ANDREW MONK AND STEVE HOWARD

The Rich Picture: *A Tool for Reasoning About Work Context*

The Importance of Concerns

Have you ever observed the following situation? A computer system is built to satisfy well-specified requirements. The requirements clearly describe the task to be supported, and the system satisfies them. Despite all this care and attention, the system is universally condemned by management and users. Why does this happen? Surprisingly often, the task supported is not one that users actually perform. More likely, the model of work underlying the computer system interferes with other tasks the user wants to perform.

Andrew Monk
Department of Psychology
University of York
York, Y01 5DD
United Kingdom
AM1@york.ac.uk

Steve Howard
Swinburne CHI Laboratory (SCHIL)
Swinburne University of Technology
PO Box 218,
Hawthorn, 3122
Australia
SHoward@swin.edu.au

The really catastrophic side effects are those that prevent other people from doing their work. If the chief accountant can no longer get the figures she needs, the system will never see the light of day!

A new computer system will affect the way people work; if it does not there is no point in introducing it in the first place. These effects will be deleterious if the developers do not consider the implications for both the system's users and other people who may be affected by use of the system. All work has numerous, and sometimes competing, objectives. A single user may have the objectives "to complete a job well" and "to get home soon." Management may have the objectives "to cut the head count in this department" and to "minimize the transaction times for customers." We call these objectives "concerns." Concerns are the high-level objectives that significantly constrain the way work is done. Effective systems can be designed only by taking into account the divergent concerns of stakeholders. A designer may think she is taking an "impersonal view of the problem," but the very act of identifying the problem implies a particular viewpoint.

How is a designer therefore to reason about these divergent concerns that motivate the way different stakeholders view the system they are designing? This paper discusses a simple graphical device, called a rich picture, that has been found to be useful in this respect. A rich picture is a cartoon-like representation that identifies all the stakeholders, their concerns, and some of the structure underlying the work context. A rich picture is a tool for recording and reasoning about these aspects of the work context, in particular, how they should affect the design. It is a tool in the sense that a notation or representation is a tool. Rich pictures have been used as an element of various methods. The next section briefly explains the origin of rich pictures in the Soft Systems Methodology and how they look. The sections thereafter sketch some examples of how they may be used in HCI. A rich picture is a small but effective idea. It can be incorporated into any design process. Perhaps it would be useful in yours.

Origins of Rich Pictures

Rich pictures originated in the Soft Systems Methodology (SSM) [4, 3, 18]. SSM, in turn, had its origins in sociotechnical approaches to system design [15]. Within this tradition, identifying multiple viewpoints of a work situation is a recurrent problem. SSM was developed during the 1960s and 1970s by Peter Checkland and his students at Lancaster University. At the core of SSM is a desire to understand human activity systems in a way that is meaningful to the actors in that system. SSM consists of seven main stages that proceed from articulating the problem situation, through building alternative systems models, to making recommendations for action. Checkland proposes the rich picture as a representation to be used at the beginning of this process.

Rich pictures are generally constructed by interviewing people. The ideal interview should take place at the workplace because the artifacts people use to do their work will be close at hand. They will be able to show you documents and products, and you may even be able to observe them doing their work. The rich picture serves to organize and reason about all the information that users provide. Drawing the picture will point to places where you need to find out more or to apparent contradictions in the conclusions you have drawn. In the latter case you will need to go back to your informants and then make changes based on what they tell you. Drawing a rich picture then is an iterative process of understanding and refining that understanding.

What does a rich picture look like? The rich picture depicts the primary stakeholders, their interrelationships, and their concerns. It is intended to be a broad, high-grained view of the problem situation. There is no single best way of producing a rich picture; the same analyst will use different styles under different circumstances. To illustrate this, Figures 1 and 2 present rich pictures of contrasting styles. They depict a pub and a Web design company, respectively. Figure 1 is intended to capture the viewpoints of

- The brewery owning and supplying the pub;

