

## Tool Support for CSCW Requirements

### Abstract

This deliverable considers the work of the COMIC project on the use of tool support to incorporate the results emerging from fieldstudies into the development process. This work builds upon previous work to consider the use of the tool in the development of a particular prototype and a general reflection on the use of the tool by ethnographers.

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# Tool support for Requirements Capture

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In this part of the COMIC work we have sought to use tool support as part of the process of uncovering and understanding the relationship between fieldworkers studying the social nature of work as systems designers constructing computer systems to support this work. This tool development has focused on the augmentation of a tool originally designed to support the representation of design rationale. This deliverable reports on our experience of using the tool in the context system development.

When we originally planned this deliverable we felt that it be a demonstration of a tool to support the approaches developed in this strand.

**“D2.3 - Prototype Demonstrator for Requirements Analysis.**

In line with the constructional philosophy adopted by the COMIC project this deliverable will be a prototype demonstrator which incorporates the concepts and principles elaborated in this workpackage. The final demonstrator will incorporate the contents of deliverables D2.1 and D2.2 and will have been tested within the field trial of task 2.3. “

(COMIC Technical Annexe, April 1992)

In fact, many of these requirements were met by the inclusion and use of the DNP in deliverable D2.2 last year. Over the last year we have focused on consolidating the DNP and confirming its utility through its extensive application across a wide range of project and trials. In this deliverable we report on our experiences in using the DNP in line with the framework introduced in D2.2 and elaborated in D2.4 this year.

The deliverable consists of two main papers concerning our experiences of using the DNP. The first paper focuses on the utility of the DNP as a device for communicating the results of ethnographic studies to designers. In this paper the DNP is being used as a means of representing the fieldwork and evolving design for a prototyping activity set in a UK national banking centre. The prototyping activity involves the use of ethnography in conjunction with approaches drawn from management cybernetics being undertaken by consultants from a different disciplinary background. The resulting prototype is currently under the process of being implemented within the bank. This field site more than meets our original expectations

“A small application will be chosen from a number of possible field sites to which the team has access. Initial agreement has been reached with these sites and the most appropriate site will be chosen nearer the time of the trial. The trial will focus on developing a set of requirements for an application within the relevant domain. Observation will be undertaken with a view to constructing these requirements and the tool will be used to record the data and its analysis.”

(COMIC Technical Annexe, April 1992)

The realisation of the prototype within the Bank also demonstrates the commercial acceptability of the use of ethnography in informing the development of cooperative systems.

The second paper reflects more broadly on the implications of using tools such as the DNP. It presents an account of the evolving use of the Designer's NotePad (DNP). In addition to considering our own utilisation of the tool, it also selects empirical examples from a number of other accounts of DNP use. This paper suggests that studies show a growing confidence and competence in DNP usage; from the early accounts.

# The DNP (Designers' NotePad), ethnography, communication and design

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This paper reflects on our experiences in supporting communication between fieldworkers and the designers of cooperative systems. We have investigated the nature of this communication by using a tool originally designed to support the representation of software designs to present emerging results of ethnographic material. In this paper we discuss the tool used (the DNP) and the experiences of using the toolkit in the context of design. Our particular focus is on the use of the tool to represent results from a study of a UK financial institution where a series of prototyping exercises was underway.

## Presenting ethnographic information - the problem of communication.

In recent years ethnography has risen (perhaps unwillingly) to a position of some prominence in CSCW research (Hughes et al 1994; Randall et al 1994). Whilst some tentatively question the whole approach and value of such workplace observational studies in informing systems design (Plowman, Ramage and Rogers 1995) others make more restricted and measured criticisms, in particular pointing to the apparently inherent practical problems associated with communicating the results of ethnographic studies. Put simply, the suggestion is that ethnography consistently fails the "so what?" test (or at least the 'so what' test as its critics choose to conceive it in terms of 'the purpose' of research). The challenge therefore becomes that of making ethnographic studies intelligible and meaningful to systems developers and designers. (Rodden et al 1995) Such communication problems have been, of course, at the heart of CSCW research, although more commonly looking at those that typically exist between designers and users; as related in this 'story' told by Cooper et al 1995;

Systems design used to be done by a bunch of techies, deep deep deep within some head office building somewhere. Here they would build their system. Test it, test it, test it, until they were sure it would work, and then they would throw it over this great high brick wall, and hope that the user would catch it, on the other side.

