



EXPERTS, NETWORKS AND INSCRIPTIONS IN THE FABRICATION OF ACCOUNTING IMAGES: A STORY OF THE REPRESENTATION OF THREE PUBLIC HOSPITALS*

WAI FONG CHUA

University of New South Wales

Abstract

This ethnography of three Australian hospitals seeks to understand how and why new accounting systems are "experimented" with in organizations. Latour's sociology of translation is adapted to argue that accounting change emerged not because there was certain knowledge of positive economic outcomes but because an uncertain faith, fostered by expert-generated inscriptions and rhetorical strategies, was able to tie together shifting interests in an actor network. The paper also highlights how accounting may ironically be both real and a simulation.

It will be protested that reality, or the world, was there before any representation or human language. Of course. But conceptualizing it as reality is secondary. First there is the human thing, the making of representations. Then there was the judging of representations as real or unreal, true or false, faithful or unfaithful. Finally comes the world, not first but second, third or fourth (Hacking, 1983, p. 136).

Truth is a thing of this world: it is produced only by virtue of multiple forms of constraint. And it induces regular effects of power (Foucault, 1980, p. 131).

In the beginning there was doubt . . .

1 March 1989

It was a plain lecture room in one of the buildings of the University. The room was equipped with the usual

"lecture furniture": several rows of white formica-topped desks that all faced the front of the room, a flip chart, an overhead projector, a screen, a board. The twenty-three people who had gathered to listen to the external costing consultant, Dr. O, were drawn from Hospitals C (7), E (7) and N (5), the University (2), the State Health Department (1) and an external institute of health (1).

Dr. O: Hospitals are production systems. General Motors Holden produces cars; hospitals produce . . .?

Some members of the audience: Healthy people.

Dr. O: . . . The answer is intermediate and final products. Occupied bed-days are not useful definitions of hospital products. Nor are lab tests — we are not in the business of producing lab tests; we are not in the business of producing occupied bed-days. But intermediate and final products: there are obvious definitions (of these terms) . . .

* The author would like to thank the following for comments on earlier drafts of this paper: Peter Armstrong, Peter Booth, Mike Briers, David Cooper, Pieter Degeling, Mark Hirst, Anthony Hopwood, Richard Laughlin, Peter Luckett, Alistair Preston, Mike Power, Tony Tinker, and Grahame Thompson. Special thanks are also due to the anonymous reviewers of this journal for their constructive comments. This paper and earlier drafts benefited from comments received at the Annual Meeting of the American Accounting Association, the Boston Accounting Research Colloquium, the Critical Perspectives in Accounting Conference and the Interdisciplinary Perspectives in Accounting Conference. Helpful criticisms and suggestions were also received in research forums at the University of Alberta, Australian National University, University of Canterbury, Case Western Reserve University, Melbourne University, Murdoch University, Queen's University and Wollongong University. Finally, this study would not have been possible without the financial support of the Australian Commonwealth Department of Health and Community Services, and this is gratefully acknowledged.

There is a 0.001% of patients who use a lot of resources but for whom there are few benefits. The money is wasted on these patients. It is being taken away from other patients. Physicians are not stupid but they are too busy to think about the resource implications of ordering tests. They want to do as much as possible for the patients they care for. But they could save the resources to use on another patient. They should be able to make appropriate trade offs. But they lack data to make these decisions. Health information systems are garbage at the moment. We make savings but these go to the State Treasury. There is no benefit to the other patients. The money could be used more cost effectively to provide good health care. Don't you expect that if this information is available, then people will do the right thing? It has been proven in the UK [United Kingdom] and the US [United States of America]. PPS [Prospective Payment System] has led to declines in length of stay, imaging rates, number of lab tests, better prevention, etc.

Hospital Financial Accountant: But you are assuming some romantic version that doctors will accept reductions in costs. Surgeons are no different from businessmen. They want to put more money in their departments; they believe that quality of care is increased because more money is pumped in. They don't want to give money to other departments. Doctors are in a competitive situation.

Dr. O: Yes, but the characteristics of the problem are the same — how do we allocate money between different units? Competition is appropriate within reason. The basis of the argument has to be correct. A department should say — I am producing more products than before, therefore my budget should be increased. We should quantify these debates and remove from subjective and opinionated argument things that can be quantified. To the extent that we can quantify — quantify. We can never eliminate some degree of judgement but at least we can debate on the basis of evidence and data.

Opposition was anticipated . . .

14 August 1989

Hospital N's committee room was dominated by a large table in the centre. Over the course of the morning, a number of senior hospital administrators, accountants, information specialists and quality assurance staff attended and left a meeting with four University academics. At one point the following conversation occurred:

Head of the Quality Assurance Unit: We need a scientific way of making decisions. Now decision-making is more an art and we are dealing with science. Unfortunately QA [Quality Assurance] is seen as part of administration. There is a them v. us among clinicians and administrators in this hospital. Clinicians dominate the Management Committee, this is really a clinician-run hospital.

We are trying to tell clinicians that ICD9-CM [International Classification of Diseases, 9th Edition — Clinical Modification] codes are more useful than local databases. We are beginning to develop UR [utilization reports] reports based on ICD9-CM codes. DRGs [Diagnosis-Related-Groups], however, are seen as a nebulous threat — connected with funding by DRGs. We need to sell them ICD9-CM coding. We have got to sell information that is useful and which is not seen as a big stick.

University Professor E: Why is the DRG connection to funding seen as a big stick? The other side to it is to say that those producers who are doing better ought to be reimbursed as efficient producers?

Director of Health Information Systems: **Clinicians are afraid of programme cost-cutting . . .**

No, the product to be sold is ICD9-CM. Try and keep DRGs out as long as possible. **We are heading towards clinical costing and cost models.** We'll need 1 or 2 bites at it before we get it right. You need 1 or 2 bites, you know, in order to massage the information using cost models to get it believable. Presentation of DRG-based data seems premature. We should try to have ICD9-CM credibility [first]. . . . There are a number of very powerful and influential people here who are great debunkers. If they wish to blow it up they will debunk it and we will never get it up again. They are very critical of shonky data. It's part of our culture. It's the way this place works.

But there were allies . . .

16 August 1989

Hospital E was in the midst of major organizational change. There was much talk of **decentralization** and of restructuring medical services into clinical modules based on existing medical relationships. It was the general manager's intention that **each cost centre and module would eventually receive its own budget and set of financial reports.**

Three University academics were meeting with the Hospital Accountant in his office. Talking generally about the restructuring plans, he said: **"Nurses will not work under a doctor. We could have major industrial action about that. Nurses will not give up their power base. They will become the managers of clinical modules".**

In a later meeting on the same day, the University academics met with two hospital administrators, a medical superintendent and the divisional deputy director of nursing.

Deputy Director of Nursing: "... Our problems with clinical costing push us to the way of DRGs. We realized that we were going the wrong way and we want to go

the way of DRGs . . . We know clinicians are very against DRGs. We try not to use that term. Talk about clinical costing. People felt it was unethical to talk about resource constraints.

... The new structure? . . . Nursing budgets will always be controlled by nurses. If anybody wants to control my budget, I'll break their legs. They won't be able to walk out of this room.

The fact-building network survives.

28 May 1991

The Costing Subcommittee of the Consortium Casemix Project met in the Board Room at Hospital S. The minutes of that meeting record that a report detailing the DRG costs from the first run of the Yale Cost Model had been distributed to all participating hospitals and more copies could be obtained from the University. The Consortium was also preparing itself for the second run of the Cost Model.

Yes, but with what consequences and power-effects?

PROLOGUE

This is a story about a relatively small group of people "doing accounting". Its principal aim is to explore the social linkages and practices that (a) enabled this group of account-fabricators to begin the construction of "new" accounting numbers, (b) sustained their activity over several years, and (c) persuaded them to "consent" to the numbers finally created. In the process, the paper focuses on the catalytic capacities of knowledge experts (see also Bloomfield & Best, 1992), the socialized decision-ladenness (Knorr-Cetina, 1981) of accounting numbers and the manner in which they are a constitutive, transformative text in organizations. The "economic reality" that accounting was to reflect did not come first ready-made. Instead it emerged through a long process of fabrication (Knorr-Cetina, 1981; Latour, 1987) by a network of enrolled fact builders and software. The collective labour of fabrication, however, did not undermine the labourers' belief in the accounting images of reality produced. On the contrary, past

compromises merely set some parameters to further decision-making and strengthened the network's resolve to search for better windows on their organizations. By being a figurative practice that promised more than it could deliver and a set of inscriptions that was both reality and simulation, a certain self-preserving accounting was created, one which could continually be made to supplement itself, thus ensuring that the economicistic truth which it had helped to build would be perpetuated.

