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Down in the (Data)base(ment): Supporting Configuration in Organisational Information Systems

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Abstract

We present a case study of a project to introduce a new organisation-wide, integrated information system within the UK healthcare sector that we conducted as part of a wider, socio-technical exploration of factors influencing the dependability of computer-based systems. We report in detail on the problems of working with and evolving a standardised classification of work procedures that is central to the organisational purpose of the new IT system, and the responses of both users and of the project team to these problems. These have important implications for the usability of computer-based systems and for the dependability of the information they contain. Drawing insights from sociological studies of classification and standardisation, we reflect upon the lessons for the development and implementation of computer-based systems designed to serve as ‘common information spaces’.

1. Introduction

In many domains of administrative and professional life, and for what may seem to be good organisational reasons, there is a tendency to classify information in increasingly standardised ways. Sometimes, this may result as a side effect (intended or otherwise) of other organisational changes. For example, the process of designing and implementing new organisational IT systems necessarily involves reaching agreement – implicitly or tacitly – about the codification and interpretation of the data that is to be held on the system. Numerous decisions have to be made as to how to classify information, that is, how to represent it through the choice of categorical definitions, structures and names, and who may have access to what information and how. Sometimes, these issues can be resolved internally; in other cases, resort will be made to an established, external standard or system of classification. The latter may include public computer standards or *de facto* standards embedded in widely established software systems. The adoption of new standards is fraught with problems, however. It may, for example, necessitate the elimination of existing and more local classification and coding practices. In the process of moving information from its local origins to a standardised, organisation-wide classification, the local meaning and organisation of information that underpins current work practices may be sacrificed (see, for example, Heath and Luff, 1996). If such changes are not managed appropriately, the consequences are likely to be disruptive, impairing system usability, and potentially presenting a significant threat to the dependability of information and of the decisions based thereon – with important implications for the activities and goals of the organisation.

Questions regarding how decisions about the classification of information are made, become inscribed in technological artefacts, are incorporated into everyday working

practices, modified or worked around become crucial for understanding how the work of organisations and groups is carried out. Once we recognise these processes we can see why it is important to allow IT systems to evolve and how this might be facilitated. To investigate these issues, we have been conducting a field study of the introduction of a complex, commercial software package within a large UK primary healthcare organisation, known as a ‘Trust’. The Patient Information Management System (PiMS) has been introduced with the aim of integrating and standardising patient administration practices within the Trust’s numerous different healthcare service teams. The expected benefits included: higher quality, more uniform data about activity across all the units within the Trust to enable management to make more accurate resource allocation decisions; and more timely, accessible and detailed clinical data to inform clinical users’ care of patients, and to support evidence-based practice and research activity. Our interests centre around in the ongoing efforts of the PiMS Implementation Group, PiMS Project Team, PiMS User Group and others to evolve the configuration of the system to fit the organisation and its users.

One particular focus of the study has been the PiMS ‘Contact Purpose’ menu. Prior to the implementation of PiMS, each of the Trust’s healthcare services relied upon its own locally meaningful classifications of contact purpose, that is, the reason formally documented for each and every occasion a healthcare professional interacts with a specific patient. With the introduction of PiMS, the Trust has introduced a new, standard contact purpose classification and embedded this into the system’s user interface menus. Our findings are that PiMS clinical users are struggling to make sense of the new contact purpose categories, sometimes having to resort to the ‘not specified’ option when they are unable to match the situation at hand with the newly standardised categories, or more often selecting from several seemingly similar options the category that seems nearest. The overall result is that users are unhappy that PiMS doesn’t fit in with their work practices and Trust management is concerned that the quality of data captured is too poor to support its strategic goals.

We report on the difficulties of working with and evolving a classification of work practices whose use is central to the organisational purpose of the new system. Our aim is to reflect on the methodological implications of needing to address such problems. We begin with a review of the literature on classification as a socio-technical process. We then present the case study, detailing the responses of both the Trust healthcare teams and of the PiMS Project Team to the problematic contact purposes menu. Finally, we discuss the implications of our findings for approaches to the implementation, deployment and evolution of IT systems. The detailed focus upon the design, implementation and use of IT systems allows us to reflect on the various opportunities that may exist – whether in terms of improved change management procedures or more appropriate systems architectures – to evolve IT systems such that they become more effective and dependable in use.

2. Classification and Categorisation: A Socio-technical Perspective

To analyse the issues that arose with the introduction of PiMS, we draw upon some recent developments in the sociology of classification and categorisation.

Star (1989) introduced the concept of boundary objects to explain how intellectual and work activities may be co-ordinated across diverse groups spread across different physical and social settings/sites with their own more or less differentiated local knowledges and perspectives. Crucially, boundary objects: “are both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use and become strongly structured in individual-site use.” (Star, 1989). Boundary objects thus allow both autonomy and ‘trade’ across boundaries (Star and Griesemer, 1989). This concept has been widely applied to understanding information system design activities regarding the relationships both between different groups of design specialist and with heterogeneous groups of potential ‘users’. The typology of boundary objects ranges from those that are ‘platonic’ (entirely virtual) to those embodied in physical artefacts such as standardised forms, etc. Together, these are part of a broader information infrastructure – a negotiated order of tools, practices and resources – through which knowledge work is coordinated and conducted (Bowker and Star, 1999).

There has been considerable interest in the extension of this framework to analyse the processes whereby classification schema are created in understanding information exchanges amongst heterogeneous communities, in particular in the emergence of scientific fields and in the design and use of information systems – since the latter inevitably involves “linking experience gained in one time and place with that gained in another, via representations of some co-ordination work ... encoding and decoding as time and place shift” (Bowker and Star, 1999: 290). Berg and Bowker (1997), for example, have applied this framework to analysing medical records as a boundary object, an “organisational infrastructure ... that affords the interplay and coordination between divergent worlds” of physicians, nurses, health insurers, etc.

The implementation of computer-based systems intended to serve in place of organisational information infrastructures based upon direct interpersonal contacts – or mediated through traditional media such as paper records – opens up enormous possibilities from the more rapid and rigorous exchange of such codified data, creating a ‘common information space’ (Bannon and Bødker, 1997) with opportunities for more effective coordination of activities separated in time and space. However, the categorisation and standardisation this entails at the same time brings risks, for example, in terms of the reduced ‘plasticity’ of the system and of preventing local elaboration of information practices to cater for particular circumstances – the very attributes which define a boundary object and give it its value (Star, 1993). The meaning of information may change or be lost when it is removed from particular local settings, and is codified and separated from, perhaps ‘invisible’, taken-for-granted local knowledges that support its interpretation.

This shows that it is not sufficient to provide a common information space for pooling and accessing information; its value as a coordinating device can only be realised if there is a shared understanding of meaning. Without this, the result may be a reduction in the organisation’s capacity to function dependably, whether through the misinterpretation of information or through the loss of trust in the veracity of information held upon the system. A study by Reddy et al. (2001) develops this line of analysis, criticising narrow technical views of the common information space as

artefact and highlighting that this also involves the work practices that surround it.¹ They point to “the tension between the need for both openness (supporting work practices) and closure (supporting coordination)”, the resolution of which depends upon features of the work and work setting (ibid). Analysis must address how various groups use, manage and integrate information into their work. However, overcoming these differences is far from trivial; the diversity of the information practices and categories adopted by diverse work groups are a reflection of their specific functions, organisational locales traditions, priorities and interests. It is a difficult and politically sensitive undertaking and calls for an evolutionary, socio-technical approach to the implementation of organisational IT systems. Work practices and related artefacts are not stable, but change in response to changing needs. Implementing new systems changes both the practices and, in an iterative process, change the system itself. Similarly, users are forced to adapt, to use ‘ad hoc’ practices and, in so doing, the work also changes. Socio-technical systems are thus mutually constituting and adaptive as organisations and work practices constantly evolve. This is an active process involving contributions from a wide range of organisation members as well as technical specialists.

