff to identify problems and contribute to the resolution of those problems in a variety of ways. During the work mapping process a collective understanding of work, problems and action is agreed. This enables staff to collectively and cooperatively seek ways to improve their work and work place. It enhances the ability of staff to contribute in participative processes in a genuine way. Staff gain in confidence as they better articulate the work processes and skills that they bring to the work.

Work mapping has the potential to overcome some perceived failings of current system development processes. Staff participation in system design in the agency in which it was developed has been an issue of concern. The methodologies used by system developers have not assisted genuine participation, in part because of the language used and their concentration on data flows as descriptive of work process. The language of systems developers reflects the interests of their professional discipline and the tools they use in going about their work. It does not describe work, not even the systems aspects of work, as staff do. Therefore, when staff get the opportunity to comment on, for example, functional specifications, they do not feel able to make a valuable contribution because they lack the language of systems development.

Likewise, the concentration on data flow inhibits staff participation. The work and work environment is much richer than the interaction between a staff member, their terminal and the data. Staff seek to understand the impact of systems in relation to entire work processes, and can contribute valuable information and suggestions for systems design if they can discuss more than just data. Further, the application of technology tends to be pursued by systems developers to the exclusion of changes to business or work systems. Work mapping enables staff, managers and systems developers to explore alternatives in a systemic and holistic way.

For example, in a client detail amendment process staff were required to access four different applications to obtain records of file location, client details, document issue dates and document return information. When the amendment process was work mapped, systems analysts used the whole work process information to develop an interface integration

prototype. This enabled staff to more easily access the different systems and their menu structures to do their work.

Work mapping was conceived in an environment which recognised that people are not merely 'users' of existing computer systems, but complex intelligent individuals rich in experience and expertise who collaborate in the work place to achieve group goals and objectives. The developers sought to design a participative approach which acknowledged and valued people's knowledge, experience, expertise, and creativity, and also acknowledged and valued the whole work community in which people interact.

Work mapping has been enthusiastically received by staff. It has produced a wide range of insights into problems with existing work practices. This data could be extremely useful in assisting organisations to improve the way in which they conduct key elements of their business, improve productivity and undertake organisational, technological and work design. Nevertheless, in the early development of the technique, a number of issues have emerged. Work mapping needs to be incorporated as an element of a broader process of change if it is to contribute successfully to participatory design. The commitment of managers and supervisors to the process is particularly critical.

Staff leave the workshops armed with new knowledge of their work place and the work they perform, and in possession of a powerful technique for assessing proposals for change. In the course of the workshop they will have identified problems with the way their work is currently undertaken, and have considered options to change those processes. They return to the workplace empowered by their new knowledge and understanding and enthusiastic to commence implementation of changes to work practices. However, their enthusiasm may sour if the work mapping exercise is not complemented by strategies which equip staff to participate in subsequent decision making and system development. In other words, work mapping is not a substitute for ongoing staff participation, rather, it is a tool to assist the collection of more useful information for systems developers and a means of commencing productive relationships between systems developers and staff.

Work mapping is in its relative infancy, although its widespread use in a large federal government agency, and in other settings is constantly yielding learning about its possible applications. The aims of this workshop are therefore twofold: to introduce participants to the process of work mapping in a participative, hands on exercise; and to develop new understandings about its potential applications, particularly in the translation of the information gathered into a format which is useful and useable by systems analysts and designers, in the context of a continuing program of participation.

The workshop will introduce the principles of work mapping and demonstrate their application in an exercise in which participants will work together in small groups to commence work on maps of their own, mapping typical work processes common in a variety of workplaces. Participants will gain an understanding of the depth and texture of the information collected in work mapping. Following the exercise, discussion will centre on means of incorporating the information which is collected into a participative design program.

REFERENCES

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URCOT (1994), *Work Mapping: Possible Applications In The Australian Taxation Office*, Working Paper No. 4, Melbourne, Australia.