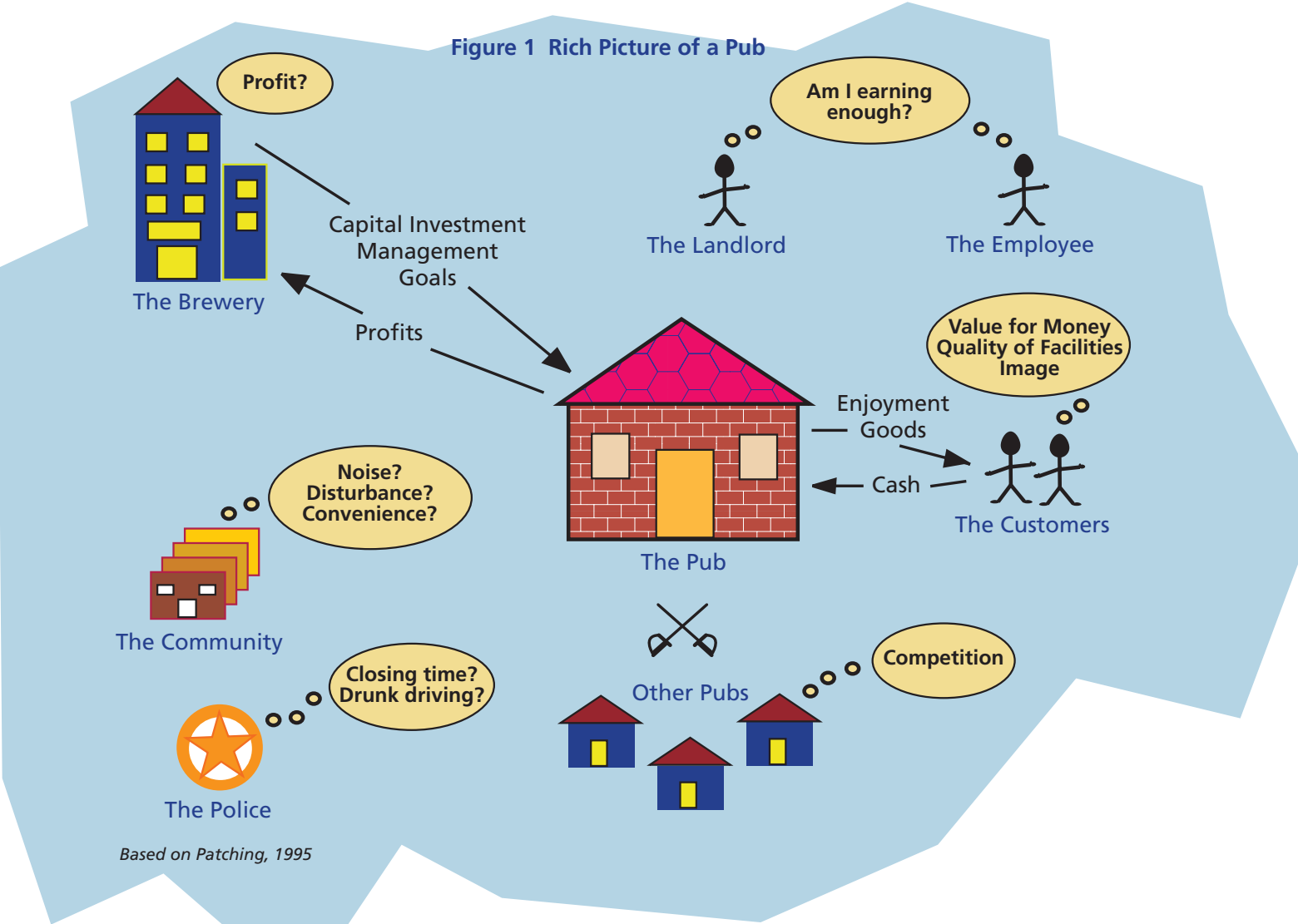
- The employees that work in it;
- The customers that frequent it; and
- Indirectly involved stakeholders such as the community, the police, and other pubs in the vicinity.

Contrast this with Figure 2, which is intended to capture the internal structure of the Web design company and viewpoints of the roles within it, as well as the viewpoints of external bodies such as clients. Figure 1 emphasizes the flow of goods and services from supplier to customer, whereas Figure 2 emphasizes the flow of influence. So, for example, the Professional Society of Web Designers influences the company through expectations and standards. The director influences the work of the analyst and the coder through strategy documents, and so on.

The three most important components of a rich picture are structure, process, and concerns.

- **Structure** refers to aspects of the work context that are slow to change. These might be things such as the organizational hierarchy of a firm, geographic localities, physical equipment, and so on. Most important, it includes all the people who will use or could conceivably be affected by the introduction of the new system. In Figure 1 the structure described is a brewery, owning a pub, having a landlord and customers, and situated in a community. In Figure 2 the structure includes the boundaries between the company and the world in general and those of a given project within the company. The analysts

Figure 1 Rich Picture of a Pub



Based on Patching, 1995

Table 1. Elements of an Effective Rich Picture

Element	Comment
1. Include *structure*	Include only enough structure to allow you to record the process and concerns. The latter requires that all the people who will use or could conceivably be affected by the introduction of the new system be included.
2. Include *process*	Do not attempt to record all the intricacies of process; a broad brush approach is usually all that is needed
3. Include *concerns*	Caricature the concern in a thought bubble (see Figures 1–3 for examples). A fuller explanation may be provided in a supplementary document
4. Use the language of the people depicted in it	This will make the rich picture comprehensible to your informants
5. Use any pictorial or textual device that suits your purpose	There is no correct way of drawing a rich picture. There are as many styles as analysts and the same analyst will find different styles useful in different situations

drawing the rich picture are included in this structure to remind themselves that they too have a separate viewpoint, concerns, and possible bias.