My narrative is constructed upon many interpreted audio-visual observations of this network of men and women. In my memory, I still see them sitting in University and hospital rooms, learning how to use a piece of costing software, reporting back on data problems encountered in the hospitals, strategizing on responses to government agencies, and shuffling bits of paper on which were written formulae, tables, spreadsheets and graphs which yielded new identities for their hospitals and patients. I do not claim nor do I attempt to objectively recount/mirror this empirical doing of accounting. This paper is not an asubjective, independent writing-up of results (see Nencel & Pels, 1991 and Clifford & Marcus, 1986, for critiques of this notion of ethnography) but the reflexive, constructed outcome of a dialogical negotiation of multiple realities: mine and those which belonged to the fact-building actors employed by the hospitals and my colleagues who comprised the University Project Team. As Clifford (1986) argues, an ethnography (such as this) may properly be called fiction (from the Latin root, *figere*) in the sense of being a fashioned, that is, made up, translation of a sliver of organizational life.

It is, however, fiction with a critical sub-text and the paper reaches towards a notion of critique in the several senses suggested by Luke (1989) and Forester (forthcoming). First, this paper is critical in that it is essentially reflective, reflexive and ironic rather than positive, objective and methodologically formalistic (see also Latour, 1988b). There are no allegedly rigorous representations called statistics or mathematical models here.

Döma

Second, both through its rhetorical structure and its subject matter, this study **criticizes** the positivistic notion of an independent reality that can be **represented unambiguously** by **accounting numbers or used as an epistemic standard to adjudicate between knowledge and non-knowledge**. Explicitly, it details the social construction of accounting images whilst implicitly the **study questions mainstream notions of how empirical evidence commands scientific authority** (although the issue of how ethnography itself commands what type of validity is beyond the scope of this paper).

Third, as critique this paper focuses on some of the complex interrelations between **knowledge, interests and power** (understood as a transformative and influential force). Foucault (1980, p. 93) wrote,

... basically in any society, there are manifold relations of power which permeate, characterise and constitute the social body, and these relations of power cannot themselves be established, consolidated nor implemented without the production, accumulation, circulation and functioning of a discourse. ... We are subjected to the production of truth through power and we cannot exercise power except through the production of truth.

The production of knowledge is thus as much about power as it is about truth. An attempt is made here to analyse these power–knowledge relations through, *inter alia*, (a) detailing the circuitous connections between the interests of **fact-builders** and the political agendas of state agencies, (b) depicting the different and unequal access to resources possessed by actors within the **fact-building network**, (c) highlighting how **accounting images may empower** core **changes in an organization's identity**, and (d) how **notions of "reality" and "truth"** are constituted discursively and help **legitimize** the authority of certain experts. Social theorists from Marx, Habermas to Foucault have indicated that **research should seek to question prevailing systems of truth and to ascertain the possibility of or work towards the constitution of a different politics of truth**. This paper is motivated by this spirit of critique. However, it does not attempt the ambitious task of detailing a more emanci-

patory accounting; its task is more modest — the interrogation of what which is constituted as **"rational" and "real" in a specific context**. The underlying premise here is that this initial investigation is useful, for whilst one accounting map of an organization may be as good as any other since neither works because it better represents reality, each may differ fundamentally in terms of its institutionalized supporting structures and power effects. Hence the need to ascertain wherein lies the will to a certain truth, who seeks what with changed accounting images, how chains are configured differently within an emergent network and what new forms of surveillance and discipline result.

Why is a piece of ethnography with such aims of general interest? **Critical accounting research has long embraced the notion that accounting is a constitutive social construction that emerges from and becomes entangled in complex structures, localized politics, multiple discourses and unintended happenings** (Lehman & Tinker, 1987; Hines, 1988; Hopper & Armstrong, 1991; Hopwood, 1987; Miller & O'Leary, 1987; Nahapiet, 1988; Covaleski & Dirsmith, 1988; Bhimani, 1993). More recently, there have been attempts to highlight the rhetorical dimensions of accounting (Thompson, 1991; Arrington & Schweiker, 1992) and to focus on the exercise of governmentality by numbers (Rose, 1991; Miller & Rose, 1990). Yet, despite this extensive body of work, there are relatively few detailed "micro" ethnographies of the making up of accounting numbers in organizational settings (compare Berry *et al.*, 1985; Ansari & Euske, 1987; Nahapiet, 1988; Bloomfield, 1991; Preston *et al.*, 1992). Whilst Latour's framework has now been used by several accounting researchers (Robson, 1991, 1992; Preston *et al.*, 1992; Bloomfield *et al.*, 1992), the preparers of accounts have not often been followed in action (see Latour, 1987, 1988a; Knorr-Cetina, 1981; Latour & Woolgar, 1979; Gilbert & Mulkay, 1984) and there remains a need for research that portrays and comments on the tactics, tools and tribulations of account-fabrication. **This paper seeks to contribute by focusing on the part played by**

experts, actor networks, computerized software and visual inscriptions in the struggle to change accounting representations. Further, it begins to investigate the diverse relations that empower accounting numbers and give them authority.

How does accounting persuade? The question is large and this case-study only begins to probe the issue in a particular context. Being exploratory, it is imperfect and incomplete (whatever completeness might mean). Given the territory it wishes to cover, it cannot be anything else. The paper does not promise to provide a comprehensive story of the complexities of account fabrication. The narrative, for example, concentrates on the emergence of a fact-building network and the parts played by legitimated knowledge experts in this process. It offers but tentative explanations as to why flawed accounting numbers command consent, especially among insiders who acknowledge their arbitrary nature. Finally, it does not assert the discovery of more generalized processes and claim to be an exemplar of these. Fabrication may take place quite differently in different circumstances. However, drawing upon but also going beyond the actor network theory proposed by Latour and Callon, the paper does spotlight a central issue, namely the basis of accounting's persuasive power, that should be further researched. In addition, its narrative empirically illustrates a general mode of thinking about and investigating how the microcreation of accounting knowledge and its practice is both constituted by and constitutes social and power relations in a post-industrial age characterized by a "mode of information" (Poster, 1990).

THEORETICAL NOTES

The work of Latour and Callon (see Latour, 1987; Latour & Woolgar, 1979; Latour 1983, 1988a; Callon, 1986; Callon *et al.*, 1986), in particular their actor network theory or sociology of translation, has already been introduced to accounting researchers (see Robson, 1991, 1992; Preston *et al.*, 1992). As a

result, this framework will not be discussed in detail here. The question, however, remains — why use their work as a springboard to write a piece of critical ethnography about the fabrication of accounting knowledge? Their work is attractive for a number of reasons. Firstly, the making up of "new" accounting numbers and the battle to secure their legitimacy may be seen as being similar in important respects to a scientific controversy. Like these controversies, the birth of an accounting may change the map of organizational reality, challenge existing work traditions, and unfold battle-like, with opposing supporters and detractors who are intent upon vanquishing each other.

Secondly, Latour's sociology of translation does not begin with the simplistic, positivistic assumption that a particular science or technology (or set of accounting numbers) is rationally accepted because it more accurately represents reality. Nor is science assumed to be created by the mechanical following of the rules of scientific method. Instead, Latour and his colleagues ask how a certain notion of reality came to be socially constructed and how and why a fact-building network emerged and survived Machiavellian-like — what are the human and non-human resources, strategems, ploys and persuasive strategies used by actors with divergent interests to initiate, maintain or, in certain cases, destroy knowledge networks? Who are the allies who/which were mobilized, how are competitors cut down and conquered, which authorities are used to stack particular arguments, how are stronger software or formulae built to cover as many contexts as possible in as succinct a manner as possible? In what ways are appeals to truth and truthfulness mobilized by fact-builders and to what effect? Such questions are useful because they focus analysis on the processes of fact-fabrication and the technical and socio-political ties that hold together to form truth. In effect, the sociology of translation extends constructivist conceptions of knowledge-creation (see Knorr-Cetina, 1981; Gilbert & Mulkay, 1984) by providing a systematic, well-illustrated framework that highlights the competitive, connected and communal

processes of knowledge-creation and the crucial role of networks of interest.

Thirdly, the work of Latour and Callon draws attention to the persuasive power of non-human resources such as visual inscriptions, academic texts and "centres of calculation" (Latour, 1988a). Paperwork such as formulae, graphs and charts are argued to possess many rhetorical advantages: they are mobile, immutable, recombinable and are perceived to be built on many facts. Most important of all, inscriptions make black boxes visible. It is not possible for government bureaucrats to manage or have control over the nation's health or economy by looking at "it". The "it" is plainly too vast and complex to be seen. But when cohorts of enquirers, accountants, medical record specialists and statisticians have collected millions of numbers, the nation's health can be imaged and counted. Visualization is especially persuasive. It appeals to the sense of sight — the most valued sense in Western, literate cultures. As Ong (1967, 1977) points out, in such cultures, the truth of vision has predominated over the evidences of sound and interlocution, of touch, smell and taste. Seeing, after all, is associated with believing.