WORKSHOP PRESENTERS

Leigh Snelling is a Research Officer with the Union Research Centre on Organisation and Technology Limited (URCOT). Her work is mainly concerned with organisational design in an environment of large scale business and technological change. Her specific activities include investigating and advising on the introduction of team based work and working with women to assess whether there is a gender basis in the different ways people experience organisational change. Prior to working with URCOT, Leigh worked in a variety of public and private sector settings advising on the introduction of change initiatives. She has extensive experience in participative training exercises, and facilitates work mapping workshops.

Cath Jolly is a Deputy President of the Taxation Division of the Public Sector Union, and an Administrative Officer in the Australian Taxation Office. Her responsibilities include representing the Union in relation to the following ATO initiatives:

- ISDM; which is updating and enhancing the ATO's system development methodology;

- LAN Mainframe Connectivity, which is advising a tender process to acquire software to upgrade the connection between LANs and mainframes, and to improve the user interface for mainframe applications;

- Business Systems Management Committee, which is the 'acquisition council' of the ATO, and which approves and schedules system development initiatives;

- Senior Management Committee, which is the steering committee which oversees systems development in relation to specific project areas, such as the potential introduction of imaging technology, electronic lodgement systems, a bar coding system for file location and user interface integration;

- People Architecture Working Party, which develops principles and methodologies for the introduction of change initiatives, especially technological change.

In addition to these representation activities, Cath is a member of the project team which developed the work mapping technique, and is involved in the ongoing facilitator training and development of guidelines for the use of work mapping.

Constructing a Framework for Participatory Work Systems Design: A Workshop for Project Managers

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KEYWORDS
Participatory design, project management, work systems design, knowledge management, knowledge modeling, social systems

INTRODUCTION
This workshop is intended for people interested in planning and managing participatory design projects in complex organizations. The workshop will guide participants through the business issues involved, using a framework that incorporates knowledge modeling, social systems analysis, structured software development, and other approaches. Participants will develop and critique project plans in the course of the workshop.

PARTICIPATORY WORK SYSTEMS DESIGN
Participatory work systems design (PWSD) is an approach to the design of work processes and the development of work support technology that examines and cares for the social systems developed by workers support learning and problem solving (in addition to addressing other aspects of business problems). This represents a considerably deeper understanding of the environment than that provided by a task-flow oriented approach. [1, 2].

To uncover the ad hoc social networks formed by workers to support their work, and study their critical importance in the workplace, participants will learn about techniques used by social scientists such as ethnography, data collection through interviews, and uses of multimedia. The workshop will provide a practical introduction to each of these methods.

WORLD MODELING
World Modeling expands on the knowledge modeling

techniques contained in CommonKADS and other systems development methodologies [3, 4, 5]. It provides a way to capture and model such information as how knowledge is applied to specific tasks; how people interact with work objects; what tasks are necessary to fulfill a business process; how knowledge and resources are distributed throughout an organization; what formal and informal relationships exist in the organization, modes of computer-human interaction, and other dimensions.

The workshop will provide participants with an understanding of the World Modeling methodology and its relationship to project management and work design.

PROJECT MANAGEMENT
Managing a PWSD project raises a number of issues that must be addressed in the planning stages. Chief among these are determining the team structure, managing relationships with stakeholders, obtaining resources, defining a structured work approach, setting a project schedule, and ensuring a shared understanding of the project's deliverables and objectives.

As a project develops, the project manager must track each of these dimensions and ensure that they are meeting criteria for quality and timeliness. There must also be a way of clearly communicating this information to stakeholders.

The workshop will introduce participants to a model-based method of project management based on the World Modeling framework. The method provides an effective way to deal with the many issues involved in PWSD projects.

ORGANIZATION OF THE WORKSHOP
The workshop will begin with an overview of the PWSD framework, placing special emphasis on the three main features of participatory work systems design: project management, modeling and representational tools and strategies, and the participatory nature of the undertaking.

Participants will then develop their understanding of the

framework by working on a case study of a common business experience, complex but small enough to be explored during the workshop.

The last part of the workshop will include review, analysis, and critique of the plans developed by participants.

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BACKGROUNDS
Albert M. Selvin, Maarten Sierhuis, and **Angelika Kindermann** are members of technical staff at NYNEX Science & Technology, Inc., the research and development arm of NYNEX Corporation. They belong to the Work Systems Design Group, which develops work-centered technology and business process design approaches. Their backgrounds range from communications and anthropology to systems development.