- **Process** refers to the transformations that occur in the process of the work. These transformations might be part of a flow of goods, documents, or data. In Figure 1 the processes depicted are transformations of goods, money, and enjoyment. In Figure 2 the emphasis is more on the process by which different roles influence one another.
- **Concerns** is the most useful component, for the purposes of this paper. Checkland calls them "issues." We prefer the word "concern" because it captures more clearly the idea of a particular individual's motivation for using the system. These different motivations give rise to the different perspectives each person has. Each of the people captured in the rich picture will have concerns. A manager might have a concern arising from the pressure being put on her to reduce the number of staff in her department. Someone in that department may have a concern that his job may be de-skilled or that he may be laid off. The thought bubbles coding concerns in Figure 1 make it clear that the brewery, the employees of the pub, and the customers each have very different perspectives on what the pub is for.

Finally, tensions between stakeholders can be highlighted. The "crossed swords" icon serves this purpose. In Figure 1 the pub is shown to be in tension with other pubs, presumably through their competition for a limited pool of customers. Identifying tensions with crossed swords is a useful preliminary step to precisely identifying the conflicting concerns and how they may be resolved.

Table 1 lists some of the features that make for an effective rich picture. The first three serve to prevent the rich picture from becoming overloaded with detail. The advantage of having a rich picture that is comprehensible to the people who have given you the information (Item 4 in Table 1) is that you can take it back to them for review. In this way you can elicit new information and correct mistakes of interpretation. The discipline of using the language of the work context may also help prevent the inclusion of structure, process, and concerns that are not real but that the analyst thinks *should* be there. The last point in Table 1 is that work context analysis requires imagination and creativity, just like design itself. Examining the examples given here and in the references should provide plenty of ideas for potential users of this technique.

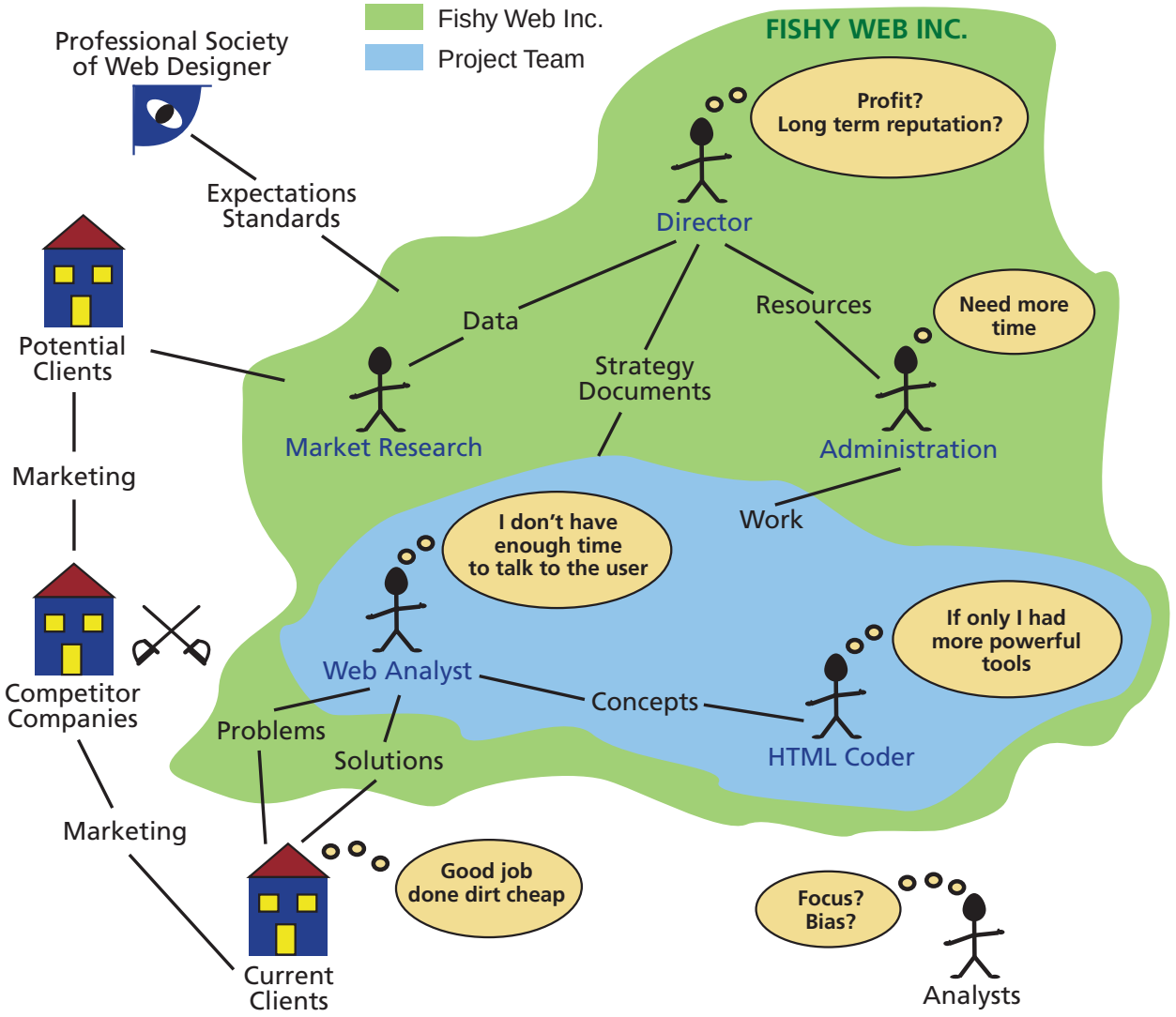
The remainder of this article illustrates the role that rich pictures can play in two related contexts: participatory design and lightweight usability engineering.