These issues are particularly relevant to understanding the introduction of Commercial Off The Shelf (COTS) software packages. The generic models of work practice embodied in standard solutions are far removed from the particular working practices and requirements of the various groups of actual users. Successful implementation requires an often-extended adaptation process in configuring together generic system capabilities with the specific practices and contexts of organisational users. The problems of evolving COTS are far greater in the context of organisationally complex, large-scale working activities, where there is often a need to come to decisions about what level of local variation is feasible and desirable in information handling and administrative practice. This is particularly true of demanding and/or large-scale organisation information environments where failure involves potentially high costs (Brady et al., 1992; Clausen and Williams, 1997; Cornford and Pollock, 2003).

3. The Case Study

Patient information management systems are a key technology at the heart of healthcare strategy aimed at generating new knowledge to guide a variety of healthcare processes (e.g., clinical decision making, resource allocation and clinical governance). At the heart of most Patient Information Systems, users are asked to take classification decisions about a variety of different situations. The quality of the classification and of the classification activity are key to the quality of the knowledge being generated by the system.

Bigcity² Primary Care Trust (BPCT) has some 7,500 members of staff serving a population of some 620,000 people, across a wide range of geography – a large UK city and the rural surroundings of Bigshire, the county to which Bigcity belongs – with a comprehensive range of services. These services include mental health, learning

¹ Echoing Fleck’s earlier (1988) insistence that an understanding of ‘information integration’ must address in tandem not only the formal computer based system, but also the work and communication/co-ordination practices of the organisation and its members.

² Names of organisations and people have been anonymised.

disabilities, care of the elderly, medical rehabilitation, district nursing and health visiting, family planning/well woman, breast screening, comprehensive dental care and those provided by professions allied to medicine (such as physiotherapy). Some highly specialist services include brain injury rehabilitation, bioengineering and prosthetics, drugs and alcohol misuse and harm reduction, AIDS/HIV, child and family psychiatric services.

PiMS is a COTS package produced by HealthSoft, a company that describes itself as a 'specialist application content provider' focused on healthcare markets in largely English-speaking (including Commonwealth) countries around the world. PiMS is becoming widely used by NHS Trusts in the UK, of which BPCT's implementation appears to be one of the most thoroughgoing, as others have often been (deliberately) partial. BPCT itself has only implemented PiMS in its Mental Health and related Services. HealthSoft describes PiMS in the following terms:

'The PiMS patient information management system provides a highly intelligent store for totally integrated information across all care settings in both the public and private sectors. PiMS has the flexibility and functional breadth to extend beyond traditional care boundaries to support acute care, community care, mental health, child health, aged care and social services. Integrated information access supports all those healthcare professionals involved in care delivery with the same accurate, timely information to enhance performance and improve communications ... PiMS provides the power not simply to cope with change, but to drive it'. HealthSoft www site.

As we shall see, how far these claims are borne out in BPCT's implementation and user practice to date remains debatable.

3.1 Methodology

The investigation reported here is based on twelve months ethnographic fieldwork carried out in BPCT. Data collection methods included participant observation and semi-structured interviews with a range of personnel across a number of sites within the Trust, in both clinical and non-clinical departments or settings. The first round of data collection in BPCT took place between Autumn 2001 and Spring 2002, after which an initial report of fieldwork findings on the implementation process to date, together with some recommendations for action, were presented to Trust managers (Hardstone, 2002).

The sites of clinical practice were chosen in order to compare PiMS implementation in a locality-based General Adult Mental Health Service (SW BigCity) with that in one of the larger specialist services, the Alcohol Problems Service. Both these services were comprised of more than one team: SW Area having three (Outreach, Day Hospital and Community Psychiatric Nurses, or CPNs) and Alcohol Problems Service two (Resource and CPNs). Each team covered a different aspect of its service's mental health provision and had its own caseloads, and therefore had different work patterns and practices influencing its use of PiMS. Whilst CPN Teams were occupationally homogeneous, others had a broader membership, including consultants, nurses, CPNs, occupational and other therapists, and social workers, as well as medical secretaries. In the context of this paper, each team had a different array of purposes for contact with patients.

Non-clinical settings in which fieldwork was conducted included regular meetings of the PiMS Implementation Group (weekly) and the PiMS User Group (monthly). These involved members of the Project Team responsible for implementing PiMS, and staff from the Information Services (IS) and Clinical Governance (CG) Teams. The latter two groups were users of PiMS data from an administrative perspective, analysing data from the system in order to compile mental healthcare statistics for decision-making within and beyond BPCT. All had an interest in ensuring the completeness, accuracy and timeliness of data entry, including the use of the Contact Purpose menu.

Detailed notes were made during participant observation by the fieldworker of activities and discussions observed and artefacts employed, such as healthcare workers' notes and patient records, both computer-based and manual, as staff went about their everyday work in an office setting. Copies of documents and reports relating to implementation and use of PiMS were also analysed. Specifically clinical work (one-to-one or group therapy) was not observed for reasons of patient confidentiality. Semi-structured interviews were conducted with a variety of staff, both administrative and clinical, including members of all the occupational groups described above. For the first round of interviews, all staff available in each of the selected Teams were interviewed. The fieldworker made notes during interviews and meetings, which were sometimes taped where BPCT staff consented.

Ethnography observes in detail everyday working practices and seeks to explicate the numerous, situated ways in which those practices are actually achieved, and the things that such an achievement turns upon. The data comprise field notes and transcriptions of interviews with staff about their everyday work, their use of PiMS and other information systems, both manual and computer-based, their training on PiMS, and also their use of the Trust's previous computer systems. The method seeks to explicate the situated character of work, as a practical production by social actors performing their activities within all the contingencies of local circumstances. It aims to portray the variety of activities and interactions that comprise the 'workaday' of working life, and the ways in which these are understood and accomplished by those who do that work.

The veracity of findings was established using a number of techniques. These included triangulation through the collection of data by multiple methods and sources. Verification was performed through discussions of findings with clinical and non-clinical BPCT staff; in feedback sessions with the clinical staff interviewed at their weekly team meetings; and in a Trust-wide workshop for feedback and discussion on the PiMS implementation project. As fieldwork progresses, comparisons will also be drawn between the activities of workers over time and between members of different occupational groups.

3.2 BPCT and the PiMS Project

BPCT provides a wide variety of general and specialist Mental Health services that cater for patients' needs from cradle to grave. Services range from Child and Adolescent Mental Health Services (CAMHS) through General Adult to Care of the Elderly, whilst some of the more specialist services include the Alcohol Problems Service (APS), the Centre for Drug Prevention Services (CDPS), and centres for the

treatment of patients with eating disorders, and post-traumatic stress disorder. Mental health provision in the region is organised on a geographical basis, comprising West Bigshire, Mid Bigshire, East Bigshire, and BigCity – the latter being subdivided into five areas (NE, NW, SE, SW and S Central). Each of these eight areas provides General Mental Health services, with some of the larger, centralised specialist services, such as APS, also having staff permanently deployed to a geographic area. For other cases requiring specialist care, patients are referred to the relevant BigCity facility.

The roll-out of PiMS in BPCT commenced in April 2001 and was still ongoing as at autumn 2002, first in the BigCity areas, and later in Bigshire. This new, integrated system was intended to replace numerous separate systems developed and used by the different services. These included two non-integrated computer-based systems; PSYMON, for in-patient care, and CIS, for Community Care. One of the major differences between PiMS and these previous systems was that clinical staff would now take responsibility for the entry of information relating to patient care. Previously, this had been the work of the central Medical Records unit.