Our emphasis on the communication problems between ethnographers and designers would involve a continuation of the 'story' something along the lines of;

Meanwhile in another part of the organisation the ethnographers were conducting their observational studies of work, layering on the detail until they were reasonably satisfied that

they had adequately described the sociality of work. The study would be so heavy that they would have no need of a brick but, having given the designers ample warning to stand clear, would simply lob it over the great high brick wall with a message attached, 'read this and then build something'.

This problem, of being able to communicate the results of the studies to designers in a form which they can understand and use, has come into increased focus as a result of our own experiences in using ethnography in the requirements process (Rodden et al 1995); since getting the ethnography 'done' necessarily includes 'getting it understood' and since the 'debriefings' that are presently employed for informing designers of the details of the ethnographic study should not be conceived of as unproblematic, particularly in view of the time-consuming and cross disciplinary nature of these meetings. Faced with these difficulties in effective communication and meaningful discussion such an arrangement is unlikely to be effective.

Of course communication problems are neither restricted to those between designers and researchers, nor to the initial 'requirements' phase of system design but are clearly manifested both in other relationships such as those between mediators and designers; users and designers; and between different researchers, (in particular those with different disciplinary or methodological backgrounds) and at different stages of system design (or redesign) and usage. The suggestion here then is that of viewing 'design' as a 'process', taking place over time and in different contexts of use and organisational response and priority; that design issues cannot, in practice, be divorced from other issues of organisational politics and communications and that in these circumstances the corresponding roles of facilitators and mediators, 'users' and 'designers' and researchers, and communication between them, become more delicate and problematic. It is in this process of communication that the analytic purchase of ethnographic approaches, (and its representation through a design rationale tool called the DNP<sup>1</sup>), proves particularly valuable in 'unpacking' the complexities of use and the viewpoints of 'users', 'designers' and others involved in system usage and design; *"Understanding terms such as 'requirement' and 'user' in practice is supported by the deployment of ethnographic methods in making work visible, in outlining the deployment of skills, use of local knowledge, local 'logics' and more."*<sup>2</sup>(Hughes et al (1995) in Thomas 1995). However, even accepting the promises of

<sup>1</sup> The Designers NotePad (DNP) is a tool originally developed to allow software designs to be represented and manipulated. Its focus is on allow users to quickly represent ideas in the form of network diagrams. This form of diagram is common to many different forms of software design and development.

<sup>2</sup> One example of this came in the fieldwork at the Securities Centre of a national high street bank. Here new, 'workflow' software had been installed based around a workflow model of the Securities process and requiring the completion of the various 'formalities' before allowing workers to move on to the next stage. While this was generally satisfactory there were occasions when, for a number of reasons such as the need to complete the securities process rapidly (such as the fast completion of a house purchase,), or when information arrived in an unexpected order, where workers would need to move on to later formalities before completing the earlier ones, that is, they would need to subvert the strict workflow model. In these circumstance workers would 'lie to the machine' by telling it that they had completed these formalities in order to get to those formalities where they had the requisite information. In this scenario then workers are overcoming what they see as the limitations of the design