Rob van der Spek is Manager, Consulting for the Center for Knowledge Technology (Centrum voor Kennistechnologie) in the Netherlands. He builds knowledge-based systems for clients and instructs students in KBS methodologies, as well as consulting to European and American organizations on knowledge management and organizational change.

Education for Participatory Design

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WORKSHOP THEME

Participatory Design is, among other things, about sharing experiences. Yet we note that one experience, how we teach about PD, has not received much attention at the PD Conferences. Education—whether credentialed or not (e.g., worksite training)—let alone the issue of user involvement/participation in the design of education programs, has not been a formal topic of discussion. A discourse on education within PDC is particularly important in relation to current curriculum discussions within ACM, IEEE, and IFIP, as well as the US National Science Foundation's initiatives.

We wish to use this workshop to initiate a more systematic discourse within the PD Conferences on education. The topic of the workshop is strategies and techniques for teaching PD, mainly in formal higher education curricula but also in worksites. Participants in the workshop will discuss what the goals of PD education should be, what materials to use, and how to campaign successfully to incorporate PD into educational activity.

WORKSHOP FORMAT AND PLAN

The vehicle to stimulate this discourse in the workshop will be a set of simulated design activities. Participants will self-select into one of five working groups. Each working group will simulate the first meeting of a task force to develop a PD curriculum proposal/development plan at one of the following levels:
1. A non-credit training program (e.g., one week) to be carried out in a worksite;
2. A single course within a department;
3. A PD stream / track within a department;
4. A distinct PD profession (e.g., the HCI specialist);
5. Infusing PD philosophy generally in a department (e.g., Computer Science).

While the first three levels will be clear to most profession-

als, the fourth and fifth deserve some clarification. Plans to develop e new profession in Human-Computer Interaction, somewhat distinct from traditional Computer Science of Informatics, have recently become an important focus of curriculum discussion; it is these plans which will be at the center of work group four. An alternative to this approach is to attempt to spread a participatory approach into all areas of Informatics/Computer Science; this infusion approach will be the focus of group five.

The plan for the workshop is:
9:00-9:30—introduction, including very short presentations by work group leaders of the main issues in PD education at the level to be addressed in their work group. This should allow participants to decide which working group is appropriate to their situation and/or of greatest interest.
9:30-10:15—group work in each working group, including discussion of examples of existing curricula/experiences at the relevant level, readings, exercises, etc.
10:15-10:30—break
10:30-11:00—continuing group work, including strategies for gaining acceptance and reflections on general principles relevant to the level and what to present.
11:00.11:45—"plenary" reports and discussion of both specific level and general issues.
11:45-12:00—wrap up.

WORKSHOP DYNAMICS

The following individuals, each of whom have relevant experience, have agreed to lead workgroups:
1. Worksite training: Kari Thoresen
2. Course: David Hakken
3. Stream: Karl Kautz
4. Profession: Michael Müller
5. Infusion: Tone Bratteteig
Barbara Andrews will be responsible for opening the workshop and making a final wrap up.

We wish to make the workshop as participatory as possible, and we believe that many of the participants in PDC'94 will have had experiences in one or more of the levels of PD education listed above. We intend participants

to participate in the task group which corresponds most closely to their current PD education interest or experience. Finally, while the details will be different at each level, we expect there to be some overlapping issues (e.g., What are the core elements of PD philosophy? When is it important to build participation itself into the educational experience?) which emerge in several of the work groups and become the focus of the general discussion. This discussion may in turn give some indication of whether there is interest in organizing ongoing discussion of curriculum issues (e.g., through the Internet) or even of some collective intervention by PDCers into the curriculum discussion.

Velcro®-modeling and Projective Expression: Participatory Design Methods for Product Development

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ABSTRACT

There is a need in the consumer marketplace today to bring better user-centered products more quickly to market. Participatory design tools and methods used very early in the design development process can help meet this need. This workshop gives participants hands-on experience with two new tools/methods.