The expressed organisational goal of the project is to integrate data and information across the Trust, “*so we’re all singing from the same hymn sheet*” (former PiMS Project Manager). Raising the quality (accuracy, completeness and timeliness) of mental health information through the implementation of PiMS has both a clinical and an administrative purpose. The objective is to improve patient care, and to increase the validity of the statistics produced by the Trust’s Information Services (IS) department a) for BPCT’s internal (regional) decision-making and resource allocation, and b) to satisfy external reporting requirements to the Information and Records Division (IRD) of the regional government, which uses BPCT’s information for policy-making and national resource allocation, and in the compilation of national mental health statistics. PiMS was ‘sold’ to clinical users with the expectation that they would be able to extract from it all kinds of useful data never before so easily available or manipulable, both for research purposes, and to move towards an improved and increasingly evidence-based clinical practice.

PiMS is a database-driven system, based on Microsoft and Oracle technologies. It is a modular system, which is claimed to be configurable to the requirements of each user organisation. This configuration occurs at a number of levels. First, users decide in which functional areas they wish to use PiMS, from the following selection of modules (Table 1).

Table 1: PiMS modules

<ul style="list-style-type: none"> • <i>Master patient index</i> • <i>Outpatient management</i> • <i>Clinic management</i> • <i>Accident & Emergency management</i> • <i>Pharmacy management</i> • <i>Mental health management and Mental Health Act³ management</i> • <i>Child health management</i>

³ Under the terms of the Mental Health Act (date), inpatients may only be detained involuntarily (or ‘sectioned’) for a specific length of time before a new request for further detention needs to be submitted to the appropriate authority.

- *Patient document tracking and document management*
- Electronic patient record management
- Integration with office administration systems (Microsoft Office 2000)
- *Inpatient management*
- Day case management
- *Community healthcare management*
- Theatre department management
- Equipment management
- *Learning disabilities management*
- Infection control management
- *Care pathway management and clinical audit reporting*
- Contract management and billing
- *Patient, business and clinical management information and statutory reporting*
- *Integration with third-party systems including analysers*

(from <http://www.isoftware.com> ; areas active in BPCT's PiMS in italics)

Each of these modules has a main menu. Use of some of the menu options will be common to more than one module. For example, most clinical departments (A&E, Outpatients, Inpatients, Mental Health, Day surgery) will need to search for patients in the system, or register new patients. The BPCT PiMS main menu is shown in Table 2.

Table 2: PiMS main menu

- Admission
- Appointment
- Assessment
- Carer
- Coding⁴
- Caseload⁵
- Contact (see 3.3 below)
- Day care
- Day clinic
- Episode⁶
- Group session
- Mental Health Act (MHA) seclusion
- MHA sectioned patient
- MHA to do
- Patient search
- Patient register
- Patient review
- Referral
- Staff diary
- Waiting list

⁴ Of diagnosis, in accordance with ICD10, the International Classification of Diseases..

⁵ Of patients, by individual practitioner, team or specialty

⁶ The term applied to an overall period of care, from initial presentation to discharge. In the case of chronic illness, often the period from one crisis presentation to the next.

- Ward view
- Ward manager
- Bed manager
- Exit PiMS

(sub-modules not [yet] active in BPCT's PIMS marked in grey)

The database behind each set of modules is then configured for the individual Trust, naming its specific wards, departments, teams and individual healthcare practitioners (HCPs). Within BPCT, the system has been further configured to include data analysis software from other suppliers, and also clinical assessment tools, such as the Cambridge Assessment of Need (CANSAS). At the lowest level within PiMS, pull-down menus within each sub-module can be customised to suit the user organisation. One such menu within the Contact sub-module of PiMS is the Contact Purpose menu, by which HCPs record the purpose of their contacts with patients.

System roll-out within the Trust is the responsibility of the 5-person PiMS Project Team, which includes the Project Manager, the Systems Administrator, and three other staff who also have a training role. This team is co-located at BPCT's main City site, the Royal City Hospital (RCH). Project implementation in the broader sense is the responsibility of the PiMS Implementation Group, which comprises representatives from the PiMS Project Team, and the Trust's IS department, together with the General Adult Mental Health Services Manager and the Specialist Service Development Manager. PiMS Implementation Group members are not co-located, but meet weekly at the RCH. Once a month, members of both the Implementation Group and the Project Team attend the PiMS User Group meeting, together with a small number of users, to receive feedback from users and to provide information on implementation progress and on how user concerns have been addressed.

At present, PiMS is used for data entry, retrieval and analysis by a variety of professional groups, each of which constitute different communities of knowledge and practice, and have different interests.

PiMS is used to **record**:

- patient details at registration and after (such demographic details, contact address and phone number, GP address and phone number)
- referrals of the patient to BPCT, either from external sources (such as GPs, self-referral), or from elsewhere within the Trust (between practitioners)
- planned/booked patient appointments
- details of each contact the patient has with Trust Mental Health practitioners
- details of patient assessments carried out by Trust practitioners

Currently, data entry is performed within the Trust's multi-disciplinary teams largely by secretarial, nursing and related staff, such as occupational therapists. Very few medical consultants or junior doctors use the system themselves, preferring to handwrite records, and delegating computer data entry to their team secretaries.

PiMS is currently used (albeit less frequently) by HCPs to **retrieve** information about:

- Patient admissions to wards (in-patient episodes)

- The ‘timetable’ of planned contacts with other practitioners (in order to spread these evenly over time)
- The history of the patient’s previous contacts with HCPs within BPCT
- The patient’s medication history
- Warnings and alerts connected with a patient (for risk assessment; including drug allergies, episodes of self-harm or violence to others)

Because of system structure, availability of software and training in its use, and data protection and patient confidentiality issues, the use of PiMS for **analysis** has been restricted to a small group of users, mainly members of the PiMS Implementation Group. The reports facility on PiMS has not been activated. However, using data/database analysis software tools such as Access, Crystal and Cube linked into the PiMS data, this group of users produce regular healthcare statistics and reports for BPCT and IRD. Clinical service-based PiMS users are able to request the production of other reports on an ad hoc basis, progress of which is monitored by the Implementation Group once approved. There are currently moves to make PiMS data analysis quicker and easier, but access will continue to be restricted. Examples of reports produced by analysing PiMS data include:

- Monthly Trust Activity Report, analysed down to team level (for IRD, IS and teams)
- Monthly Error reports (for IS and teams)
- Monthly report on out-of-area patients treated (for Finance, to recoup costs from the patient’s home area Trust)
- Ad hoc report on all hospital detentions in Edinburgh over 12 month period
- Ad hoc report on number of referrals to a particular clinic (for the clinic administrator)

PiMS embodies a generic model of the information flows and work practices of the sector. The package had been already customised to meet the requirements drawn up by BPCT. However, post roll out revealed several areas in which this *a priori* configuration has proven inadequate for the system’s users. This raises a number of issues relating to how lessons from use of systems can be feedback into ongoing configuration work. Here, we focus here on the configuration and evolution of the ‘Contact Purpose’ menu within the Contact module of PiMS, a central element of the system for both BPCT and service users.

3.3 The Contact Purpose Menu

Every time HCPs within the Trust have contact with a patient, whether face-to-face or over the telephone, whether one-to-one or with other HCPs (as at a care planning meeting), they enter this and other associated data, such as date, time, duration, location, Trust personnel involved and the healthcare team they belong to into the Contact sub-module of PiMS. There is also a pull-down menu for the Contact Purpose, from which HCPs have to select one option. This effectively classifies the work done by HCPs trust-wide into standard categories. Most of the clinical and care-related details of the contact are entered manually in patients’ casenote folders at present, since PiMS in BPCT does not (yet) involve an Electronic Patient Record. The significance of the Contact Purpose menu seems to lie in the fact that it is one of the few points in PiMS where they enter data that really matter to them – data they feel should reflect their day-to-day practice accurately.

The original menu for ‘contact purpose’ was supplied by HealthSoft, having already been configured from the English version to suit the Scottish mental health and legal systems. It was initially re-configured to BPCT’s requirements prior to roll-out. It was subsequently reconfigured again during the early phases of roll-out in response to certain users’ feedback, and other additions have been made to the menu at intervals since. Its evolution is discussed later in this section of the paper. The current (as at June, 2002) and complete PiMS contact purpose options are (alphabetically, the order in which they appear on the pull-down menu) are shown in Table 3, with ‘Not Specified’ as the default option.