Uses of Rich Pictures

Rich Pictures in Participatory Design

Drawing a rich picture requires that the analyst work closely with the stakeholders so that the pictures capture the situation and related concerns from the stakeholders' points of view. Stakeholders participate in the process by working with the analyst to identify structures,

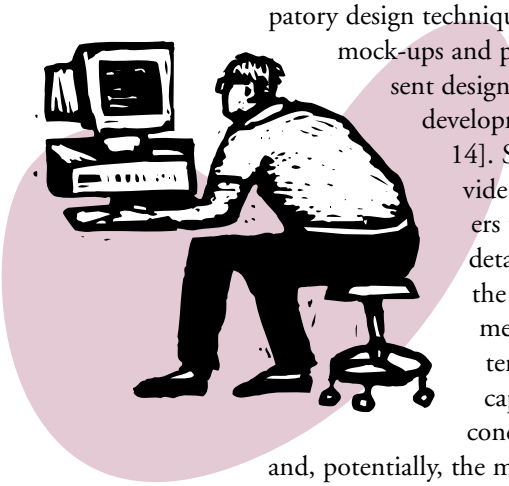
Figure 2 Rich Picture of Web Design Consultancy



processes, and concerns significant to them. SSM's focus on the stakeholders' viewpoint shares much with various participatory design methods [e.g., 7]. There is, however, an important difference between participatory design and SSM: the role of the user in the design process. In participatory design the user takes an active role in the analysis and design process; in SSM this is often not the case.

Rich pictures can be used to record, reason about, communicate, and negotiate significant issues as they arise during or after participatory design. Essentially the role of the rich picture is to make explicit the stakeholders, their interrelationships, and their concerns. Interestingly, this can be done at two levels. A rich picture of the work context can be drawn that identifies the stakeholders and the work setting. Figures 1–3 are examples of this type of rich picture. Additionally, a rich picture of the participatory design team itself can be used to identify the necessary managers, hands-on users, beneficial users, analysts, designers, and other participants. This type of rich picture can be useful in "designing design," in composing the stakeholder meetings, and in reasoning about design processes. Comparing the work-context rich picture with the design-context rich picture provides a way of checking whether there is appropriate stakeholder representation on the design team. Consider the use of rich pictures with the following techniques seen frequently in approaches to participatory design.