Inscriptions further enable the exercise of comparative, normalizing judgement. This in turn permits action from a distance, enabling people far away from the scene of activity to ostensibly have a window on those activities and intervene in the name of better management. One organization's financial health may be compared with that of another's, conclusions drawn about relative efficiencies and effectiveness, and action initiated to correct evidence of ill-health.

Useful though the sociology of translation is, it is not without ambiguity or weakness. For example, Latour's fourth rule of method argues that society should not be separate from science. By this, he appears to mean that the development or spread of a body of knowledge should not be causally explained by reference to the interests of particular groups. This is because:

Analysts who use groups endowed with interests in order to explain how an idea spreads, a theory is accepted, or

a machine rejected, are not aware that the very groups, the very interests that they use as causes in their explanations are the consequence of an artificial extraction and purification of a handful of links from these ideas, theories or machines. Social determinism courageously fights against technical determinism, whereas neither exist except in the fanciful description proposed by the diffusion model (Latour, 1987, p. 141).

According to Latour, interests and other social factors cannot be used as causal explanations because they are the consequences of negotiation and the effect of settled disputes. Latour uses his account of the translation of interests through talk and negotiation as proof of the validity of his argument. Shapin (1988) and Barnes (1981) counter by pointing out that accounts of interest are theoretically distinct from interests; and each may change in a way that is independent of the other. Also, Latour's and Callon's own empirical work (see, for example, Callon, 1986) do not depict actors as people devoid of intentions and they too use a concept of goal-directed action to help explain why actors relate to a set of constructed facts in particular ways. This apparent inconsistency leads Shapin (1988, p. 544) to comment that "Latour has, to all appearances, banned interests by treating them as the same as interest-accounts, while re-introducing the instrumental character of technoscientific work by the back door, in the form of 'goals'". An alternative (and more sympathetic) reading might, however, conclude that Latour has not "banned" the concept of collective interests *per se* but was over-concerned to argue for a dynamic, more contingent conceptualization which did not see interests as being theoretically predetermined by the class structure of capitalistic societies.

In this paper, interests are a crucial starting point of analysis because people engage in making up accounting numbers for a reason(s). Their purposes may not be explicitly articulated or only vaguely defined. They may change over space-time and differ fundamentally between individuals and groups. But accounting, like science, is assumed to be an instrumental activity. Thus, to begin following accounting in the making, it is first necessary to identify core

individuals/groups who are either directly or indirectly involved in the fact-building process and to ask why they are or why and how they become interested in the construction of accounting numbers.

Interests, however, are not theorized as atomistic, randomly distributed matters that have no history and no possible connection with other interests. As Scott graphically illustrates (1991, p. 30) in her critique of the Latour and Callon framework, in order for researchers to know whether a laboratory or power-knowledge can "raise the world", it is necessary to "look beyond the boundaries of the laboratory or the laboratory's influence to the larger society to consider the forces that encourage laboratories or provide counterweights to sink them". Current fact-building networks, therefore, need to be considered in terms of larger, older networks. But interests are also not objective matters that can be rigidly read off class, ethnic, gender, or rank differences. Instead people's interests are argued to be gene-like possibilities — partly grounded in the social, economic, political and cultural institutions of a society at a point in time and partly possessing the agency to transform in quite unexpected ways, thereby injecting an element of unpredictability in the relationship between interest and outcome.

Further, unlike the work of Latour and Callon, this paper does not present inanimate objects such as computer software or hardware as actors which are identical to human agents (compare Callon, 1986). To do so reifies machines and technologies in a way which detracts from the purposive activities of their designers. It is people who make up accounting numbers in specific ways to try and achieve certain objectives. Software, by contrast, has neither interest nor agency.

ABOUT THE STORY

My story revolves round attempts to define "the" output or product of a hospital via its casemix. This notion is similar to the manu-

faturing concept of volume mix. Casemix seeks to measure a hospital's output in a defined period in terms of the number and type of cases (patients) treated. A number of casemix measures exist, the one used in this study is a set of 467 diagnosis-related groups (DRGs) which measure output via the types of inpatients discharged from acute care hospitals. DRG 103, for example, refers to heart transplants while DRG 242 identifies patients diagnosed as suffering from septic arthritis. DRGs, as an iso-resource measure of hospital output, were devised by a Yale research team set up in the late 1960s. The team was primarily concerned with hospital management, utilization review and an evaluation of clinical performance (see McMahon, 1987). With these early purposes in mind, the designers used length of stay as the proxy measure of resource consumption and DRGs are differentiated statistically on that basis. A discourse about DRG-based accounting, that is, the allocation of accounting costs to individual DRGs for internal budgetary and managerial control purposes, did not arise until the late 1970s and 1980s (see Fetter *et al.*, 1976, 1977; Thompson *et al.*, 1978, 1979; Fetter & Freeman, 1986; Freeman *et al.*, 1986; McMahon *et al.*, 1986; Wickings, 1987). It was only then that specific software, such as that embodied in the Yale Cost Model (YCM), became more widely known. Thus, it is possible for researchers who are familiar with the statistical generation of DRGs and their use for utilization review purposes to be unfamiliar with the technicality of DRG-based accounting.

To guide the reader, the following bare chronology lists the following "facts". In the second half of 1988 a team of four University academics (the University Project Team) came together to make a submission to the Commonwealth Casemix Development Programme. Reflecting the federal government's interest in measuring hospital output, this programme had been set up in 1988 to fund casemix "development" initiatives throughout Australia. Over a five-year period, it would have at its disposal \$25 million. In its first year of operation (1988/89), the programme funded some twenty-nine projects costing approximately \$5.9 million.

The University Project Team's final submission to the Commonwealth Programme was made in late March 1989. By this time, the University had become part of a consortium which included three public teaching hospitals (Hospitals N, C and E) and the State Department of Health which formally co-ordinated all submissions from the State to the Commonwealth. As a collective, the consortium applied for just over \$1 million for 1988/89 to fund each hospital's individual projects and the three projects proposed by the University. The University's projects were (1) the development of casemix accounting and costing systems using the YCM; (2) the development of non-financial casemix management information systems and utilization review; and (3) the investigation of organizational change, new organizational structures which were appropriate for casemix management, and the development of educational packages. The University team, which eventually included computer specialists and research associates, was divided into three separate subgroups, one for each of the projects listed in the submission.

The author belonged to the subgroup involved with Project 3, in the sense that she was actively involved with project management, data collection and analysis. This paper, however, is essentially an ethnography of Project 1 and in particular on the making up of DRG product costs by a subgroup of hospital personnel who were co-ordinated and guided by University staff assigned to Project 1. In the narrative, this subgroup is labelled the Cost Modelling Group. Its hospital members consisted of middle-level functionaries from all three hospitals. On average, Hospital N was represented by two accountants and one statistician, Hospital C by two administrators (one of whom used to be a medical records practitioner) and two accountants, Hospital E by an ex-nurse turned administrator and one accountant. Project 1 staff from the University consisted of a computer specialist, Professor E, and a research associate. The size of the Cost Modelling Group, however, eventually increased by six as staff from three other hospitals requested and were permitted to sit in and learn from the consortium's costing workshops.

Data used to prepare the case-study were collected over the period mid-1988 to July 1991 by (a) attendance at a series of consortium costing workshops, regular consortium and University project staff meetings, hospital visits, presentations by external consultants and academics; (b) interviews of hospital personnel; and (c) analysis of University and hospital documents. July 1991 was chosen as a cut-off point because a first run of the Model had been completed. At this point, the results produced were still regarded as preliminary and were not widely circulated among doctors or nurses. Nevertheless, the period discussed did offer useful insights into the doing of accounting. 1988 was chosen as the start-date because that was when the University Project Team gradually emerged. But in another sense, the story did not start then but much earlier, in a prior world of "sick" governments and hospitals.

former

THE ANTECEDENT WORLD OF SICK GOVERNMENTS AND HOSPITALS

Prior to the 1970s, Australia was often portrayed by its popular media, various art forms and major literary figures as the "lucky country". This luck, if it did exist, apparently ran out in the 1970s. Unpleasant economic news led to negative social news and the community looked to its governments (both State and Commonwealth) for corrective action (see Kouzmin & Scott, 1990; Painter, 1987). This was partly because governments had grown to penetrate many areas of Australian life — from the provision of health, education, housing, policing and social security to cultural and town planning services (Painter, 1987). In the 1970s, however, these government agencies came to be perceived as ineffectual and too big and became the subject of extensive reviews. The Bland Inquiry of 1973–1975 in Victoria spoke of major administrative staffing deficiencies, outmoded attitudes and a lack of initiative. The Corbett Inquiry of 1973–1975 in South Australia commented on a lack of productivity and efficiency. The Wilenski Inquiry in 1977 into

the New South Wales administrative apparatus was equally critical. And the influential Coombs Inquiry of 1976 into the Commonwealth bureaucracy criticized it for its aloofness from the public, its unrepresentative composition and the general lack of managerial accountability. These inquiries (which spanned both conservative Liberal and Labor administrations) enshrined a particular definition of the malaise crippling the Australian public sector — “inefficiency”, “little public accountability”, “poor value for money”, “low productivity” and “waste”.