During the first round of fieldwork, two important strands of research data emerged about the use of the Contact Purpose menu; one from clinical users seeking to input their practice-related data into PiMS, the other from the perspective of the PiMS Project and IS Teams, which were trying to ensure compliance with system use and quality of data entry.

Many of the clinical users interviewed reported difficulties choosing which option to select on the Contact Purpose menu, because the categories did not fit the way they would have described the work they did with patients. This could be because the specific practices of their particular professional grouping were not reflected in the menu options:

“You’ve got [what an] Occupational Therapist does and she would have to report that as a ‘Follow-Up’ [but] it doesn’t really describe what goes on”. (Team Leader, SW Area Outreach).

It could also be because the menu failed to reflect the work of the team. For example, some teams caring long-term for people with severe and enduring mental illness had on their caseloads patients who needed support to undertake even basic daily activities, such as shopping, socialising and leisure, *“Just social contact ... that’s recorded as ‘Follow-up’, which doesn’t really describe ... it doesn’t really accurately describe what we do”* (Team Leader, SW Area Outreach).

Table 3: PiMS ‘Contact Purpose’ menu options as at June, 2002.

Assessment
Case conference
Challenging behaviour
Cognitive behavioural therapy
Depot medication
Detox
Discharge
Enabling
Epilepsy
Follow-up
Full assessment
Health promotion
Initial assessment
Initial assessment
Interview/schedule for
8 To a specific employment programme.
9 To certain kinds of medication and their side-effects.
Maintenance
Management
Mental health assessment
Methadone contract signing
Methadone programme
Methadone review

Delivering medication was another such significant activity for which there was no menu option. It was one of a range of medication-related practices that included supervised medication and the intra-muscular administration of medication (depot), all of which would typically be performed by a single team, but each of which implied rather different degrees of illness and patterns of patient care:

“We actually deliver people’s medication, but we can either only put ‘not specified’ for the contact, or ‘supervised medication’, which is unfair to the client¹⁰, and doesn’t bear the cost information to the service... By cataloguing all of these contacts, you could look at the cost implications and see if there were other ways in which you could change that, and how the service could mature” (CPN, SW Outreach).

Here, the user also suggests that the potential of the PiMS system to inform and improve patient care by supporting evidence-based practice, and to assist the Trust in financial control, is being ignored.

Whilst some teams, such as the SW Outreach Team, felt that the menu options were inadequate to categorise the crisis management and emergency call-out work they did, other teams felt that PiMS did not reflect the ‘everyday stuff’ they did with patients, and that the system was weighted towards activity:

“If things are going well for a patient, that’s a good thing. But it doesn’t mean you do nothing, it’s more a question of ongoing support. There’s no menu option for this. It’s maintaining contact more than anything else, so you can spot any approaching problems early on, and perhaps do something to mitigate them by early intervention. PiMS assumes you should be doing something to the patient, rather than just being with them”. (CPN, SW CPN Team)

Some users resorted to picking the option that seemed nearest, since clear definitions of terms were often not available, and took refuge in the menu’s ambiguity, whilst deploring it. One CPN described the category ‘problem resolution’, as *“very vague, very general, very broad spectrum”*, so that ‘agoraphobia desensitisation therapy’ and ‘sorting out the electric bill’ could end up represented as the same thing in the system, since both aimed at solving specific problems, albeit at immensely different levels of involvement. However, even users within the same team, with similar caseloads and work practices, did not always agree on the terminology to use for PiMS: *“... between the five of us, I might say it’s problem resolution, but someone else might say it’s treatment...Or is it therapy?”* (Charge Nurse, NE Area).

Other users expressed frustration with the menu’s profusion of apparently similar contact purposes, and also with having to reduce the complexity of their practice to a single option within the system:

“There’s one that’s an ‘Initial Assessment’ or ‘Full Assessment’, but that doesn’t fit in because you’re not doing a full assessment every time and you’re

¹⁰ By implying that the patient could not be trusted to take the medication without supervision.

certainly not doing an initial assessment every time. You would be assessing the things that you know are of importance. If you know that somebody's depressed, you're not going to go and assess them for being hypermanic. So you're not going to do a full assessment. So I just don't think that the information is truly representative of what we're doing. I suppose we're having to fit what we're doing, round about these 2 or 3 words on a line really". (Team Leader, SW CPN Team).

As a last resort, some PiMS users had taken to entering their contact purpose as 'not specified' because having searched the pull-down list, they had failed to find an option they felt adequately reflected their everyday practice. This (early Spring, 2002) was the point at which the Implementation Group and IS Teams, already concerned about the validity of PiMS data in terms of its completeness and timeliness, started to question the accuracy and dependability of data entered into the system. Their concerns were accentuated by their decision to start using PiMS data as the main basis for BPCT's monthly Activity Reports to IRD at that time. The in-depth version of this report (not sent to IRD) revealed exactly which clinicians or teams were not using the system. Remedial action was planned.

The Implementation Group and IS attributed the use of 'not specified' for Contact Purpose to user laziness, even more so because it was the default option. Correction of data already in PiMS represented an 'easy win' in terms of data quality improvement¹¹. They were already sending a monthly 'Error Report' to each Team, detailing individual user errors, which would then have to be corrected by the user. It was decided to add use of 'not specified' to the error lists, even though the option remained visible on the Contact Purpose and several other similarly contested menus. This offended some users' sense of rightness of classification, and, indeed, of veracity:

"Now, nobody told us that we couldn't have a 'not specified' outcome and of course the outcomes are quite general and not specific to our service, mental health or whatever, so lots of them ... they're not relevant. Well, none of those are relevant so I'm better recording ... rather than recording something that's not true, is to say I'm not going to specify an outcome on that." (Team Leader, SW Area Outreach).

The first interim fieldwork report brought this mismatch of views to the attention of the Implementation Group, raising the issue of classification, and the need to produce more or less stable but workable definitions of categories of clinical activity by consultants, nurses and therapists (Hardstone, 2002). It stressed that research data gathered from interviews and observation showed that 'not specified' was the menu option of last resort, and not the easy way out, and focused on the Contact Purpose menu because its use was at that point mandatory within PiMS, whilst those for Diagnosis, or Warnings and Alerts were not (although equally contested in different ways). Fieldwork had also revealed that existing mechanisms for user feedback were not working effectively, with the result that the Implementation Group was largely unaware of users' conceptual and practical difficulties with 'Contact Purpose'. Many teams in BPCT did not know the PiMS User Group existed, or how to get in contact

¹¹ At that point, easier than compelling non-users to use the system.

with it to make their views heard. The Group itself was poorly attended by ‘real’ users; those who attended were a far from representative cross-section, having self-selected prior to roll-out, perhaps because of an interest in IT; and the Group tended to run to agendas that provided no space for clinical users to articulate their concerns about PiMS.

3.4 The Evolution of the Contact Purpose Menu

At this stage, our research explored the history and evolution of the Contact Purpose menu to find out how it had developed 38 options, yet still confused and failed to satisfy users. This led the Implementation Group simultaneously to address this issue in practice, including attempting to (re)establish definitions of the existing menu terms.

During configuration prior to roll-out, BPCT had requested HealthSoft to migrate parts of the Contact menu from CIS across to PiMS. Many of these options had been placed in the PiMS Contact Purpose sub-menu, which only allowed one purpose to be selected. By contrast, CIS had allowed users to select more than one option, which they had found useful. PiMS users made unfavourable comparisons with the affordances of the previous systems, such as CIS, which did not represent practice in quite such a reduced way:

“And the other thing is that you can only pick one thing out of the list. Now, we’d do somebody’s depot¹² but you don’t go to somebody’s house and purely do their depot. You go to their house and you monitor their mental health, do their depot, you might give them a bit of support, a bit of counselling, but there isn’t the scope for that. It really just ... you can only identify one thing that you’ve done ... and the list isn’t that great. I preferred the list on the Community Information System. You could pick as many as you want, or up to 4, I think ... And it had things like ‘Supportive Counselling’ in it. It was a very, very long list. The one on PiMS is not terribly long.” (Team Leader, SW CPN Team).