- **Brainstorming:** Brainstorming is often used to generate ideas about the problems and potential solutions of the work situation. Because rich pictures can be drawn "on the fly" during a brainstorming session, ideas can be captured without unduly disrupting or constraining a necessarily creative, unstructured process. Rich pictures here present an alternative to the multitude of sketches and doodles that participants often walk away with from brainstorming sessions. A rich picture helps everyone involved in its construction to take a consistent view of the problem situation without demanding that they all agree on what the problem is. Multiple conflicting concerns can be captured in the pictures as shown in Figures 1–3.
- **Storyboarding:** Storyboarding is often used to describe the flow of, for example, the users' activities so that they can be reviewed and evaluated by both designers and users. Rich pictures can provide an elegant adjunct to a connected series of storyboards by representing, in a single abstract summary, the major structures and flows, at an organizational level, relevant to a work situation. Rich pictures here present a supplement to the flow charts and procedural descriptions often used to connect the separate episodes of a story.
- **Paper-Based Prototyping:** Many participatory design techniques use paper-based mock-ups and prototypes to represent design ideas early in the development process [e.g., 14]. Such techniques provide a way for stakeholders to comment on the details of the design and the extent to which it meets the user's characteristics and needs. In capturing the primary concerns of the users and, potentially, the major information flows likely to affect the system, the rich picture places the emerging design in its overall social and technical context.



Using a rich picture does not, in itself, solve any of the delicate problems encountered in participatory design: how to deal with private or confidential concerns, how to bring together different constituencies that have very different ways of describing the work context, or how to deal with minorities within a constituency. However, constructing a rich picture with the help of the relevant stakeholders will make the concerns apparent, and identifying a problem is an important first step in solving it.

Rich Pictures in Lightweight Usability Methods

When people think of user interface design they usually think of large, high-profile projects, such as word processors or military command and control systems. The majority of user interface design projects are in fact very small: perhaps, for example, someone has requested a Windows 95 interface for some small part of the company database. Another example is the design of a Web page. The one or two developers given the task probably do not even consider themselves user interface designers; yet cumulatively these small projects significantly affect the productivity of an organization.

On a large project one can afford to recruit or train developers in specialized techniques; indeed, an elaborate, well-specified design methodology may be necessary just to manage the large number of personnel involved [11]. On a small project the techniques used must be "lightweight," that is, the costs to the organization must be minimal. Nielsen [16] has dubbed these techniques "discount." They may only achieve 90 percent of what is possible with more elaborate methods, but they do so for very much less than 90 percent of the cost. Costs here are measured in training and in the time it takes to apply the technique; therefore, lightweight techniques have to be easy to learn and quick to apply. If a project is assigned only 4 person-weeks of effort, a technique for improving some aspect of the quality of a user interface is unlikely to justify more than 1 day of training and 2 or 3 days of application. Examples of lightweight techniques

include Monk et al.'s simplified user testing procedure Cooperative Evaluation [13] and Nielsen's simplified usability inspection technique, Heuristic Evaluation [17]. With these techniques, prototypes and scenarios are crucial parts of communication between designer and user. Without these concrete representations of the design, little communication can occur. With them, however, both user and designer can develop common ground by focusing on actions and tasks. A rich picture can serve a similar communicative function much earlier in design when one is thinking about the general work context and the constraints this imposes.

Monk [12] describes how a rich picture can be used as the first step in a lightweight design process, to reason about the redesign of the