The 1970s was not only a time of review but also of radical reform, particularly within the Australian health-care sector (for a more detailed history see Crichton, 1990; Palmer & Short, 1989; Opit, 1983; Hicks, 1981; Gardner, 1980). Prior to 1975, Australian public hospitals were, in general, managed by autonomous hospital boards. Doctors, by and large, possessed an honorary status; that is, they were not hospital employees but were granted access to hospital facilities for their private patients in return for free services to public patients. As Degeling (1992) points out, both hospital boards and doctors were keen to maintain this type of arms-length relationship between themselves and with State and Commonwealth governments. Such relationships changed, however, in 1975 when a reformist Labor Commonwealth government created Medibank, a universal health coverage scheme. Medibank was funded entirely from Commonwealth revenue and administered by a central Health Insurance Commission. This mode of funding and administration changed somewhat in later years as subsequent Liberal and Labor Commonwealth administrations tinkered with the scheme's precise financing format. But universal, state-financed, health coverage exists today, modified as the Medicare system. The creation of Medibank and its variations has had two important effects on the Australian health care sector — (a) both Commonwealth and State governments became increasingly concerned with their respective roles in the financing and management of hospitals, which consume the largest share of recurrent expenditure; and (b) the medical

profession could no longer keep governments at arms length. Instead the profession now had to continually negotiate (often bitterly) with state agencies over matters such as government-negotiated payment schedules and private practice rights in public hospitals (see Daniel, 1990; Rees & Gibbons, 1986). The medical profession also had to deal with government and community concerns about overservicing, inappropriate use of technology and fraud. These worries arose partly as a result of the following types of reports:

Between 1967–68 and 1976 there was a 20 per cent increase in the number of medical services per head, but, more importantly, there was a 66 per cent increase in specialist care. ... Apart from more referrals, there was a definite increase in the number of other doctor-initiated services in the early 1970s, particularly diagnostic investigations, including radiology and especially pathology (Hicks, 1981, pp. 46–47).

Given such concerns which, in turn, were related to the increasing involvement of state agencies in the funding of health care, the proportion of the total health dollar consumed by hospitals and the general climate of surveillance and review within the public sector, it was unsurprising that the hospital sector also became the target for change. When Medibank was being set up, the Commonwealth created a Hospital and Health Services Commission which took a direct interest in hospital management. This Commission conducted a number of enquiries and in 1974/75 argued that there was a need to (a) devise funding methods that would be based upon robust evaluations of hospital capital expenditure and operating costs, and (b) strengthen hospital management structures and systems. In addition, the 1974 Sax Report and the 1981 Jamieson Report reviewed the performance of hospitals nationally whilst the 1983 Sax Report enquired into South Australian hospitals. According to Palmer (1987), these reports highlighted a number of major problems within the Australian hospital sector. It was said to suffer from (1) maldistribution, (2) overcapacity and overutilization of hospital beds, (3) overemphasis on inpatient care, (4) a lack of

Hospital
sector
target
for
change

co-ordination of hospital activities, (5) absence of statistical and management information systems that measured hospital output and efficiency, and (6) inadequate allocative mechanisms for distributing funds to States and hospitals. In short, hospitals were depicted as suffering from the same illness afflicting the Australian public sector more generally.

This definition of "what was wrong with hospitals" in the 1970s and early 1980s was associated with yet another shift in Commonwealth health policy. The government that had created Medibank was replaced in 1975 by a Liberal administration committed to reducing Commonwealth health expenditure as part of an attempt to reduce inflation and reverse the downturn in Australia's domestic and international economic activity. During 1975–1983, five attempts were made by the Commonwealth to operationalize a "user-pay" principle by reintroducing minimum fees payable by patients or their private insurers (Degeling, 1992). More importantly, the Commonwealth adopted a recommendation from the 1981 Jamieson Report and abandoned existing open-ended hospital cost-sharing agreements. It substituted a system of identified health grants to States. Such grants were calculated on a per-capita basis with adjustments for factors such as age, sex, population size, and standardized mortality. The information required to make these adjustments was supposed to emerge from better management information systems, which the Report also recommended should be established within hospitals and State health departments. This system of fixed grants, in effect, shifted the bulk of financial responsibility for hospital costs from the Commonwealth back to the States. But for this financing strategy to work, the sickness of government had to be fundamentally alleviated, if not completely cured, in other ways.

If the 1970s was the era of problem-definition, the 1980s was a period during which solutions of a certain kind were implemented throughout the Australian public sector. Caiden (1990), Chapman (1990), Yeatman (1987) and Pusey (1991) detail this economically rational, managerialist solution which was the increased

penetration of private business sector ideas and practices into the public sector. To the 1970s criticism that the public sector was not sufficiently businesslike came the following answer:

... governments sought the best business advice they could get. They employed leading business consultants and multinational corporations expert in business and accounting methods to investigate public organisations and produce management plans and strategies. They brought business managers into the higher echelons of the public bureaucracy for policy formulation and managerial direction. They insisted that public organisations adopt and adapt business methods in their operations. They also redesigned and restructured the machinery of government more on the lines of the best practices of multinational corporations and leading Australian companies. They required their senior officials to be more than policy advisers, ... They demanded that they be, as well, managers skilled in management and the administrative sciences, speaking a management language, practising management skills, thinking in managerial terms and working according to managerial models (Caiden, 1990, p. 45).

Caiden goes on to point out that this managerialism of the 1980s was distinctive in being not only associated with neo-conservative economics and the predominance of economic criteria in public policy-making but with the implementation of cost-cutting strategies, management by objectives, financial management improvement plans and management through information technology. Managerialism also changed the language of public administration. Since the 1980s, words such as privatization, performance indicators, productivity gains, commercialization, contracting-out, asset-management, and user-charging have become part of the everyday language of public sector managers.

The rise of managerialism and the Commonwealth's budget reduction strategy impacted upon the New South Wales (the focal State of this case-study) government and its health sector in a number of ways (see Degeling, 1992, for more details). In 1982, a rationalizing State Labor government abolished its Health Commission and health was brought directly under ministerial control with the establishment of the State Health Department. In the same year, the State's Parliamentary Public Accounts

Committee recommended a series of significant changes aimed at tightening the financial control of hospital accounting systems; the introduction of a form of global budgeting, the provision of standardized statements of sources and applications of funds in hospital annual reports, the requirement that hospital auditors report to the Auditor-General and the institution of State controls over hospitals which exceeded certain budget allocations. In addition, in the name of efficiency and equity, the newly established State Health Department recommended hospital consolidation. For the city of this study, this meant the closure of three inner-city hospitals in order that bed capacity might be increased in outer suburbs which had been experiencing fast population growth. **In 1983, despite sustained opposition from various stakeholder groups and the media, two of the three hospitals were closed.** The third, a large teaching hospital, had its bed capacity as well as its clinical role substantially reduced. The State Department further instructed hospital administrators and boards to stay within budget or face dismissal. No longer would the State "cough up" at year-end in the face of hospital overspending and "shroud waving". As Degeling (1992) points out, the State's message that the rules of the game had changed was very effectively communicated when, in 1983, it sacked the board and some senior staff of one public hospital for alleged financial mismanagement. Strict limits were also placed on total hospital expenditures and these effectively capped expenditure growth in real terms. As Palmer & Short (1989, p. 86) point out, the total expenditure of Australian public hospitals has not increased in constant price terms per head of population since 1978. In part, this outcome was achieved through the State's promotion of a new career structure in medical administration (which resulted in the growth of doctors as a distinctive managerial group) and the increased employment of doctors (staff specialists) by hospitals. Both processes strengthened the hand of the State Department as it sought to more directly control the hospitals which it was indirectly financing. Further, in 1986 individual hospital

boards were abolished and public hospitals came under the direct control of Area Health Boards controlled by the State. In 1988, a newly elected conservative Liberal State government further strengthened moves to turn the New South Wales public sector into NSW Inc. The number of Area Health Boards was reduced to ten and these were headed by chief executive officers (CEOs) who held fixed-term (seven year) contracts with the State's Senior Executive Service. These CEOs reported directly to the State Minister for Health, who made it clear that continual reappointment upon the expiry of contracts would depend on demonstrated performance to stay within budget and improve the efficiency and effectiveness of their Areas.