insight' and relevance that attach themselves to ethnographic approaches there still remains one further twist to the issue of communication and the place of the tools such as the DNP in 'resolving' this issue. This concerns providing through the DNP, a means, flawed though it may be, for 'making visible', in communicating, to those concerned with system design, the 'relevancy decisions', the choices and omissions of fieldworkers, designers and users in constructing and justifying their particular accounts of the application domain. The (perhaps) natural corollary of this is the suggestion of the utilisation of the DNP as a general communication medium for encouraging wider input into the design process - in moving towards the practice of 'participative design', in 'building a bridge' between users, researchers and designers, for, as Greenbaum and Kyng (1991) argue, "each of us understands the workplace from within our own experience.. designers cannot automatically expect the users to participate creatively in design activities... since neither designer nor user groups can fully understand each others' practices or meanings, we need to build a bridge that brings these experiences closer together.."3. Despite appearances this is a relatively *modest* claim - we are not really talking about (or to) 'Wittgenstein's Lions' here - but about the sharing of a common practice to promote the active involvement of various users and researchers in the creative design process4.

Our response to the challenge of effective communication from ethnography to designers has been to focus on a more systematic means of structuring the results of ethnographic studies. This approach has a number of elements: the utilisation of a systematic framework for organising data produced by the fieldworker; and tool support to allow the structured ethnographic record to be presented in an intelligible fashion to designers, to support the development of requirements; to users, mediators and facilitators, to support the understanding, implementation and adaptation of systems; and to enhance and facilitate complementarity in organisational research and systems design. Integral to all these aspects is both the exploitation of 'viewpoints' as a means of structuring the ethnographic material to promote the construction of abstract models of work as part of the requirements process; and the use of a 'framework' for the analysis of work to promote an appreciation of the domain of application, of the context within which the system is used. The suggestion in this paper is that used as a practical device to assist in communication in the design process, by making available the different rationalities on view in the work setting, the DNP may perform some role in what Anderson (1994) calls 'the play of possibilities for design'.

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in order to more adequately meet the needs of the customer, in particular their desire for speedy service. There are problems however in this approach, in subverting design decisions that are clearly based on some conception of bank 'policy', as one software designer pointed out: "*lying to the machine... under the illusion of 'customer service' .. we collude with the customer to overcome internal Bank systems .. but where do you cross the line..?*"

3 Greenbaum, J & Kyng, M. (eds) (1991) *Design at Work: Cooperative Design of Computer Systems* Hillsdale. Lawrence Erlbaum. p 4.

4 Those interested in Wittgenstein, Wittgenstein's Lions and design should see Greenbaum and Kyng (1991); Mogensen (1994); and Gammack, J...

The purpose of this paper is then to explore the notion of using a computer tool - the Designer's NotePad (DNP) to encourage and facilitate 'communication' between the various groups who are party to the design process. After a brief description of some of the facilities of the DNP, the 'viewpoints' approach, intended to represent and communicate different views on a system in use, is first outlined and then applied to an ethnographic study of lending control in a major high street bank. The relationship between 'viewpoints' and the 'framework for the analysis of work' is then explored and illustrated by reference to the same research. The emphasis throughout is on how these representations might, by providing a common focus, improve communication between designers, researchers and users. Finally, the DNP is compared with other qualitative computer packages and the contrast is made between their emphasis on 'analysis' - the theoretical basis for which is often unacknowledged or unappreciated - and the DNP's emphasis on 'communication', on leaving any subsequent analysis to the readers themselves and their particular theoretical or practical interests.

## Tool support: a brief outline of the Designers' NotePad.

The Designers' NotePad (DNP) is a prototype flexible information management and browsing system providing a range of facilities for representing, changing, rearranging and referencing information. Sommerville and Rodden (1992), in stressing the need to recognise and understand the social aspects of systems design, emphasise its role in providing support for informal design activities. The flexibility of the DNP has led to its use in a variety of contexts.<sup>5</sup> This restricted account of its facilities and use concentrates on its employment in the organisation of data produced during an ethnographic study of work processes. The intention here is further limited to an examination of a small number of the facilities of the DNP - designs, text notes and cross references. It is certainly not intended to produce a definitive list of features, although this account does cover those features currently most utilised.