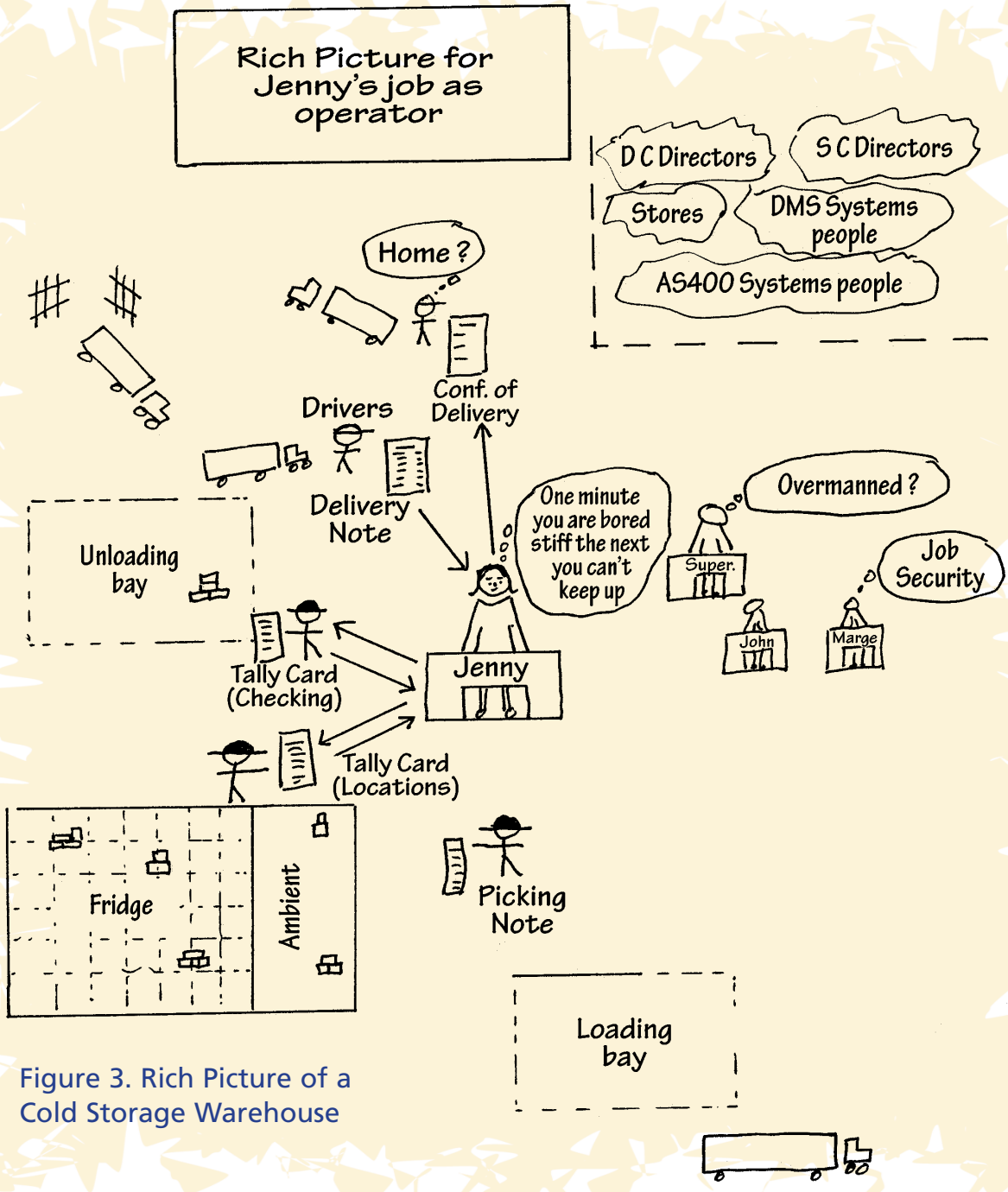
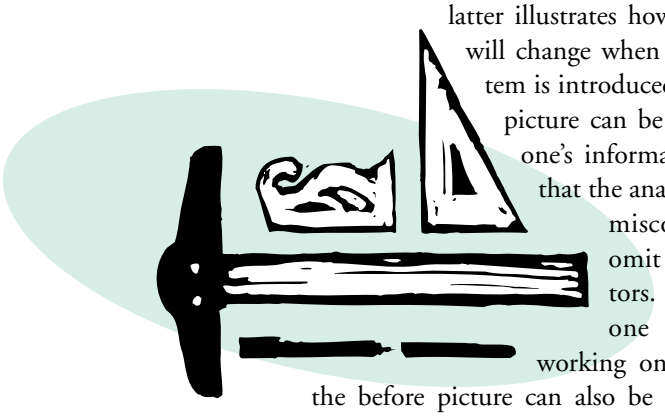


Figure 3. Rich Picture of a Cold Storage Warehouse

work context that will be required. He suggests that "before" and "after" rich pictures be developed. The former records critical aspects of the work context as it now exists, and the latter illustrates how the context will change when the new system is introduced. The before picture can be presented to one's informants to check that the analysis does not misconstrue or omit crucial factors. If more than one developer is working on the project, the before picture can also be invaluable in communication between developers and getting everyone to think on the same wavelength. As the prototype design is developed an after picture will emerge. The after picture can be presented to management to alert them to the implications of the new computer system. If they are unhappy it is still early enough for changes to be made. If they accept the design then they can make appropriate adjustments, change reporting structures, organize retraining, and so on.



The procedure suggested by Monk first involves talking to stakeholders about their jobs. A rich picture can be a useful way for developers who are not used to this sort of work to focus their thoughts. Normally a designated contact in the user organization will be interviewed first. The people who will end up actually using the system should also be interviewed. It is then a matter of judgment how many of the additional stakeholders identified by these initial informants one also needs to talk to. It is always a good idea to interview people in their workplace, where they can show you documents, screens, and so on. A portable tape recorder may be useful to check what was said, and you should always have a prepared list of topics or interview schedule so that you cover all the critical points. Clegg et al. [5] give useful and practical advice on how to get the best out of your informants.