Change was also afoot at the operational and technological level. **In the late 1980s, the State Department of Health, like its Commonwealth counterpart, was concerned to develop a measure of hospital output that would enable inter-hospital/Area comparison and guide resource allocation.** To this end, it followed the example of health authorities in the mother country (Britain) and began constructing a Resource Allocation Formula. Under this formula, funding to Areas would be based upon factors such as population size, age distribution, number of teaching hospital referrals and hospital casemix. The State Department also introduced a form of specialty costing and was exploring a major overhaul of its computerized hospital information data-gathering systems. More generally, the State's Premier (who held an MBA from Harvard) had directed that public sector organizations, like their private sector counterparts, should learn to manage "all their assets and liabilities" and change to an accrual accounting system by given deadlines.

SE! Summering

As the above historical sketch indicates, the hospitals studied from 1988 onwards emerge from a particular antecedent world in which state agencies (both State and Commonwealth) now funded the bulk of the nation's health services. As the financial burden this entailed came to be seen as excessive in tight economic conditions, both Liberal and Labor administrations sought to shift it among themselves (the

Commonwealth to States and vice versa) and to others (consumers, private insurance agencies). At the same time, increased dissatisfaction with the quality of public administration led state agencies to seek higher levels of surveillance, control and accountability. This was attempted partly through organizational restructuring and partly through investment in "rational", private sector financial and information technologies. The Commonwealth Casemix Development Programme was one part of this portfolio of managerial technologies.

THE TRANSLATION OF INTERESTS OR HOW DID THE FACT-BUILDING NETWORK EMERGE?

Developing casemix management information systems in hospitals, however, was not going to be easy. As the field quotes above illustrate, it was not altogether clear that in 1989 a form of DRG-based hospital product costing would be viable in the hospital world under study. There were "hawks" and "doves". The central question of this section is: who comprised the fact-building network and how did it emerge? Did the actors come together because of a common perception that there was an "obvious" need for DRG-based accounting information in hospitals? Or was this need fabricated?

The network consisted of four major groups of actors — academics, hospital personnel, State Department officials and Commonwealth bureaucrats. Let us begin with the University Project Team, for in the narrative it is made to act as the "obligatory passage point" (Callon, 1986), the channel through which all other network interests must pass. The Team consists of four principals — two internationally known DRG advocates, a political scientist and myself. The DRG experts were well connected to the Australian communities of health economists and medical record practitioners and to the American designers of DRGs. Their careers were rooted in DRG research and prior to 1988 they had received state funding to investigate the

applicability of DRGs for use in Australian hospitals. Only one of the experts, a health economist, had some knowledge of DRG-based accounting but even he had had no hands-on experience of installing the YCM in organizations. These two DRG experts might be described as believers, being convinced that DRGs could form the basis of a more efficient and equitable system of resource allocation to public hospitals. As they saw it, present allocative mechanisms were overly influenced by interest group politics and in need of a rational, scientific basis. At the very least, a more objective formula would help identify when, how and whose politics influenced particular outcomes. The other two members of the Team were not familiar with DRGs *per se*, but wished to study change processes in organizations. I, in particular, was more concerned to investigate than to develop DRG-based accounting.

In a proposal dated 2 March 1989, the Team wrote an early draft proposal for "the development of integrated casemix management information systems" that did not have a DRG accounting subproject. Instead, it spoke of developing casemix reports which would group all hospital discharges by DRG and for each DRG, show the numbers and proportions of all discharges and of all bed days, the mean and median lengths of stay and the coefficients of variation of lengths of stay. Given the Team's expertise in health economics, medical record practice and organizational analysis, this was perhaps unsurprising. However, by the end of March 1989, the final submission listed casemix accounting as Project 1 (Projects 2 and 3 were as originally proposed in the draft submission of 2 March 1989). Why the change? Primarily because the Team had been persuaded by one of its DRG experts that hospital participation and Commonwealth support would be more difficult to secure in the absence of concrete benefit. In order that organizational change might be observed and studied over time, extensive access would be required. That privilege to merely observe was unlikely to be given and supported unless administrators and funders received useful managerial information

in return. In addition, applied or action research was common in health-care research and had a certain academic legitimacy. Finally, it was pointed out that without enabling hospitals to develop new types of accounting information, there might be no change to observe for sometime.

The generation of product cost information thus became a key "interessement" device, which would tie together the Team's interests in development and research and also enrol strategic others. Such data, for example, would be of interest to a managerialist Commonwealth, which as pointed out earlier, was keen to allocate resources rationally, reward efficient producers, eliminate waste and generally manage its budget deficit partly through holding hospital expenditures in check. Product cost information would also interest the newly appointed Area CEOs and general managers of Hospitals C, N and E. All three Areas faced budgetary pressure in the form of state-capped budgets, constant state pressure not to overspend but to make productivity gains, and inter-Area and inter-hospital competition for scarce resources. In 1988/89, these CEOs had recently been placed on short-term performance-based contracts. They had witnessed the very public sacking of hospital administrators for financial mismanagement and the acrimonious closure of inner-city hospitals much like their own. Decreasing lengths of stay, changed population growth patterns and associated electorate pressures had convinced State officials that city hospitals should be rationalized, their bed capacity reduced and resources diverted elsewhere in the city. Knowing more accurately what their products were and how much they cost could help these hospital administrators to manage with less, and possibly get more from the government.

However, while the University's projects appeared useful in principle, particular financial and organizational pressures meant that in practice the level of initial support among the three hospitals was quite uneven.

Hospital E was in the throes of a major redevelopment, with one of its premier teaching

and research hospitals being threatened with relocation to another site. The University's proposals appeared incidental as administrators at the hospital and Area level constantly composed and recomposed capital costings during long negotiations with a State Department of Health focused on rationalization. However, Hospital E also had a general manager who intended to come in on budget, who needed to close approximately 100 beds, to cost the savings that these closures would bring, and who wished to decentralize his organization by setting up clinical divisions (modules) which would eventually hold clinical budgets and be held financially accountable. The University's projects thus appeared to be of some relevance as they promised to reveal a picture of output and associated costs. Also, Hospital E was one of the main hospitals used by the University for teaching and research purposes and thus was tied to the University Team through other networks.

If support from Hospital E was ambivalent, that from Hospital N was even more so. Unlike either E and C, N was not embarking on major structural change. It was not introducing matrix organizational structures nor the concept of general management and N was managed through a traditional management committee comprised of directors of medical, nursing and administrative services. However, like the other Areas, its CEO was keen to come in on budget as the Area had begun life "\$13 million in the red". It was also seeking to make department heads financially accountable and had recently sought to "overhaul" its financial reporting system. Hence, when approached, the hospital was in the process of evaluating, buying and implementing expensive, integrated hospital information systems which, *inter alia*, would enable the provision of better financial, casemix and quality assurance information. *Prima facie*, then, Hospital N appeared to be one step ahead of the University Team, who, in any case, was proposing a concept that was politically "too sensitive" (see field quotes above).

Interest in the University's projects, however, was strong in Hospital C, whose Area CEO was

familiar with and supportive of DRGs. Also, he knew the University's DRG experts well. Further, similar to the other two hospitals, C faced budgetary pressures and had closed beds, although it was not in a state of financial crisis. Nevertheless, the Area CEO knew that given the State Department's policy of "shifting beds to the west", Hospital C would need to radically rethink its role in the Area and the city. Recently, to alleviate internal resource battles, the hospital had embarked on a policy of divisional devolution. Effectively, this meant that clinical specialties were divided into divisions with designated resources (principally nurses and beds). These divisions, however, did not hold their own clinical budgets and the hospital continued to produce only cost centre reports. These were considered "rudimentary" at best and were "useless" for the purpose of divisional management. The University's projects were therefore of interest as they might "throw some light" on the DRGs produced by each division and associated costs. In addition, a greater knowledge of the hospital's costs might assist the hospital to accurately cost its tertiary services which formed part of the resource allocation formula used by the State Department. Further, product cost information could potentially help senior administrators to "rein in the doctors" and make them "more cost-conscious". C thus became enrolled, hopeful that the University projects could be lodged within the specific managerial agendas of senior administrators.

I believe that acceptance by C was instrumental in consolidating support from the other two hospitals. To begin, traditional inter-hospital rivalry helped create a sense of "it is important to keep up with the competition and not be left out of new, innovative developments". Hospital C had a long historical tradition and in the past had often been regarded within hospital circles as "the jewel in the crown". For Hospitals N and E, their symbolic capital would at a minimum be maintained by working in a select group that included Hospital C and a well-known University team.

In addition, the University offered to help individual hospitals make submissions to the

Casemix Programme. This meant that hospital participation in the University's projects not only cost little in resource terms but also had the potential to raise extra funds at a time of budgetary constraint. Further, a multi-hospital and University consortium was attractive because (a) it lessened the degree of inter-hospital competition for funding, (b) the University team possessed a level of expertise about DRGs which was not easily found within the hospitals; and (c) the University team was trusted as a neutral mediator who would ensure that sensitive hospital-specific information would either be kept confidential or be fairly traded among the three hospitals. The two DRG experts, in particular, were well known to staff from all three hospitals. Finally, at the very least, the University's projects would help hospital administrators keep abreast of Commonwealth attempts to control health expenditure via the use of casemix-based management tools. Given the rapid changes of the recent past at both State and Commonwealth levels, administrators most likely thought it politic to be in the know.