KEYWORDS: User-centered, consumer product development, "Velcro®-modeling," projective expression, hands-on

INTRODUCTION

This workshop has been designed to give its participants hands-on experience in the early design development process of a consumer product. Both hardware and software aspects of the product will be simultaneously addressed. Workshop participants will first play the role of end-users in creating artifacts from specially created stimulus materials. They will then shift into the role of design researchers in order to analyze the resulting artifacts and to draw design implications from them.

THE PLAN

A 30-minute slide presentation will be used to give the workshop participants an overview and exposure to a wide variety of participatory design methods. The slides will show work-in-progress from the design development of many types of products (*e.g.*, consumer electronics, products for children, military vehicles, medical instruments, etc.). All the methods shown in the slide presentation have been found to be useful in developing user-centered products for today's marketplace, with its emphasis on shorter and shorter product development cycles. This introduction to participatory design methods will emphasize the variety of methods available. It will

also discuss the time period within the product development process during which the methods are most effective.

The remaining two-and-a-half hours will be a learning-by-doing experience. We will focus upon two of the methods that we have found to be most useful very early in the product development process: "Velcro®-modeling" and "projective expression."

A hypothetical consumer product will be introduced. This product will be one that all workshop participants could possibly be purchasers and/or users of.

Workshop participants will learn how to use Velcro®-modeling and projective expression by taking part in three steps:

1. Act as potential users of the product and engage in the Velcro®-modeling and expression exercises. The Velcro®-modeling exercise will be done by teams. The projective expression will be done as individuals.

2. Analyze the information collected and the artifacts created in the first step. This will be done collaboratively by all workshop participants.

3. Develop design implications from the result of the analysis in the second step. Again, this will be done by the whole group.

THE PARTICIPANTS

Because of the "props" needed by these methods, it will be necessary to limit the number of participants to about 12. People with any kind of background are welcome.

The Role of Representations in Distributed Design: The Social and Technical Organization

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OVERVIEW

It is becoming increasingly common to characterize systems development work as processes of learning. Notions such as Participatory Design, Cooperative Prototyping and Process-Oriented Systems Development emphasize that the role of shared representation in social learning and communication should be primarily considered to establish sound design methods in order to arrive at systems that are appropriate with respect to the work practices of the domain experts using the system. However, learning is largely regarded as an individual activity. Furthermore, it is often assumed that design artifacts such as specifications, drawings or prototypes effectively convey the respective knowledge to the various parties involved in the design process.

The use of computers and communication technologies redefines the process of design even further. Networked systems store and display information about design products, about designers and their decisions, about users and user organization, during various stages of the process. Systems accumulate design knowledge which is spread out among designers and users through the distribution of the system. At the same time representations, specifications or other documents embodying related knowledge about the system, and in particular specific design rationales, are distributed through varying social processes. All those artifacts together represent what might be called an external social memory of all the people and parties involved in the design process.

As a consequence, the overall meaning or knowledge of

the system cannot be located at one specific place or set of documents, nor is there one single person knowing all and everything which is relevant for using, maintaining or adapting the system to changing needs.

Also, the location where design is actually accomplished may shift over time, creating new "virtual" teams. Thus, the functional organization of design changes, thereby changing the organization itself.

WORKSHOP GOALS AND PROCEDURES

The aim of the workshop is to explore this perspective of design, especially the interaction of the social organization of design teams and the artifacts they use for communication and learning. Several problems arise, which are not sufficiently well understood:

> What kind of representations do design teams use and which do most effectively become sites for the development of shared understandings?

> How are the representations used and spread out, creating and requiring "distributed cognition"?

> What kind of organizational learning processes are needed to organize the design process under different circumstances (or situations) and how can they be fostered?

These questions should provide a rich forum for practitioners as well as researchers in the field of user-oriented systems design in general, and interface design in particular.

In the first part of the workshop every organizer will present a certain aspect of the topic, as well as his/her experiences with the helpfulness of theoretical methods in the special field. Emphasis will be put on a common perspective which shows how closely interlinked the issues are.

After the introduction, workshop participants should contribute their own cases and insights on the issues.