### Representing Designs in the DNP

The DNP is designed to allow information stored in it to be reorganised flexibly and easily. Designs are seen by the user as a window on which entities - shapes chosen from a menu and used in a variety of ways, for example, to represent people, processes, information stores and so on - can be placed and moved around. The cross-references, text-notes and sub-designs are structured

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<sup>5</sup> For Haddley and Sommerville (1990) the potential of the DNP is not restricted to computer-based systems, while Monk (1994) argues that its flexibility has led to DNP being used in a variety of contexts; as a basis for computer-supported learning, the development of safety cases for software systems; as a generic software design tool; and, in this instance, in the organisation of data produced during an ethnographic study of work processes.

annotations to entities or links. The DNP supports hierarchical decomposition by allowing an entity to represent a sub-design. This subdesign behaves in the same way as its parent design so that entities, links and sub-designs can be created in it<sup>6</sup>. As a simple example, in the case of ethnographic fieldwork notes, the work site can be represented as a simple plan which utilises entities (to represent desks, workers, filing cabinets etc.), links (where, for example, the same worker may appear in another design), text-notes (such as accounts of work activity) and sub-designs (for example of the outline of the day's tasks, or the organisation of a desk or filing cabinet) to valuable effect. Various colours and symbols can be used to signify the social actors, their positions and spatial relationships. A sub-design can be used on an individual worker in order to display a information concerning their work flow, the organisation of work and so on.

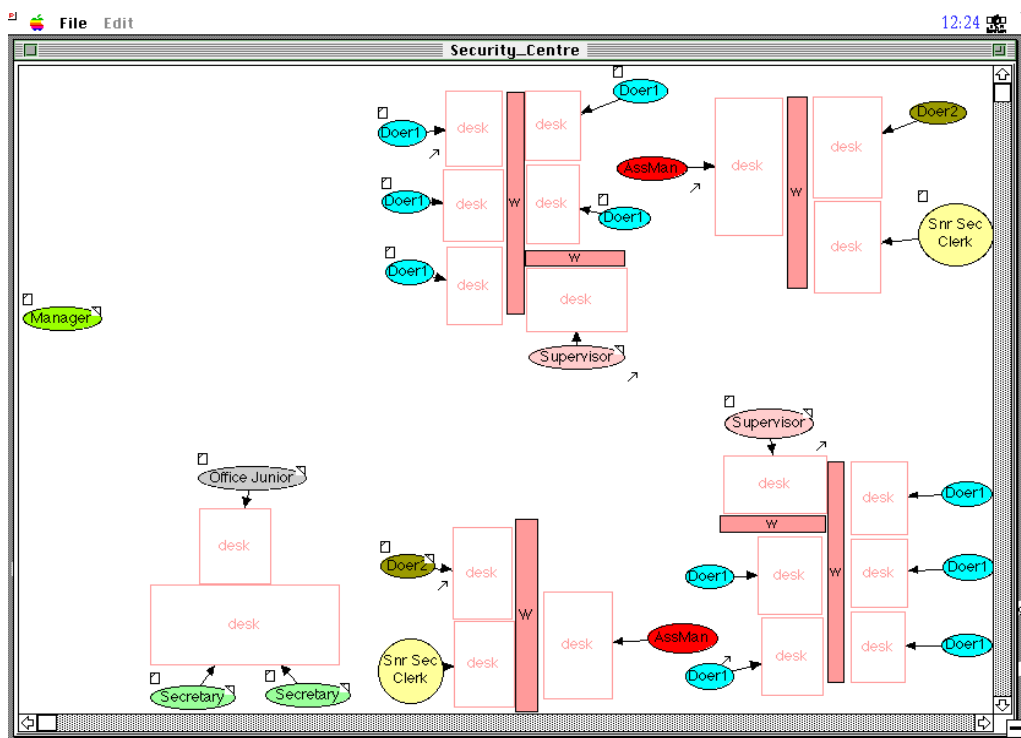


Figure 1: Using a design in the DNP to represent a work setting

## Text-notes

The manipulation of text-notes in DNP is a key feature for ethnographers in the representation, management and organisation of their fieldnotes, since the text-notes will conventionally contain the bulk of the ethnographic observations. Text-