PiMS Contact Purposes had been drawn from five CIS menus:

- Reason for care (medication; treatment)
- Intervention (assessment; health promotion; medication; case conference)
- Care packages (assessment)
- Care Aims (assessment; maintenance; problem resolution; palliative and bereavement care; health promotion)
- Contributing Factors (epilepsy; challenging behaviour)

Most of the migrated options within the CIS menus had accompanying definitions that the PiMS Implementation Group could send to users as a reminder. It turned out that even in CIS, the definition of ‘problem resolution’ could indeed encompass help with utility bills or agoraphobia. However, the five menus above represented different aspects of care, and none were exactly equivalent in meaning to ‘Contact Purpose’.

¹² A ‘depot’ is an intramuscular injection of slow-release medication, the effects of which last for about a week. This is particularly useful in the case of clients who, for whatever reason, have difficulty complying with a pill-based regime.

Contact Purpose itself appeared ill-defined if commonsensical – although the Group were clear that overall purpose was not the same as a specific intervention. Hence, from the outset, the PiMS Contact Purpose menu was a conflation of incommensurable options from a variety of sources, and users could only choose one; no wonder they were perplexed.

More Contact Purpose menu options had been added since roll-out by user request. At this stage this process did not seem to have been systematic: it was a case of who shouted loudest. During the early phases of roll-out, users in one particular, large specialist service asked for several additions to the menu, as they felt that the options supplied failed to reflect their teams' activities. The PiMS project team granted this request because the service concerned was large and vocal (hence powerful), and had not previously kept 'good records', in the expectation that this would help achieve user buy-in and ensure compliance in use of the system. However, for various reasons this had not happened. In fact, this service had not input PiMS data at all, nor had it been keeping summary manual records in a form suitable for computer input. Other smaller, less prestigious teams, unhappy with the Contact Purpose menu options, had also discussed proposed additions to reflect their activities. These had been sent to the PiMS Team, but had been lost without trace. That nothing had been done to address these teams' requests was not perceived by their members as untoward.

From June 2001, all requests for additions to the system had been logged and a procedure put in place for dealing with them. In particular, additions had to be 'owned' by a team, and they had to be defined. Two new contact purposes had been added since then: 'parole report' (mental health examination of a prisoner at the request of the Scottish Prison Service, on a par with 'PF report') and 'relapse prevention', another request from the large specialist service, which was still not using PiMS.

In May 2002, the Implementation Group agreed that the Contact Purpose menu was 'out of control' and action was needed. The possibility of creating sub-sub-menus reflecting each team's activities in their own terminology that would map to a reduced Contact Purpose sub-menu had finally to be rejected as technically infeasible. The issue was raised at a meeting of the User Group to elicit suggestions for dealing with the situation. One proposal was "Just cut it down to 10 choices, and let them get on with it" (medical consultant), which was felt to be unworkable at that stage, as it might further upset many users.

The PiMS Systems Administrator then used the analysis software reflexively to produce a report on use of each Contact Purpose category from roll-out in April 2001 to June 2002. This was illuminating in many respects. Out of nearly 200,000 patient contacts during the period, 80% had been allocated to 6 menu options (representing just 16% of the 38 categories). Fewer than 1% of contacts were described as 'not specified', which strongly suggested that concern over misuse of this category had been overstated, even accounting for reclassification as a result of the Error Reports. Some categories had hardly been used, including 'epilepsy'. When the team and individual detail behind the report was viewed, HCPs selecting this option were found to include those known not to deal with epileptic patients. Instead, they belonged to teams that had many 'follow-up' contacts. 'Follow-up' succeeds 'epilepsy' in the

alphabetic menu, raising the possibility that some clinical users lacked mouse control skills¹³.

Members of the PiMS Implementation Group and the fieldworker began (separately) to examine the menu classification, in order to amalgamate similar options into a slightly smaller number of categories. It was initially considered that this could be safely undertaken. However, when this was discussed at an Implementation Group meeting, it was found to be problematic, as there were diverse interpretations even within the Group as to which instances should be included in each category, and hence on what basis to amalgamate them. The incommensurability of categories became very apparent, and managers also realised that basic definitions of contact purposes were either unclear, contested or absent. Hence a Group member was delegated to seek and tabulate definitions for every existing contact purpose. Only two, 'follow-up' and 'discharge', had nationally agreed definitions, so it was up to BPCT to reflect its local practice(s) in the rest. On further consideration, it was realised that neither 'follow-up' nor 'discharge' were actually contact purposes, the former being a 'Contact Type' and the latter a 'Contact Outcome'. However, at the time, it was deemed infeasible to remove them from the menu, as both were well-used, and their removal might have substantially increased again the number of contacts of which the purpose was 'not specified'.

Teams were asked to decide at team level which of their activities translated to which contact purposes, to agree team-level definitions of the latter, and to feed back their decisions to the PiMS Implementation Group, which decided that, for the time being, it could accommodate this kind of local variety within the system, "just as long as we know what each team means" (Data Protection Manager), and could map it back onto a more global classification scheme, for use at Trust-wide and external reporting levels. Teams that undertook this exercise found it useful, as it helped them restate and clarify the work that their team members did. Members of multi-disciplinary teams felt more cohesive, whilst better appreciating the variety of tasks undertaken by the different professional groups represented within the team. The exercise also resulted in new contact purposes, such as 'Deliver Medication' and 'Phlebotomy',¹⁴ being added to the menu, as Team Leaders realised the difficulties members were experiencing with fitting their everyday activities into the system, and made formal requests for menu additions to the Implementation Group. These were implemented, and so the Contact Purpose Menu continued to expand. However, new team members were not always made aware of the recently established definitions, and so made their own, sometimes idiosyncratic, decisions about how to categorise their activities using the menu.

In Spring 2003, the Implementation Group decided to attempt amalgamation and standardisation of the team-level definitions, and a working party was convened for several sessions over the summer to take this forward. The new group was composed of representatives from the various generalist geographical areas of BPCT and specialist services, and also included a wide range of professions, and some not previously involved, such as therapists and counsellors. Members of the group also varied in experience, and relative novices, such as Student CPNs, attended. It proved

¹³ A point borne out in concurrent fieldwork observations of computer training in an acute NHS Trust

¹⁴ The taking of patients' blood for testing.

problematic for participants to agree on any but the widest definitions of menu terms, since there were almost as many definitions as there were representatives. Discussions were sometimes heated, highlighting inter-professional differences and hierarchies. It was also difficult for group members to arrive at brief definitions of menu terms in the first place, as experienced practitioners could always think of exceptions to the 'rules'. Those who found it easiest to define menu terms, such as students, tended to have the least practical experience, both of mental health practice and of the organisation. Eventually the working party was disbanded, and in the autumn the Implementation Group proposed a more radical solution.