Finally we will lead a discussion of how this perspective can result in a better understanding of design processes and enumerate research issues following from it.

Meeting of the Minds: The Challenges of Interdisciplinary and Inter-occupational Communication

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KEYWORDS: participatory design, interdisciplinary communication, software design, translation.

INTRODUCTION

Effective participatory design requires communication across the boundaries of disciplines and occupations. The challenges posed by such interdisciplinary and inter-occupational communication are often overlooked, but can contribute significantly to the difficulty of designing. Disciplines and occupations have not only their own vocabularies and cultures, but also their own world views. Members have learned to see — and not to see — aspects of the world in discipline- or occupation-specific ways. Inequities in status enable members of some disciplines to impose their world views on the design process.

In this workshop we seek to explore the nature of the challenges posed by interdisciplinary and inter-occupational communication. We start from the premise that the work and world views of practitioners (especially practitioners of low social status) deserve our respect and careful understanding. Using our own research-in-progress on communication across disciplinary and occupational boundaries, and drawing on the experiences and observations of workshop participants, we will work to identify common themes and challenges of communication across boundaries. In so doing, we hope to find ways to sensitize members of design teams to the difficulties of cross-disciplinary and cross-occupational communication, and to provide them with conceptual tools that will enable them to be more reflective and more effective in interdisciplinary and inter-occupational settings.

We presenters are ourselves an interdisciplinary team, and we will lead the workshop participants in an exercise which asks them not only to analyze a videotaped example of an interdisciplinary conversation but to do so in small, interdisciplinary groups. This approach should provide lots of data upon which participants can reflect: the data from the presenters' research, the data from their own work, and the experience of discussing the videotape in an interdisciplinary group.

As a useful byproduct of this workshop, participants will be exposed to videotape as a means to capture complex and sometimes subtle interactions. The presenters believe that this powerful tool may be useful to participants who wish to conduct their own investigations of work, disciplinary and occupational differences, and human interaction.

Our experience investigating communication across boundaries comes largely from projects involving three very different user groups: machinists, social scientists, and schoolteachers.

MACHINISTS

This project began from the premise that, although technology has usually been used to replace and deskill production work, it can also be used to support the skilled work of production workers. During a "skill-based automation" project whose purpose was to design a CAD system that would support a machinist's, rather than a design engineer's, view of the production process, we discovered that a computer scientist consulting to the project had difficulty grasping the notion of a technology that supported, rather than displaced, skilled production work. This led us to an interest in the nature of disciplinary training, especially in engineering and computer science, and the ways in which disciplines and occupations cause their members to focus on some phenomena and miss others.

We began a study of communication between machinists on the one hand and engineers and computer scientists on the other. In a series of videotaped conversations, we asked machinists and engineers to discuss what characteristics a computerized system to support skilled machining work would have. Our data show evidence of disciplinary and occupational barriers to mutual understanding, and provide

insight into the machinist's world that could inform the development of skill-based automation in machining.

SOCIAL SCIENTISTS

Interested in extending our exploration of interdisciplinary communication to our own university, we began work with an interdisciplinary group of psychologists, political scientists, and health-related professionals who were investigating and mapping toxic hazards in the neighborhoods of the city of Lowell, MA. The goal of their project was to inform community activists and provide them with data to use in their quest to improve their neighborhoods.

The social scientists had become interested in the possibility of using a Geographic Information System for their work, but were unfamiliar with GIS technology. We arranged for them to hold a series of meetings with a GIS expert. These meetings are recorded on videotape and provide clues to interdisciplinary communication issues, as well as information about the process by which domain experts who are not computer experts begin to adopt a computer technology.

SCHOOLTEACHERS

Schools are most often studied as the students' learning-place, not as the teachers' workplace. A premise of this project is that teachers have many of the same workplace issues as other workers. They are curriculum domain experts, but are far less apt to be cognizant of computer technology. Yet computers are being introduced into the classroom at record rates, and teachers are expected to incorporate their use into curriculum. We view as crucial the task of learning how to give teachers, especially those who are not computer-literate, a real voice in the design or customization of the software they will use on the job — that is, in the classroom.