Hospital administrators were not the only enrolled actors within the fact-building network whose commitment was initially lukewarm. The State Department of Health also had to be persuaded and Commonwealth-State sensitivities "on who was doing what in whose territory" had to be clarified to the mutual satisfaction of both levels of bureaucracy (I was not present at such discussions). Eventually, the State Department came to be seen as having a legitimate role in the co-ordination, evaluation and monitoring of all successful State submissions to the Commonwealth programme. This process of role definition took time partly because the State Department initially lacked enthusiasm for and technical expertise on the issue of casemix. Also, the Commonwealth's initiative coincided with a period of extensive rationalization and change within the State Health Department, during which time staff experienced considerable stress and ambiguity.

Finally, the Commonwealth bureaucrats — what did they want for their investment? The provision of monies for development as distinct

from research and the pattern of funding that did eventuate indicate that they essentially sponsored enabling projects by believers, that is, work that would aid the implementation of a certain type of casemix control in the future. Thus they gave money for the hospital world to be prepared, for potential problems to be identified and solved and for transplanted knowledge (American DRGs) to be modified to local conditions. Direct funding of developmental work also circumvented unconvinced State bureaucrats wary of Commonwealth interference and would help constitute a new knowledge and commercialized reality within the hospital world.

Inferring such a purpose, however, does not allow a further inference that this group of actors was confident of success or that they knew precisely how and when their aim might be achieved. The above account highlighted how university-located knowledge experts, who were convinced of the utility of a technology, could become connected to the policy agendas of state agencies. In this case, the practice of government was mediated, assisted and ultimately legitimated by the authority of external experts. But for a new technology of surveillance to be institutionalized in organizations, that was only the beginning of a long battle. To achieve victory, new converts would need to be formed, critics silenced, competitors overcome, sceptics convinced and the technology shown to work in many, diverse workplaces. As Latour (1987) points out, the fate of a technology does not lie in the hands of designers or initial supporters but with those who come after — actors, who are often possessed of different interests and subject to different pressures. Thus, I believe that while some Commonwealth bureaucrats wanted to develop an Australian form of casemix management and had initial expert allies, in 1988, the widespread adoption of such managerial technologies in the foreseeable future was by no means certain.

In essence, this section argues that the fact-building network had to be carefully built up. Clearly, there were actors who did want DRG-based accounting information — a group of

Commonwealth officials, and they had money to tie in advocates who believed in the technology. But there was also variety in interests and levels of expertise within the network. The Commonwealth wanted knowledge about costs calculated on a casemix basis. The University team wanted funding for both research and development purposes and included experts who believed in the utility of DRGs but who were not masters of the YCM. The hospital administrators and State officers wanted better financial information (this interest was itself largely shaped by State and Commonwealth policies in the 1970s and 1980s), but there was no precise master-plan to achieve this better state. In addition, each hospital and the State Health Department faced particular pressures on their resources; in two instances major reorganizations were in process and all hospitals reported budgetary constraints. Also, as the field quotes illustrate, some hospital personnel were not convinced that DRGs could be sold at that particular time (especially to doctors). And casemix itself was a notion that was relatively new to the hospital world.

The origins of the network were thus complex and diverse; much was happening besides the possibility of changing internal accounting systems within a group of hospitals. Some of these processes acted as catalysts for accounting change whilst others served to distract. The allies and the doubtful had to be corralled and their divergent concerns and levels of commitment translated into Projects 1, 2 and 3. The University Team had to convince itself that Project 1 was necessary in order to enrol the Commonwealth and hospital administrators. The latter had to be persuaded that their interest in obtaining more resources, decentralized management, efficient financial control and coming in on budget could be met by co-producing a knowledge about DRG-based costs. And State bureaucrats had to accept that Commonwealth interest in the casemix management of hospitals, which were located on their turf was *a fait accompli*. The Casemix Programme was not going to go away, it had resources independent of the State and hence the sooner

they (the State) assumed some degree of control the "better". In short, the reality of inadequate DRG-based accounting was not uppermost in the minds of the majority of network members. Reality came later. First, there were a number of diverse "conditions of possibility and existence" — discontinuous state involvement in the financing and administration of health care; shifting macroeconomic conditions which were perceived as more and more adverse; an increasingly managerialist state bureaucracy at the Commonwealth and State levels; changing patterns of population growth and distribution of voters; emergent professional groups (medical administrators and nurses) keen to maintain or extend their professional territories *vis-à-vis* older professional groups (clinicians) and finally, academic experts with varying levels of interest and expertise in DRG-based accounting.

MAINTAINING CHAINS

Latour points out that "interessement devices" are those that are interposed between the network members and all other competing entities that threaten to weaken or break network linkages. The single most important interessement device in this case-study was the Commonwealth's approval of the consortium submission. Once the money came, the network was secured at least for two years. More specifically, the chains between the consortium and the Commonwealth and between the consortium and the State Health Department became strengthened by accountability relationships. Now the consortium had to report back to government agencies on how they had spent the money given and what was achieved. The grant not only strengthened existing links. It created new relays that in effect made the consortium larger. The grant enabled the hospitals and the University to employ people who specifically worked on the project and to buy project-specific hardware and software. In addition, subgroups for specific projects and committees began to form and meet regularly. Times had to be set for these gatherings, rooms

found to house them and the new project staff. By early 1989, the consortium projects had not only a material presence but also a temporal rhythm in both the University and the hospitals. Further, word travelled round to other hospitals within the city and at least three other hospitals formally requested to join the fact-building network.

Links were also extended nationally and overseas. By virtue of the grant, the consortium became a part of an Australian casemix community, that included all other project workers supported by the Casemix Programme. All funded researchers met once a year, to present reports of progress or results of completed projects. In addition, DRG experts in other Australian states were invited to present their experience with DRGs generally and the YCM specifically. Further, because several overseas countries had been using DRGs for a variety of reimbursement and internal hospital control purposes, numerous overseas experts were invited by the University team to discuss the impact of using DRG-based information systems. Those who visited the consortium included Bob Fetter (the retired Yale professor who helped invent DRGs), several of his colleagues, the chairman of the United States Prospective Payment Assessment Commission, an American professor of nursing and several British DRG experts. The hospitals also independently invited other DRG and costing experts to assist them with their specific projects.

Money and allies were important aids in the battle to create product costs but as Callon (1986) points out, interessement devices do not necessarily lead to actual enrolment of network members. To describe enrolment is to describe the group of "multilateral negotiations, trials of strength and tricks" (Callon, 1986, p. 211) that accompany interessement devices and enable people to view the fact-building exercise as a success. For the network in question, one of the key issues was how the non-tangible concept of DRG-based costs could be transformed into a series of statements that could be perceived as more certain: DRG-based product costs could be obtained without great expenditure of

resources; the information *was* reliable and *could* be used by people such as hospital administrators, State and Commonwealth bureaucrats; it *would* stand up to the scrutiny of potential debunkers such as doctors, and their expected opposition *could* be overcome through appropriate educational activities and the support of other groups (such as nurses).

In order to obtain these types of certainty statement, the most crucial battle was to enrol the YCM, which was stored within a suite of computer programmes. If the Model was to be successfully enrolled, it had to be shown to work. But this successful working was not easy to achieve partly because at the beginning of the project, even the University researchers who were perceived to be DRG experts did not know the Model in detail. More importantly, the Model presumed a world that did not exist in any of the trial hospitals. To negotiate with the Model meant negotiating the difference, the gaps and empty spaces between the two worlds. In addition, once an isomorphism had been achieved, it had to be stable and capable of being achieved

repeatedly. The Model had to be a consistent re-presentative. The following sections detail how the Cost Modelling Group generated a particular level of certainty about DRG costs using the YCM. The first section describes the technical structure of the Model itself and its potential to change modes of seeing, thinking and talking about hospitals and patients. The second section focuses on the activities of the Group as they seek to make the HOSPITAL embedded in the Model isomorphic with Hospitals C, N and E.

From many to few — inscriptions with re-presentative potential

To the end-user, the YCM presented on the video display unit of a personal computer as a series of screens that asked for information. The user could not access the logic of the Model which was located within the source code of the computer language in which the programmes were written. But this logic could be diagrammatically depicted, shown at costing workshops and placed in texts (see Fig. 1).