Trust workers were informed that from December 2003, the Contact Purpose Menu would be reduced to three options: Assessment, Treatment and Support, plus the default 'Not Specified' (which could not be removed from the system). At first, there was little reaction from users. HCPs had ceased to see Contact Purpose as clinically relevant (and, perhaps, worth consideration), as it did not meet their information recording or retrieval needs. In addition, more specific modules that were seen as clinically useful, such as assessments and care plans, had been added to PiMS. This made the Contact Purpose menu much less of an area for clinical debate. Moreover, users' attention had shifted to other parts of the system, such as the (even) more contentious classification systems of 'Diagnosis'/'Significant condition' and 'Warnings'/'Alerts', which were as yet only partially implemented in PiMS and not mandatory.¹⁵

However, some teams, including the large specialist service that had initially been very concerned that the Contact Purpose menu did not meet its specific clinical recording needs, then began to request additions to the new abbreviated menu, on the grounds that they needed finer detail in order to make an effective case for the future resourcing of their services. These potential requirements were discussed with teams, but not implemented within the menu. For some months, it seemed as though the issues of Contact Purpose had been resolved. Then, during the summer of 2004, it was remarked by BPCT's internal Information Services team that use of the Not Specified default option had been rising significantly – since the menu was no longer seen as clinically important, HCPs in general had, perhaps, become more inclined to click the first option they encountered, which was the default. It was decided to tackle the issue with a combination of increased emphasis on Error Reports, user re-training, and meetings with middle management (Team Leaders and above) to stress to them the value for BPCT as a whole of accurate administrative information. At the same time, new funding was made available for teams to deploy additional clerical support staff to enter patient data into PiMS, on the grounds that clinical users had, over time, proved unsuitable to undertake their own data entry into the system. This reversed the major change in the division of labour for information recording that had accompanied (and played a part in cost-justifying) the initial roll-out of the system within BPCT.

¹⁵ For various reasons, plus in the case of BPCT's multi-disciplinary Mental Health service teams, 'diagnosis' raises not just the usual issues in classification (see Bowker and Star, 1999, for a discussion of the International Classification of Diseases), but also the prospect of finding a way to get different diagnosis classification schemes to co-exist simultaneously within PiMS – with psychologists using ICD10, psychiatrists using DSM, and nursing staff entering nursing diagnoses. 'Warnings' and 'alerts' are subjects for debate within BPCT because of stigma and Data Protection Act issues.

Through an investigation of the origins, history and evolution of the Contact Purpose sub-menu, the researchers and the PiMS Implementation Group came closer to an understanding of how the current situation had arisen, and what actions could be taken to address it. Lessons learned and methods used were applied to the reconfiguration of other operational and mandatory PiMS menus in BPCT, such as ‘Outcome’, ‘Type of contact’ and ‘Intervention’.

However, more subtle lessons could be learned from the case of the Contact Purpose Menu about reasons for the failure of PiMS to function as a shared, common resource. From the outset of implementation, although the first project manager had championed the new system as serving the needs of both clinical and administrative users, it had rapidly become clear that this was almost entirely an administrative system. Both the data entered and most of the reports extracted served the needs of Trust’s Information Services team and through this, the Information Services Division of the Scottish Executive. Clinical users perceived little or no benefit for their daily activities from PiMS, nor were they able to use it to improve patient care. Moreover, areas of the system that appeared to have some clinical content and relevance, such as the Contact Purpose menu, proved to be problematic because of the heterogeneity of professional knowledge and practice, and difficulties agreeing common classifications between groups. Rendering menu categories sufficiently simple for administrative purposes also had the effect of making them meaningless to many clinical users, and led to the entry, for various reasons, of invalid data. This in turn made statistics derived from system data unreliable. At the same time, a menu that satisfied most clinical users was also cumbersome, and created data accuracy issues for administrators.

4. Discussion

The case study illustrates very clearly the obstacles to the creation of a common information space or boundary object capable coordinating different ‘communities of practice’ (Lave and Wenger, 1991). Different occupational groups, teams and individual have evolved their own, more or less idiosyncratic terms to suit their particular purposes, traditions and practices. Attempts to bring these all on board into the new system may lead to convoluted and inconsistent classification schema; conversely harmonisation efforts may be at a cost in terms of how useful and dependable the shared data are seen to be for different groups. In the process of accommodation between these perspectives, some ‘users’ are better able to represent their views (for example, government sponsors with their statutory reporting requirements) than others.

Earlier accounts of medical records as boundary objects have described contexts in which there were substantial gulfs between the different communities of practice involved ‘most physicians never get to see the coding forms used by the coders; most record administration coders know little of the elaborate nursing coding schemes; most nurses primarily draw on the nursing record during their work’ (Berg and Bowker, 1997).

There are two significant differences between the situation they are describing and PiMS as implemented in BPCT. First, it is intended by BPCT that all clinical staff – consultants (or their secretaries), nurses, therapists, social workers – should input their own activity data into PiMS at team level, rather than relying on central Medical

Records staff to act as mediators between themselves and the act of coding. This forces HCPs to attend to the rightness of the codings that they have to use for data input, with the mismatches bound to provoke debate about definitions and classifications, particularly with regard to hitherto ill-defined nursing (Bowker and Star, 1999) and other therapeutic work. In particular, debate is likely to centre on those classifications and codings considered to be of greatest clinical significance, such as contact purpose. Diagnosis, and warnings and alerts are also contested classifications in PiMS, and their evolution will be addressed in future work as system implementation proceeds.

Second, BPCT's mental health services have been reorganised into multi-disciplinary teams, and patients are referred to the care of the most appropriate practitioner within the team, who is not always a consultant.¹⁶ In fact, some patients may never see a consultant. All BPCT mental health team members draw on and contribute to the 'multi-disciplinary case notes', which comprise the whole team's notes on a patient, regardless of the individual members' occupational status. This represents a fairly radical departure from traditional concepts of the divisions of labour surrounding health care, and is as yet not well understood by some non-clinical parts of the Trust that receive activity reports based on PiMS data, such as Finance, Performance and Planning, which still see the consultant's activities as paramount, with nursing and other clinical work being merely 'included in the price'. When designing and configuring an information system for use in a multi-disciplinary environment, menu options and their underlying classification schemes will need to reflect that diversity of practice. For example, teamwork greatly facilitates alignment of classification practices within (co-located) professions, though not overcoming differences between geographically or functionally/organisationally remote groups

The medical records on PiMS in BPCT do, indeed, serve as infrastructure and are intended to be interoperable between different organizational communities of practice. However, they have to do this without the intermediation of a Medical Records function at the initial data input stage. The raw data are now to be input by diverse clinical teams who are also potential end users of analyses of that data. As such, they have a strong and partial interest in the medical record reflecting their practice in terms meaningful to them, and perhaps little interest in what other organizational communities might require. Problems of user commitment to information recording are heightened by BPCT's initial emphasis on fulfilling the data requirements of bodies external to the Trust, and the failure to implement any reporting facility that would enable clinicians to interrogate the data themselves. At present, members of the PiMS Implementation Group are the multi-disciplinary mediators that perform subsequent work on the record, translating data in the system into reports and analyses that are meaningful to clinicians, Trust managers and external bodies such as IRD.

The perceived relevance of information on the system may also be of crucial importance, since those who benefit from timely and accurate information may not be the same as those who have to work to put the information onto the system. Some common understanding of the purpose of the information and consensus about the value of the system is crucial to maintaining the commitment of organisation

¹⁶ This occurred prior to the roll-out of PiMS. Connections between this organisational change and the implementation of the new system do not yet appear to have been made by all BPCT's managers and non-clinical staff, although PiMS explicitly supports multi-disciplinary working.

members to the often demanding requirements of the system – necessary to ensuring the dependability (accuracy, timeliness) of information the system contains, a finding that mirrors earlier experience with integrated systems such as computer-aided production management (CAPM) (Webster and Williams, 1993).

In terms of methods for IT systems design and implementation, the case study points up the significance of apparently minor configuration details, such as the design and naming of database fields translated on screen as seemingly innocent pull-down menus. Addressing this may be particularly (but not exclusively) challenging in complex, heterogeneous, public sector organizations, such as the NHS, where there are a large number of differentially powerful, overlapping and non-mutually exclusive communities of practice. Classification systems of immense professional, organizational and political importance may be represented by such menus. These will evolve as implementation proceeds, and thereafter over the life of the system, and will probably need to be reconfigured iteratively.