When drawing a rich picture for this purpose, you normally start by sketching in the middle of a large sheet of paper some figure who represents the primary user or operator. Monk's lightweight technique is to encourage user centered-design and to avoid the natural tendency for developers to take a system-oriented view. Putting the operator at the center of the picture makes her the focus of attention. Next, the stakeholders that directly influence the operator's work can be pictured along with the elements of structure needed to explain the process of work. Monk illustrates his methods with a real example of design for a cold storage warehouse; the rich picture developed in this process is shown in Figure 3. The operator is given a fictitious name, Jenny. Jenny's job involves taking delivery notes from the drivers of vehicles bringing goods into the warehouse (depicted as stick figures wearing caps). Jenny enters the data from the delivery note into a computer system to provide tally lists for the deliveries to be checked by the warehouse men (signified by stick figures wearing black hats). The roles described thus far then are the core stakeholders in the process of getting the work done. The rich picture also identifies other clerks and a supervisor. Finally, the most peripheral stakeholders are drawn in. In Figure 3 they appear at the top edge of the picture. They are the directors and computer systems people of the two organizations taking part of this operation—the owners of the cold store and the owners of the stores supplied.

When the major structures and processes have been added, the concerns can be addressed. The thought bubble for Jenny in Figure 3 codes the wide variations in workload she has to put up with. Other concerns included are the need for the drivers to get away as soon as possible, worries about job security, and so on. Thought bubbles may be somewhat cryptic to someone who was not involved in generating a rich picture, so Monk suggests that an additional sheet be added explaining in slightly more detail the concerns of each stakeholder. The same sheet may explain the process and specific responsibilities not coded on the picture.

One of the important reasons for drawing a rich picture is to clarify one's thoughts. For

this reason one should not be afraid to throw away an early version and start again. Rich pictures can also be presented to informants (although you may need different versions for different informants) to make amendments or radical revision. The rich picture is only the first step in Monk's lightweight method. The next is to identify work objectives and user exceptions, which are then used to develop scenarios that can be used to refine early prototype designs and to make sure that the design supports all relevant aspects of the work. The rich picture serves as a starting point and a context for all these activities. Readers wishing to know more about this process should consult Monk [12].

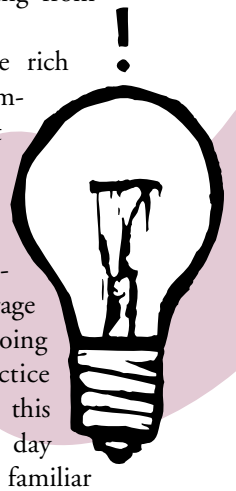
Monk's lightweight method is a relatively informal technique; that is, it is not precisely specified. This has the advantage of making it relatively easy to learn and apply. The disadvantage is that different people will apply it in different ways. This is not a problem when the design team is small and coordination is straightforward. However, when design teams get larger a much more precisely specified method is needed, just so that everyone knows what everyone else is doing [11]. Examples of more tightly specified procedures that make use of rich pictures are

- TheoryBuilder [10, 19];
- Howard and Smith's [8] use of rich pictures with Johnson's [9] Knowledge Analysis of Tasks; and
- Multiview [2].

Some Final Comments

One recurring theme in this review has been the value of using more than one technique when analyzing a work context. We are not suggesting that using a rich picture will solve all your problems. It is just one of many small but useful ideas that may be applied to any design problem. The value of using a wide variety of techniques is eloquently discussed by Dearden and Wright [6]. They report on a case study that borrowed from a number of methodological traditions to analyze a work context. According to this approach an SSM-style rich picture is just one of the techniques used. Dearden and Wright also used contextual interviews, "train me" sessions, work logging, semistructured interviews, scenario analysis, model building, wish lists, and assumption challenging. They argue that no single technique is capable of capturing full the diversity of the work setting.

Dearden and Wright draw an interesting distinction between techniques that are situated in the work context and those that go beyond the immediate situation. The former techniques can be used only in the work place. The latter allow the analyst and the user to detect issues beyond the range of the observable situation, for example, the organizational and historical contexts. Dearden and Wright assert that different techniques have different strengths and weaknesses. Observation allows one to separate what people say they do from what they really do, but it has practical limitations. With only a limited amount of time in the workplace it may be impossible to see the full process. Infrequent, but nonetheless important, problems may not crop up while you are actually there. Only by using a variety of situated and nonsituated techniques can the fullest account emerge, given the prevailing practical constraints. The rich picture can serve as a representation to motivate all these different sources of information about the work. It can also serve as a representation to integrate information regarding the higher level work context coming from the sources.