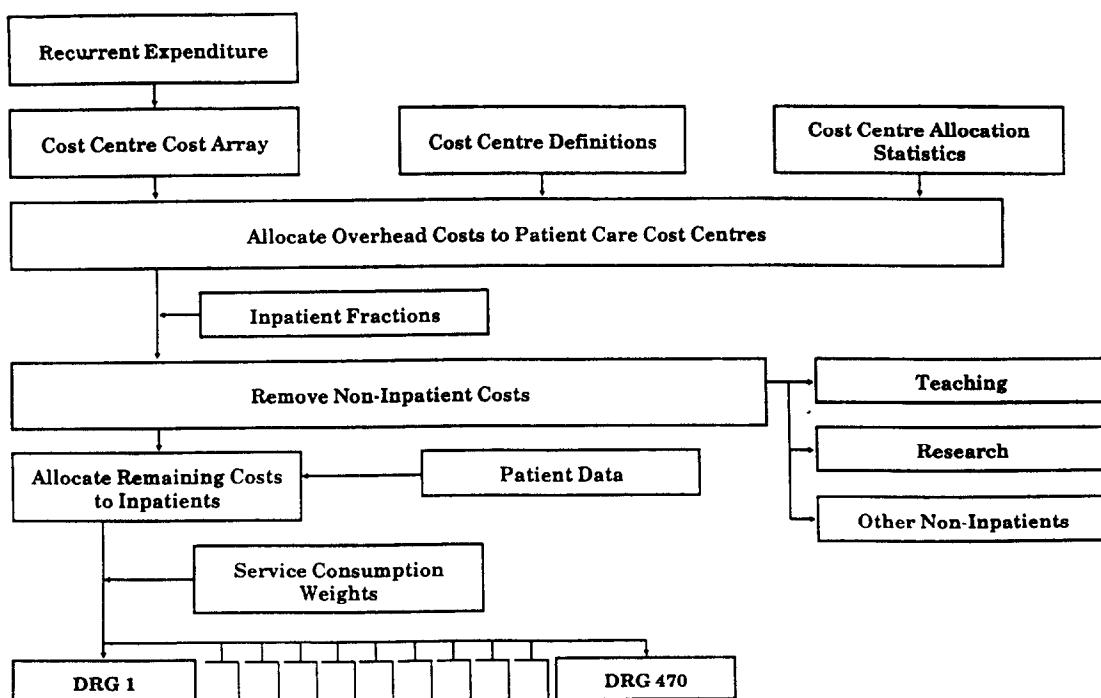


Fig. 1. Yale cost model: the core working principles.

This visual representation was important for a number of reasons. **First**, there was only one actor within the fact-building network who could understand the computer language and translate between it and English, the computer specialist employed by the University. In order to persuade fellow fact-builders (for example, medical records practitioners, hospital accountants), the Model could not remain a total black box because if it did, actors would not quickly understand why they were doing what they were doing. They would be unable to see how adding up a set of numbers in a certain way and discarding others fitted into the big picture. **Second**, seeing and knowing that the software embodied a certain logic paved the way for an end-user to begin to talk with the personal computer. For that conversation required the end-user to initially play the role of a provider of answers. It would have been difficult to start and maintain a conversation with a machine which continually asked unless one was confident that there was a rationale to the questions.

The input data required by the YCM were collected in five¹ core files that required many thousands of inscriptions to be supplied. These files are: CCDEFS, STATDEFS, ALLOC, COSTS and INPAT. A more detailed description of the meaning of the inscriptions as they appeared onscreen is presented below:

CCDEFS_	1	1	Maintenance
	10	4	Housekeeping
	101	2	Nursing Administration
	202		Surgery A
	301	99	Supply

Interpretation: The file Cost Centre Definitions (CCDEFS) asked for information on the total number of cost centres that a hospital had. The first column was a code number for the cost centre. The second was the code number of an allocation statistic, essentially a cost driver that was used to allocate the costs of an overhead cost centre to a final cost centre. A blank in the

second column denoted that a particular cost centre was a final cost centre whilst a 99 denoted a descriptive header for a group of centres. The third column contained the names of the cost centres.

STATDEFS_1	Total Admissions
2	Total Number of Full-time Equivalent Staff
3	Total Operating Costs per Cost Centre
4	Total Beddays

Interpretation: This file required a user to give a definition of each of the allocation statistic codes.

ALLOC:_	1	2	3	4
1 Maintenance	0	29	260,980	0
10 Housekeeping	0	35	105,800	0
10 Nursing Admin	0	10	87,368	0
202 Surgery A	100	12	168,000	2300

Interpretation: This file was a matrix of all the cost centres by the total value of their cost drivers. For instance, reading across row 1 told the reader that there were 0 admissions, the total number of full-time equivalent staff was 29, the total operating costs of the Maintenance Department per the general ledger was \$260,980 and there were no beddays incurred.

COSTS _	Labour	Supplies	Totals
1 Maintenance	205,789	55,171	260,980
10 Housekeeping	67,348	38,452	105,800
101 Nursing Admin	45,631	41,737	87,368
202 Surgery A	115,850	52,150	168,000

Interpretation: This file was also a matrix of cost centres by operating costs. The above example shows three types of costs — labour, supplies and total operating costs by cost centre.

INPAT:

187 Medical A	1.00
198 Radiology B	0.78
212 Nuclear Medicine	0.45
310 Speech Pathology	0.23

¹ There is a sixth file which enables the allocation of cost-centre costs to individual DRGs via the application of a series of service weights. In the first run, this file was not manipulated by hospital personnel and hence is left out of the description here. Its workings, however, are discussed in the paper.

Interpretation: This file asked the user to set down the in-patient fraction, that is, the proportion of service provided by each final cost centre that related to inpatient activity only.

These five files are listed in some detail to show how the HOSPITAL embedded in the YCM has a distinctive architecture. It was made of three types of cost centres/pools — overhead, final and those classified as irrelevant/the too-hard basket. Only cost centres of the first two types concerned the HOSPITAL. These were conceived of as producing three main types of products — in-patient care (which had 467 product lines called DRGs), out-patient care, and others such as research and education. **The Model's HOSPITAL was only designed to analyse in-patient care production. As a result, all other types of production had to be removed from consideration.**

The process of fabricating the 467 in-patient care product lines was as follows. First, overhead cost centre costs were allocated to final cost centres based on estimates of resource consumption. Next, estimates were made of the proportion of final cost centre costs that related to the production of in-patient care. Finally, the in-patient services of final cost centres were divided into several types — medical, nursing, pharmaceutical, pathological, etc., weighted and costed by product line. For instance, assume that Final Cost Centre 85 produced only DRGs 1, 2, and 3 and had incurred \$60,000 of nursing costs. A set of American service weights indicated that DRGs 1, 2 and 3 consumed nursing resources in the ratio 1 : 2 : 1. The \$60,000 of nursing costs would then be allocated to DRGs 1–3 in accordance with this ratio. And by manipulating the Model, one could then obtain a series of cost reports of, for example, the average cost of each DRG or the average cost of each cost centre.

Not only did the HOSPITAL possess a particular structure and set of production processes, it embodied a specific set of images of patients and hospitals. A patient was not pictured as an individual who had been diagnosed as suffering from a particular sickness. Instead he/she was viewed as an exemplar of a class of diagnoses

(say, fractured femurs). Since this class constituted a product line (DRG 325), the patient became a product of this type. By extension, hospitals were depicted as multiproduct firms and health-care provision as a process of manufacturing 467 product lines.

This architecture, set of production processes and culture made the YCM into a potentially powerful rhetorical and representational device. **First**, the Model was extremely mobile and relatively immutable. It fitted on a single computer disk which operated on a standard personal computer. Also the licence fee for using the software was modest. Thus, copies of the Model could be reproduced cheaply and quickly installed in all trial sites. There was no need to purchase expensive hardware.

Second, the YCM had the ability to reduce the confusion and complexity of human activities within a hospital into a set of finite, visual inscriptions in two-dimensional space. Patients, doctors, nurses, cooks, cleaners and their diverse activities (operating, writing care plans, freezing meals, mopping floors) were now re-presented as a set of inscriptions that collectively made up the Model's HOSPITAL. This re-presentation was achieved not by a cumbersome manipulation of three-dimensional objects but by handwork, by using the accountant's two-dimensional images of the hospitals. That is, the YCM took the hundreds of existing accounts in the hospitals' general ledgers and recombined them into a new mobile called the HOSPITAL. There was also little need to collect additional information that was not already contained within existing hospital databases.

Third, owing to the use of number, formulae and standardized units of quantification (for example, the dollar value of resources expended) to represent the activities of hospitals, the YCM could be used to re-present all three trial hospitals. Indeed, any hospital anywhere in the world at any time could, theoretically, be simplified and made in the image of the hospital. The software was immutable and non-perishable.