It is our opinion that the key issue here is interdisciplinary and inter-occupational communication between users and software developers. The translation between their domains involves not only the different terminology used by teachers and software developers, but also the understanding of each other's work and workplace. We have successfully used a former-teacher-turned-computer-scientist as the translator in our projects. The translator understands both the language used by teachers and by software developers, and the detailed nature of their work and the conventions of their workplaces. The translator can help to ensure that there is a meeting of the minds between teachers and software

developers. By studying such translators, we hope to learn techniques that will benefit interdisciplinary design teams that do not have a translator aboard.

ORGANIZATION OF THE WORKSHOP

The organizers will introduce the topic, goals, and timetable for the workshop. Then the following four activities will occur.

Presentation of the organizers' work in progress

Each of the organizers will do a brief presentation about work in progress with one of the user groups described above (machinists, schoolteachers, and social scientists).

Exercise: Videotape and transcript

A short videotape of a design session involving engineers and users, taken from one of the organizers' projects, will be shown. A transcript of the videotape will be distributed. In small, interdisciplinary groups, workshop participants will be asked first to discuss the interdisciplinary communication issues that are revealed in the videotape and then to reflect upon how the interdisciplinary make-up of their group may have influenced the discussion of the videotape.

The purposes of this exercise are (1) to let participants who use videotape in their own work compare their approaches with others, and share their expertise and experience with participants who have not used videotape; and (2) to let participants think about how the interdisciplinary make-up of their small group affected their discussion of the videotape.

Contributions by attendees about their work

Workshop participants will be given an opportunity to describe their own work, and to show similarities and differences with the organizers' case studies.

Summary

The organizers will lead participants in summarizing the issues raised during the workshop. A list will be compiled of points on which consensus has been achieved. A list of open issues will also be compiled.

ACKNOWLEDGMENTS

Video-based Interaction Analysis in the Workplace: A Tool for Workers' Appropriation of Their Own Practice

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ABSTRACT

In 1992 we initiated a project at the Xerox Customer Administration Center (CAC) in Dallas during which we started up an Interaction Analysis Lab or IAL (a process for the collaborative analysis of video recordings of work practices) in the workplaces we were studying. With our guidance and facilitation, workers, trainers, and first-line managers participated in the analysis of video tapes. They found these sessions useful and empowering.

This workshop is intended to build on our experience by showing and discussing examples from our work and adapting the ideas and techniques we have developed to the projects and interests of workshop participants.

KEYWORDS: Interaction Analysis, video analysis, collaboration, learning organization.

ISSUES

How can tools for understanding the current state of learning and work practice be developed that ensure that the environment for learning is supported and that actual work practices are better understood and reflected on? How can "empowerment" be made a reality rather than a rhetoric in the workplace? How can we improve communication between field organizations and headquarters? How can we, as researchers, share our insights with the people we study? Most importantly, what is it that we can leave behind beyond reports gathering dust on office shelves, that would truly improve the quality of life in the workplace?

INTERACTION ANALYSIS IN THE WORKPLACE

Video-based Interaction Analysis (VIA) is a method for investigating the interaction of human beings with each other and with the physical objects in their environment. It allows for the analysis of work and training practices in

the physical and social context in which they occur and offers participants the ability to closely study actual work and learning practices.

In 1992 we initiated a project at the Xerox Customer Administration Center (CAC) in Dallas during which we started up a process for the collaborative analysis of video recordings of work practices in the workplaces we were studying. We introduced Video-based Interaction Analysis (VIA) to workers, trainers, and first line managers. With permission, we videotaped many aspects of work in the CAC: people responding to customer inquiries, attending meetings, taking computer-based training courses, listening to lectures, and engaging in on-the-job learning. We made these tapes available to workers, trainers, and managers for collaborative analysis under our guidance. These joint sessions, known as the Interaction Analysis Laboratories or IALs, became a powerful tool for reflecting on the actual processes of work, learning, and socialization as they occur in the CAC.