It is unlikely that such menus can be designed ‘right first time’, and related reconfiguration work need not be taken to indicate failure on the part of system suppliers, designers or implementers. Rather, it should be seen as yet another aspect of the ‘normal’ process of implementation, with its attendant ‘learning processes’. Our empirical evidence suggests, as does some of the classification literature (Bowker and Star, 1999), that when a classification scheme is being developed, one should expect the number of categories to expand significantly before it can be reduced. Effective mechanisms for obtaining feedback from a full range of users should be in place. Care should also be taken to match like with like classifications when migrating menu options from legacy or previous systems, particularly where the database structure is different, or menus are being aggregated.

The picture that emerges from the case study is one where practice prior to PiMS has relied upon diverse, distinct and locally meaningful classifications and category labels that emerged and had been closely tailored to the needs of specific communities of practice within the Trust. While the information management practices are very locally meaningful, they also relate to the overall practice of medical care. Introducing centralised information systems such as PiMS is a difficult undertaking as they have an inbuilt tendency to strip away local meaning, replacing it with externally defined categories (whether reflecting outcomes of some formal classification exercise, the information required by particular influential actors [government; clinicians] or a schema contained within packaged software). In order for such a system to work, local interests have to be enrolled to support such universalities and keep them functional through day-to-day interpretation (Timmermans and Berg, 1997).

This draws attention to the processes whereby local concerns and particular distinctions and practices are catered for within the overall system, and the extent to which the gulfs can be bridged. In the case of the contacts purpose menu, a complex and difficult accommodation process has only just begun. One issue concerns the heterogeneity of the clinical teams and how their different purposes can be accommodated. However, this is not a simple process of articulation and alignment of interests. We have already alluded to the politics of categorisation: agreement will necessarily prioritise the information/classificatory purposes of some groups over others; a negotiation made more perilous by the uneven access to decision making and

status of the different groups involved within the Trust and beyond. However, the politics of classification are more rather complex – and here we differ with the somewhat heroic accounts of the politics of classification advanced by Bowker and Star (1999) – insofar as the potential uses of the information on the system, evidently manifold, are not yet reliably mapped out or known.

The implications of recording some particular practices and not others are hard to assess. This brings us back to long-debated questions about how information infrastructures can cater for the needs of future, as yet unknown, users and uses. The PiMS project is still under way – and we plan, through longitudinal study, to go beyond the currently available snapshot studies (and historical reconstructions) and gain a deeper understanding of how these issues are addressed over time as systems bed down and become widely used, as uses emerge and systems and practices evolve. In this way we also hope to obtain insights into the technical and organisational means adopted to remedy these problems.

5. Conclusions

This case study, in line with a growing body of research into the design and implementation of IT systems, highlights the problems inherent in introducing software systems that require (or attempt to bring about) the standardisation of hitherto diverse, local practices (Ellingsen and Monteiro, 2000; Heeks et al., 1999). In the case of PiMS, the Trust management and the software supplier seem to have assumed that a stable, organisational-wide community of practice could be conjured up through the agency of a software artefact: the standardised classification scheme and associated set of category names inscribed within the PiMS system as user interface menu structures, entries and dialogue field names.

Our case study illustrates how the work of constructing PiMS as a common information space is an ongoing achievement as members of different communities of practice learn to work together. To be successful, PiMS must achieve both local and global meaning. It must adequately provide for the work practices of the multiple clinical teams and services in satisfying their internal and possibly heterogeneous needs for record keeping and coordination; it must generate a sufficient degree of alignment between contexts to satisfy the purposes of characterising activity within the Trust as a whole. Moreover, the desired alignment around, e.g., contact purposes must be given time and support to evolve as the implications of service integration goals and more rapid information flows and new forms of accountability are experienced and understood by the system's numerous users.

Of course, there are problems that must be resolved if PiMS is to fulfil the expectations surrounding it. We observe, for example, the feeling amongst health service teams that frontline clinical and care workers are being taxed with generating the data, but that it is the hospital resource managers who benefit. The issue of what kinds of incentives different stakeholders require to encourage them to greater alignment of practices and understanding is, of course, a recurrent theme wherever new information systems cross boundaries between professional and/or organisational groups. A common failing is that the benefits seem to many stakeholders to be unfairly apportioned, with the consequence that the system becomes a site of contention rather than cooperation.

In the case of PiMS, we note two specific issues that are indicative of a fundamental obstacle to successful and meaningful information integration. The first is that healthcare service teams have so far found the activity reports and summaries that PiMS provides to be inadequate. In particular, they find it difficult to relate these abstract accounts of their work to their own local understandings, making the use of activity reports and summaries as a record of work problematic at the local level. The second issue is uncertainty among the Trust healthcare service teams as to how the broader organisational aims of PiMS – specifically, the Trust’s desire for greater accuracy in the allocation and management of resources – will play out. Resources are notoriously scarce in healthcare, with many sectors working at the limit of their capacity and struggling with long waiting lists. Resource allocation, therefore, is a matter of huge concern to all Trust service teams. Each service team is concerned that their levels of activity are accurately recorded and that Trust managers then draw the appropriate resource implications. The problem for the service teams is that they do not yet fully understand how the information on contact purposes will be used, nor the rules of the resource allocation decision-making ‘game’. The result is that the teams have been unable to form a clear idea of how to use PiMS as a mechanism for recipiently designing accounts of their work for others so as to ensure what they would regard as a fair outcome for themselves.

What these two issues serve to remind us is that information is always created in a specific locality where it acquires a local meaning, and that work has to be done to achieve universality and then to interpret it appropriately within a different context (Berg and Timmermans, 2000; Timmermans and Berg, 1997). For a common information space to work, translations have to take place that first *de-situate* information and thus achieve universality and then *re-situate* information in order to make it useful for specific actors within their own locales.

It would be mistaken, however, to conclude that a useful and usable system will not eventually emerge from the PiMS project. We must remember that the Trust is still in the early stages of the transition towards an integrated IT system. In several ways, the Trust seems to be replicating the experience of manufacturing and financial service organisations that were going down this road a decade ago (Fincham et al., 1994). Public sector organizations could learn from this previous experience that implementation and reconfiguration are often complex and lengthy processes, and should be anticipated and resourced accordingly. This experience also underlines how information integration is an iterative, evolutionary and ongoing process; subsequent implementations may prove more successful than the first, given the extensive effort required for achieving a practicable level of alignment of meanings and practices (Webster and Williams, 1993). The question is what measures can be taken to best support this change process.

The weakest claim we feel that we can make is that improved awareness of these issues (and a more critical assessment of supplier rhetorics) may help organisations to minimise these problems when implementing such systems, as well as helping identify the areas where difficulties can be expected to arise. In the course of our involvement in this case as action researchers (following our initial period solely as observers), we have drawn attention to the ways in which the mechanisms designed to involve users across diverse communities were not working effectively. However,

there are inherent tensions and trade-offs underpinning the projects of classification and of creating a common information space.

In considering more concrete measures, questions still remain about which kinds of intervention may prove most effective – between, for example, those geared towards technical change and those geared towards organisational innovation. We outline below two possible and related avenues for advance, one revolving around a more detailed treatment of the constituent activities involved in classification and categorisation work and how it can be supported; the other revolving around a vision of a more devolved socio-technical architecture for information integration.

Analysis of the data we have gathered has already identified three distinctive kinds of activity involved in deploying a classification within an organisational setting:

- 1) Constructing the classification: this work involves both amalgamating the local classifications that arise within the healthcare service teams, and, at the level of the overall classification, of considering example cases and how they fit within it.
- 2) Using the classification: this is the practice of classifying cases as they arise in the course of everyday work.
- 3) Analysing and auditing information within classes: this is the work involved in constructing statistical analyses of the classified data and verifying its correctness through, for example, quality assurance procedures.