The versatility of the rich picture arises from its simplicity. We suspect that many readers will already have seen ways of incorporating rich pictures into their own methods and we would encourage them to do so. The foregoing examples of good practice should allow you to do this effectively. Perhaps one day the rich picture will be as familiar a diagram to see at a design meeting as the now ubiquitous data flow diagrams and flow charts. When that day arrives we will have moved much further toward removing our

METHODS & TOOLS
COLUMN EDITORS

Michael Muller
Microsoft Corporation
One Microsoft Way
Redmond, WA 98052
mullerm@acm.org

Finn Kensing
Department of
Computer Science
Roskilde University
Building 20.2
P.O. Box 260
DK 4000 Roskilde
Denmark
+45-4674-2548
Fax: +45-4674-3072
kensing@ruc.dk

blinders and making a genuine attempt to see the other person's point of view. System design can only benefit from such a change.

Acknowledgments

Dr. Monk was supported by the ESRC Cognitive Engineering Program. Dr. Howard was supported by a grant from Swinburne University of Technology, Australia. We would like to thank the editors of this section for valuable comments on an earlier manuscript.

References

1. Avison, D. and Fitzgerald, G. *Information Systems Development: Methodologies,* Techniques and Tools. Blackwell Scientific Publishers, Oxford, 1988.

2. Avison, D. and Wood-Harper, T. *Multiview Methodology.* Blackwell Scientific Publishers, Oxford, 1990.

3. Checkland, P. *Systems Thinking,* Systems Practice. John Wiley and Sons, Chichester, 1981.

4. Checkland, P. and Scholes, J. *Soft Systems Methodology in Action.* John Wiley and Sons, Chichester, 1990.

5. Clegg, C., Warr, P., Green, T., Monk, A., Kemp, N., Allison, G., and Lansdale, M. *People and Computers: How to Evaluate Your Company's New Technology.* Ellis Horwood, Chichester, UK, 1988.

6. Dearden, A. and Wright, P. Experiences Using Situated and Non-situated Techniques for Studying Work in Context. In S. Howard, J. Hammond, and G. Lindgaard, eds., *Human Computer Interaction—INTERACT'97.* Chapman and Hall, London, 1997.

7. Greenbaum, J. and Kyng, M. *Design at Work: Cooperative Design of Computer Systems.* Lawrence Erlbaum Associates, Hillsdale, NJ, 1991.

8. Howard, S. and Smith, R. Using the Soft Systems Methodology to Front-end Task Analysis. In *HCI: A Light Into the Future, Proceedings of OZCHI'95* (Wollongong, Australia, November 1995), pp. 88–94.

9. Johnson, P. *Human Computer Interaction: Psychology, Tasks Analysis and Software Engineering.* McGraw-Hill, London, 1992.

10. Khushalani, A., Smith, R., and Howard, S. What happens when designers don't play by the rules: towards a model of opportunistic behaviour in design. *Australian Journal of Information Systems 1,* 2 (1994), pp. 13–31.

11. Kraut, R. E., and Streeter, L. A. Coordination in software development. *Communications of the ACM 38,* 3 (1995), pp. 69–81.

12. Monk, A. F. Lightweight techniques to encourage innovative user interface design. In L. Wood & R. Zeno, eds., *Bridging the Gap: Transforming User Requirements into User Interface Design.* CRC Press, Boca Raton, 1997.

13. Monk, A. F., Wright, P., Haber, J., and Davenport, L. Improving your human-computer interface: a practical technique. BCS Practitioner Series. Prentice-Hall, Hemel Hempstead, 1993.

14. Muller, M. J. PICTIVE—An exploration in participatory design. In S. P. Robertson, G. M. Olson, and J. S. Olson, eds., *CHI'91 Human Factors in Computer Systems* (New Orleans, 1991). ACM, New York, pp. 225–231.

15. Mumford, E. Sociotechnical system design: evolving theory and practice. In G. Bjernes, P. Ehn, and M. Kyng, eds., *Computers and Democracy: A Scandinavian Challenge.* Avebury, Aldershot, UK, 1987.

16. Nielsen, J. Usability Engineering at a Discount. In G. Salvendy and M. J. Smith, eds., *Proceedings of the Third International Conference on Human-Computer Interaction,* HCI-International '89, Boston, September, Elsevier Science, 1989, pp. 394–401.

17. Nielsen, J. and Mohlich, R. Heuristic evaluation of user interfaces. In J. C. Chew and J. Whiteside, eds., *Human Factors in Computer Systems, CHI'90.* CHI '90, Seattle, April, ACM, New York, 1990, pp. 249–256.

18. Patching, D. *Practical Soft Systems Analysis.* London, Pitman Publishing, 1990.

19. Smith, R., Howard, S., Sutherland, T., and Khushalani, A. TheoryBuilder: A Behavioural Perspective on Modelling and Improving Systems Development. *Proceedings of First Australian Seminar on Modelling and Improving Systems Development.* School of Information Technology, Swinburne University, 1994.