<sup>6</sup> An extensive symbol library is available so that users can define the graphical representation of the types required in their method. The ability to manage multiple families of types means that the DNP can support a comprehensive yet simple system of information hiding. The ability to create entities and links quickly and to rearrange them spatially has facilitated the use of the DNP as an outliner/ideas organiser. The free-format is very fruitful as ideas are put down as entities and then rearranged, grouped and deleted as they become more coherent.

notes are annotations, similar to sticky 'post-it' notes, that can be attached to any type of entity or link. So, for example, they might be attached to a particular worker giving an account of their observed activities at any particular time; they might be attached to a desk, giving a list of files, folders and forms contained in the drawers; or they might, again for example, be attached to a computer listing the software packages available on that particular machine. They can take a variety of forms, be it simple unformatted text areas or complex, lengthy user-defined terms. Text is usually typed into the note pad and then attached to the entity or link - it can also be pasted in from Word. Any number of text-notes can be attached to an entity and they can be browsed, edited, searched (for example, for particular key terms or activities) and printed.<sup>7</sup>

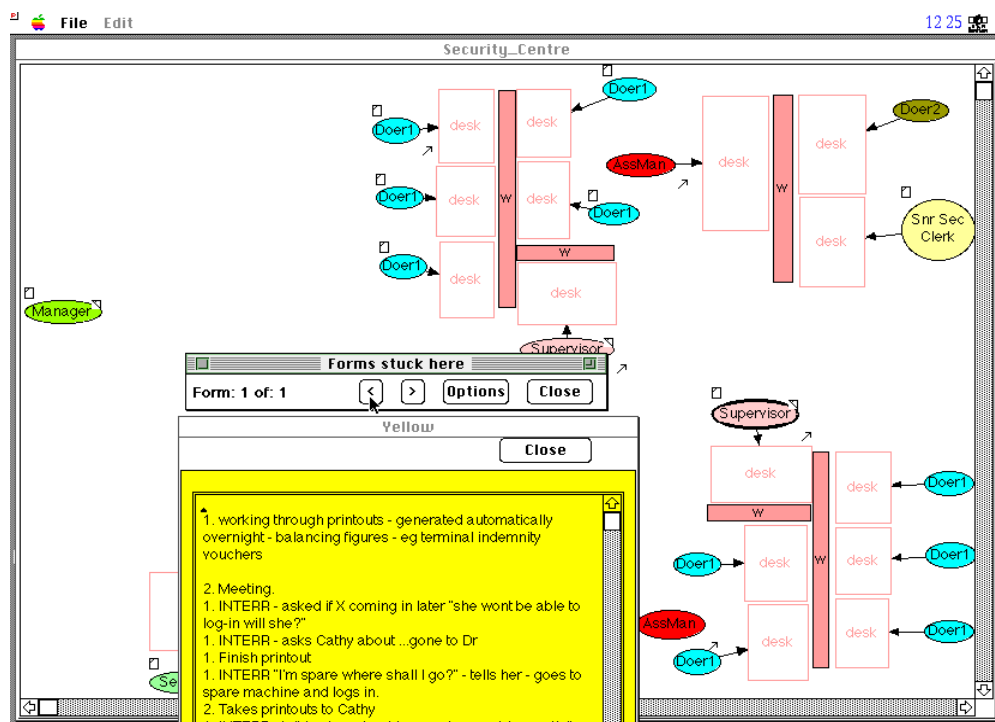


Figure 2: Text notes in the DNP.