Each of these different activities engages with different groups of practice to varying extents and these groups have different concerns and support needs. In building support tools and procedures, we therefore need to consider which activity we are supporting. Beyond this, however, what is clearly essential is that there be mechanisms in place for feedback between the groups involved in these activities, and that these mechanisms are themselves set within an overall strategy for evolving both the IT system and the work practices that it supports. The evidence of our study is that, in the case of the PiMS project, these feedback mechanisms – that is, the Implementation and User Groups – were not adequate for this purpose. The fact that it fell to us, through our research, to draw attention to how PiMS was actually being used and to articulate user concerns, is clear evidence of the failure of the formal mechanisms. A simple lesson from this would be for IT project teams to deploy members to observe the use of a new IT system in detail, perhaps using techniques similar to those employed in ethnographic research. Elsewhere in this book, we discuss how this kind of approach might be implemented and incorporated into IT systems design and development work (Hartswood et al., 2005).

Beyond methodological issues, the idea of evolving IT systems also raises important questions about the fit of integration strategy and systems architectures: not all systems architectures are equal in this respect. In the case of PiMS, we have an example of an integration strategy which is based upon the implementation of a ‘localised universal’ (Timmermans and Berg, 1997): a large-scale, standardised software package being tailored and re-shaped to fit local practices. We have seen how this process of localisation is conditioned by technical constraints in the form of the PiMS package’s limited support for local configuration and also by the project team’s appreciation of the benefits of standardisation in terms of minimising the subsequent support effort – in other words, we see an example of the classic package

paradox (Brady et al., 1992). We have argued elsewhere that IT departments should, instead, consider the merits of a strategy for information integration based on ‘universalised locals’ (Hartwood et al., 2001), creating a common information space as a ‘patchwork’ of multiple instances of local systems (Ellingsen and Monteiro, 2000). In this approach, using some kind of data dictionary mapping service, locally produced and managed information is translated for other localities and users as required, but without the need for organisation-wide standardisation. This approach has a number of advantages:

- Information is organised and managed in locally meaningful ways, and so the usefulness at the source is maximised.
- Translations involve explicit contracts, so information providers remain aware of who uses their information and in what ways.
- Systems continue to be locally designed and evolved – and so reflect the culture and purposes of the groups who use them.

In the context of the Trust, a project based upon this strategy would see the implementation of a mini-PiMS within each health service team as a first stage towards an organisation-wide information infrastructure. Only once these have been successfully deployed, would the second, integrative stage begin. Several benefits follow from this. First, information is organised and managed in locally meaningful ways and thus the usefulness at the source is maximised, ensuring local buy-in. Local adaptations are possible and remain local. Second, decisions about the information needs of non-local users are deferred to the latest possible time. Because translations involve explicit contracts, local information owners remain aware of non-local users, their information needs and how they use the information so provided. Third, the costs of translations are borne by those non-local users who will benefit from accessing the information and not by the local producers. Finally, this approach naturally allows for practices of information production and consumption to evolve gradually and with minimal danger of disruptive effects. Such benefits may need to be weighed against concerns for the wider organisational dependability of information where its production remains subject to local practices and standards. This underlines the importance of maintaining adequate information audit and verification procedures.

The PiMS project is still in its early stages in terms of the bedding down of the system within the Trust and the development of attendant classification work (let alone its extension to other sites). We will be continuing this study longitudinally, allowing detailed insight into how these ongoing issues are addressed by those involved, in terms of categorisation efforts, co-ordination work practices and system enhancements. This will involve more extensive feedback and discussion of our research findings with the array of interested parties within BPCT and beyond. In this way, we expect to be able to elaborate in more detail, and assess the possible measures and tools by which evolution in information infrastructures may be more effectively supported.

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Bibliography

- Berg, M. and Bowker, G. (1997). The Multiple Bodies of the Medical Record: Towards a Sociology of an Artifact. *Sociological Quarterly*, 38, pp. 511-535.
- Berg, M. and Timmermans, S. (2000). Order and Their Others – On the Constitution of Universalities. *Medical Work* 8(1): 31-61.
- Bowker, G. C, and Star, S.L., (1999). *Sorting things out: classification and its consequences*, Cambridge, Mass./London: MIT Press.
- Brady, T., Tierney, M. and Williams, R. (1992). The Commodification of Industry Applications Software. *Industrial and Corporate Change* 1(3): 489- 514.
- Clausen, C. and Williams, R. (1997). *The Social Shaping of Computer-Aided Production Management and Computer-Integrated Manufacture*. Luxembourg: Office of Official Publications of European Communities.
- Cornford, J. and Pollock, N. (2003). *Putting the University Online: Information, Technology and Organizational Change*. Milton Keynes: Open University Press.
- Ellingsen and Monteiro, E. (2000). A patchwork planet: The heterogeneity of electronic patient record systems in hospitals. In Proceedings of the Information Systems Research Seminar in Scandinavia (IRIS'2000, Uddevalla, Sweden, August).
- Fincham, R., Fleck, J. Procter, R., Scarbrough, H., Tierney, M. and Williams, R. (1994). *Expertise and Innovation: Information Technology Strategies in the Financial Services Sector*, Oxford University Press.
- Fleck, J. (1988). The Development of Information Integration: Beyond CIM? *Edinburgh PICT Working Paper* No. 9, Edinburgh University.
- Hardstone, G. (April, 2002). *PiMS Implementation: Preliminary feedback to BPCT*, first interim report, unpublished (commercial-in-confidence).
- Hartwood, M., Procter, R., Rouncefield, M., Slack, R., Voss, A. and Williams, R. (2001). Building Information Systems as Universalised Locals. In Dittrich, K. and Egyedi, T. (Eds.) special issue on Standards, Compatibility and Infrastructure Development, *Journal of Knowledge, Technology and Policy*, vol. 14(3), p. 90-108.
- Hartwood, M., Procter, R., Rouchy, P., Rouncefield, M, Slack, R. and Voss, A. (2005). Co-realisation: Towards a Principled Synthesis of Ethnomethodology and Participatory Design.
- Heath, C. and Luff, P. (1996). Documents and Professional Practice: 'bad' organisational reasons for 'good' clinical records. In Proceedings of CSCW'96 (Boston MA, November), ACM Press, pp. 354-362.
- Heeks, R., Munday, D. and Salazar, A. (1999). Why Healthcare Information Systems Succeed or Fail. *Institute for Development Policy and Management Working Paper Series* No. 9. ISBN 1 9025 1825X. University of Manchester, Manchester.
- Lave, J. and Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*, Cambridge: Cambridge University Press.
- Reddy, M., Dourish, P. and Pratt, W. (2001). Coordinating Heterogeneous Work: Information and Representation in Medical Care. In *Proc. of the European Conference on Computer Supported Cooperative Work (ECSCW'01)*, pp. 239-258.

- Star, S.L. (1989). The structure of ill-structured solutions: Boundary objects and heterogeneous distributed problem solving. In *Distributed artificial intelligence*, Vol 2. London: Pitman.
- Star, S. (1993). Cooperation without Consensus in Scientific Problem Solving: Dynamics of Closure in Open Systems. In *CSCW: Cooperation or Conflict?* S. M. Easterbrook (ed.), London, Springer-Verlag, pp. 93-206.
- Star, S. L. and Griesemer, J. R. (1989). Institutional Ecology, 'translations' and boundary objects: amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science* vol. 19, pp. 387-420.
- Starr, P. (1992). Social Categories and Claims in the Liberal State. In Douglas, M. and Hull, D. (eds.) *How Classification Works: Nelson Goodman Among the Social Sciences*, Edinburgh: Edinburgh University Press.
- Timmermans, S. and Berg, M. (1997). Standardization in action: achieving universalism and localization in medical protocols. *Social Studies of Science*, vol. 27, p. 273–305.
- Webster, J. and Williams, R. (1993). 'Mismatch and Tension: Standard Packages and Non-standard Users' in P. Quintas (ed.), *Social Dimensions of Systems Engineering: People, Processes, Policies and Software Development*, Ellis Horwood, pp. 179-196.