Like learning itself, the analysis of work practices in IALs is collaborative. During these sessions, the tape is played and replayed many times over, as participants develop grounded hypotheses about what is happening on the tape. As barriers to effective practice are discovered, remedies are discussed and, if possible, implemented. Issues that cannot be resolved locally are noted for later follow-up. Sometimes questions arise that can only be answered by further research or inquiry after the session.

By doing Interaction Analysis in groups with individuals from varying ranks and roles within the organization, multiple points of view emerge and are aired. We know that shared understanding is something that must be constructed, not received. By making the invisible visible, by articulating what had never been talked about, and by grounding this process in the reality of their own work practice, people at the CAC have begun to construct a shared view of what is going on, a common understanding of problems and potential solutions, a collective moving towards a shared view of "where we are heading."

IMPACT OF WORKPLACE INTERACTION ANALYSIS

There are signs that the CAC is appropriating Interaction Analysis for its own use. The training organization has acquired video equipment and is actively debating creative ways of using cameras for documentation, understanding, and teaching. One of the trainers took a video tape from the field site to headquarters to show it to curriculum developers, believing that seeing trainees' confused reaction to computer-based training programs would give the developers of these programs better user feedback than any other method. Most of them, indeed, found the evidence incontrovertible. We are here beginning to see some mechanisms for improved communication between the field organization and headquarters that is based on the field "owning" representations of its work.

A number of employees have learned Interaction Analysis techniques and have found them helpful in self-assessment. For us as researchers, intensive analysis of videos in collaboration with the workers, trainers, and trainees has contributed to a deeper understanding of how workers view what they do, what access they have to resources and what decisions they feel are theirs to make.

In the series of Workplace IALs (WIALs) within the Dallas project, we have discussed a great variety of topics including facility design, difficulties in navigating through computer systems, the compatibility of computer systems with other support materials, training techniques, work practice inconsistencies, and social interactions on the job. These sessions have resulted in changing work processes, clarifying misunderstandings for new hires, brainstorming for technology design, reevaluation of the design of training programs, and increasing job satisfaction when people noted where a job is well supported and well done.

One could think of WIALs as a step on the path to "the learning organization." Beyond that, we would suggest that WIALs provide a low-cost, efficient means towards involving workers, trainers, and managers in designing and re-engineering work practices, producing ideas for new training programs, suggesting facilities changes, and championing technology development. Though not without danger, the use of collaborative Interaction Analysis has tremendous potential to make real contributions to the empowerment of individuals and groups in all parts of the organization.

WORKSHOP CONTENTS

The workshop is structured as three modular activities, separated by brief "stretch+yack" periods.

Part I: An introduction to the principles of Video-based Interaction Analysis (VIA) as we use it for the microanalysis of work practice in technologically and interactionally complex work environments.

Part II: Joint viewing of videotapes from one of our workplace projects to demonstrate and discuss the ways in which workers and first-line managers used these tapes.

Part III: Discussion of the ways in which this kind of co-analysis could be adapted to workshop participants' projects. We will examine likely pitfalls, suggest cautions, and pay particular emphasis to the ethical and political considerations that need to be entertained when contemplating such activities.

HANDOUTS

We will provide a variety of handouts, consisting of:
- several papers (our own and others') on the topic of VIA
- informative statements and forms, including consent forms, which we use for videotaping and in WIAL sessions to caution participants and advise them of their obligations and rights
- a series of unsolicited memos written by employee participants in WIALs regarding their views of the value of WIALs for them.

REFERENCES

Jordan, Brigitte and Austin Henderson
(1995) Interaction Analysis: Foundations and Practice. In press: The Journal for the Learning Sciences 4(1): 39-103. Also available as IRL Report #94-0026, Palo Alto, CA: Institute for Research on Learning.

ORGANIZERS

Brigitte Jordan, a senior researcher at Xerox PARC and the Institute for Research on Learning, has been a pioneer in the development of Video-based Interaction Analysis. She was principal investigator for the project during which Workplace Interaction Analysis was piloted.

Melissa Cefkin is an ethnographer at the Institute for Research on Learning. She was intimately involved in doing the foundational ethnography and establishing the relationships of trust that made the introduction of Workplace Interaction Analysis possible. She has been the facilitator for almost all of the WIAL sessions conducted so far.