## Cross-references

The DNP allows the construction of a hypertext network of links between different entities and designs in the system. The value of this cross-referencing facility clearly emerges in establishing links between different types of design. So, for example, a 'workflow' design showing the temporal and sequential organisation of work within an office or organisation might be cross-referenced to

<sup>7</sup> A large number of different type of documents are created during a study. These can be transcriptions of conversations, interviews, statistics and observations etc. This information is often held in files created across a wide variety of applications. The information in text-notes need not be necessarily held within the DNP. A text-note may be linked to a file so that its contents are derived from that file. This facility allows material generated in existing tools to be directly linked to material within the DNP.

an 'ecological' design showing the geographical position of particular workers within the organisation and the importance of any particular workflow process in an individual's daily routine. Such cross-references, which are designated by a small arrow next to that entity, can be bi-directional. If more than one cross-reference exists, for example where a worker is involved in a number of different 'teams' or workflow operations, when asked to search these, the DNP lists them in an options menu.

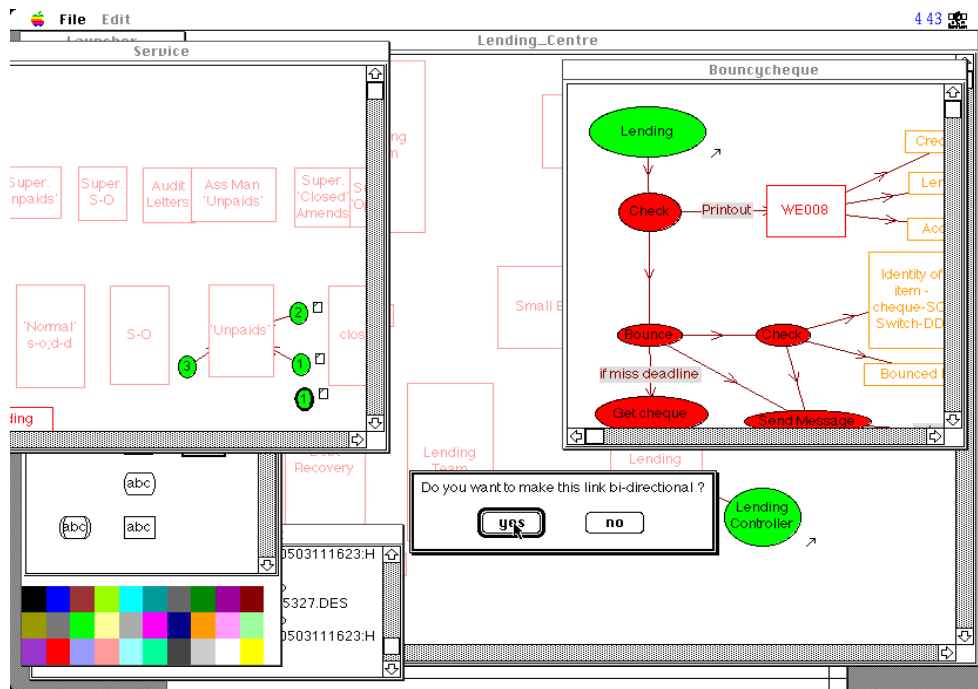


Figure 3: Developing links using cross referencing

## Viewpoints as a means of presenting ethnographic material.

As we have noted elsewhere (Hughes et al., 1995) the adoption of a technique based on 'viewpoints' allows us to present information in a form that makes explicit the different but complementary interests involved in the design and implementation process and thereby provides the starting point for developing fruitful communication between designers, users and researchers since the presentation of these different viewpoints allows alternative views and perspectives to be set aside each other as a resource. The reasons motivating the choice of 'viewpoints' as a means of involving ethnography in the process of design include; the need to highlight the multiple orientations people may have to a supporting system; to provide a means of setting the multiplicity of user needs alongside each other; to facilitate and support multi-disciplinary communication and working.

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