Fourth, the YCM offered a concept of products and product costs that was stacked and

supported (both in effort and money terms) by many prestigious individuals, groups and institutions. The group of 467 DRGs used by the Model had a distinguished lineage, being a refinement of an earlier group of 383 created in the 1970s. Both groups of DRGs were manufactured at Yale University via a complicated computerized statistical procedure (see Health Care Financing Administration, 1983, for more details). Their creation involved a stratified sample of 1.4 million medical records chosen from 325 American hospitals, the set of 10,171 ICD-9-CM diagnosis codes, panels of doctors and the development of a specialized, computerized partitioning algorithm called AUTOGRP. DRGs were also supported by auxiliary software that had been purpose-built by multinationals to enable swift and accurate encodification of medical record inscriptions into a DRG number (a version of this software had been distributed to all trial hospitals). Further, since 1983, DRGs had formed the heart of a Prospective Payment system in the world's most technologically advanced and expensive health-care system (the United States). While the evidence about the effects of that reimbursement system were ambiguous (Chua & Degeling, 1993), they could be read as indicating success (defined as effective cost control). In short, *prima facie* DRGs appeared as the end-point of a cascade of inscriptions all carefully combined. Many traces had been expertly made into few. And to question them would have required mounting a battle against a complex system of spokespersons, both Australian and overseas, who ranged from academics, consultants, hospital professionals to government bureaucrats, etc.

Fifth, the YCM had the ability to generate summarized comparisons in the form of visual tables and reports such as Table 1.

Table 1 shows a sample tabulation of twenty DRGs by different sites. This single piece of paper attested to the potential persuasiveness of the YCM at several levels. It showed that the Model would not overload the reader with too much information. The centre of calculation (the Model) had already processed many diverse inscriptions over numerous cycles to

produce space-time *compressed summaries*. One number spoke for and represented whole distributions and frequency counts of many different elements — the patient's age, length of hospital stay, type of treatment, etc. And the table seemingly stood at the end of a torrent of prior inscriptions and appeared as the tip of a mountain built of many facts. Such visualization further enabled comparisons across enormous stretches of space and time. Now, not only could the trial hospitals be placed on a single horizon, so could a sample of South Australian and American hospitals. And this vision did not necessitate travel to South Australia or the United States. All one needed were computer printouts of DRG costs from hospitals in these faraway places and a YCM that permitted cycles of accumulation. Information could also be produced not only for a single year but for many. And perhaps most important of all, the evidence was quantitative not qualitative; it was not based on opinion, prejudice or subjective judgement but consisted of hard, visible numbers.

Finally and perhaps most important of all, the image of patients, hospitals and health-care provision embedded within the HOSPITAL appeared to complement the new economic rationalism of the 1980s and the organizational structures being implemented by administrators at Hospitals C and E. As pointed out earlier, both hospitals were in the process of setting up clinical modules/directorates. These organizational units were easily translated into the language of the HOSPITAL. Essentially directorates were productline divisions that would be managed by product managers (clinical directors) who were financially accountable to the hospitals' general managers. The financial information required by each directorate for budgetary and control purposes could easily take the form of DRG variance reports which would compare the efficiency of the same type of clinical directorates in different hospitals or the same division over time.

Numerous though these advantages were, the YCM had yet to work in practice. The Cost Modelling Group faced two tasks. First, it had

TABLE 1. Cost per discharge by DRG for consortium teaching hospitals, South Australian hospitals and U.S. Medicare*

Drg No.	DRG name	Hosp. A 1988-89		Hosp. B Jul89-Dec89		Hosp. C Jul89-Dec89		Hosp. D 1988-89		Hosp. E 1989-90		Hosp. F 1989-90		Hosp. G 1989-90		S.A. Hosps 1988-89		U.S. Medicare 1989	
		Total disch	\$	Total disch	\$	Total disch	\$	Total disch	\$	Total disch	\$	Total disch	\$	Total disch	\$	Total disch	\$	Total disch	\$
1. CRNIOT,A>17~TR	200	11,035	64	10,161	18	7,584	301	10,134	3	11,169	205	10,981	4	5,552	313	8,967	11,829		
2. CRNIOT,A>17+TR	75	15,460	14	15,743	3	25,729	58	15,602	3	17,209	21	15,465	0	0	105	17,536	14,045		
3. CRANIOTOMY,A<18	25	13,590	2	12,862	2	9,863	22	13,421	0	0	14	8,922	135	6,444	24	11,485	9,899		
4. SPINAL PROCEDURES	49	16,064	11	7,908	6	4,339	27	6,420	1	4,649	38	12,484	27	6,363	83	7,896	9,103		
5. XTRACRL,VASC,PR	72	6,023	25	5,787	3	6,442	51	5,040	2	3,916	59	6,964	0	0	87	5,145	5,286		
6. CARPL TUNNEL,RLS	48	1,501	19	1,904	21	1,375	22	1,720	16	2,099	51	2,301	0	0	166	898	1,525		
7. PRPH/CR NR+OT+CC	24	18,064	6	9,605	0	0	18	9,472	2	37,347	10	6,868	4	7,769	66	6,193	9,644		
8. PRPH/CR NR+OT+CC	101	2,790	17	3,181	11	2,500	81	2,394	27	3,574	117	3,118	49	1,830	213	1,980	2,521		
9. SPINAL DISINJ	41	9,845	5	4,065	3	4,171	5	5,994	1	1,422	49	21,909	15	1,820	34	6,940	4,361		
10. NRVS SY NEOPL+CC	19	6,507	7	4,405	4	3,225	40	3,668	14	5,425	8	4,457	13	1,034	64	3,623	4,221		
11. NRVS SY NEOPL+CC	56	2,722	5	2,224	4	1,388	60	3,196	31	2,626	13	3,205	69	1,382	63	1,870	2,663		
12. DEGENR NERVS DIS	68	4,703	25	4,364	18	3,355	154	3,493	17	4,422	64	5,079	32	1,213	237	3,668	3,153		
13. MT SCLER/CRBL,AT	21	2,765	7	3,215	0	60	3,803	2	4,790	51	3,495	2	2,650	61	4,669	3,148			
14. SPEC.CBRVSC,DIS	313	6,025	83	5,470	126	4,376	275	5,769	192	6,173	110	8,130	14	3,691	1,151	3,889	4,188		
15. TRANS ISCHEM,ATT	156	2,066	33	2,787	32	1,904	78	4,621	38	2,656	33	2,848	0	0	347	1,676	2,148		
16. NONSP CBV DIS+CC	7	4,116	5	4,206	0	5	5,095	5	6,350	1	4,896	1	1,385	24	2,787	3,566			
17. NONSP CBV DIS,CC	13	2,766	2	3,361	2	1,650	11	2,703	0	0	4	3,569	0	0	34	1,718	2,138		
18. CRAN/PRPH DS+CC	7	4,917	12	6,012	3	3,240	25	5,717	4	2,642	12	3,430	0	0	118	2,638	3,251		
19. CRAN/PRPH DS,CC	88	3,881	37	2,320	12	1,538	273	3,222	16	3,516	91	2,638	9	3,367	305	934	2,064		

NB. Data are experimental and are subject to errors and omissions.

to learn how to be competent constructors of the HOSPITAL. Producing numbers, however, was easy. A second, more demanding job would be the production of tables like Table 2 that were convincing and credible to others. To accomplish this task, the Group had to first convince themselves that the numbers were credible. More specifically, the hospital-based actors within the Group had to learn to be as faithful as the University's DRG experts. As indicated above, the emergence of this hospital-located group of believers is essential, for a representational device, no matter how astutely designed, requires human support. A piece of software is weak if left to speak for itself. New inscriptions need spokespersons — people who genuinely believe in their utility and final, comparative advantage over competitors; advocates who would be able and willing to continually make the inscriptions pass tests posed by human and non-human enemy forces. This proposition in no way questions the integrity or ability of believers. Neither is it meant to imply that faith is blind or that believers strategically lie about the efficacy of a new technology or that those who are persuaded are dupes. It merely points out that the willingness of someone to do battle on behalf of an untried technology has ultimately to be based on faith because one does not know in advance that one will eventually win.

Following the faithful: persuading and converting

How did the Cost Modelling Group seek to overcome the many enemies that threatened the workability and credibility of the YCM? What were the strategies used and where were the victories, compromises or defeats to be found? One of the Group's earliest advantages was that it began life as a protected species. Common-sense had dictated that its membership should only include hospital-based staff who were familiar with the financial and patient information systems of their hospitals. As a result, there were no sceptical debunkers in the Group; only a core of middle-level labourers assigned the task of fabrication by their senior managers.

Also, the Group (and in particular the hospital personnel) perceived themselves to be novices and constituted their activities as a tentative first run, trial, or developmental exercise. As a result, they came together, expecting teething problems and errors but encouraged by one another, resolved to deal practically with those issues that were feasible and most urgent. In one of the earliest costing workshops held in November 1989, the Cost Modelling Group was encouraged by an external costing consultant R (who had been invited by the University) in the following manner:

First time round, we just want to learn about it [the Model], understand it, see how it works. Or do you want to be upfront and use the data (straightaway)? Our hospitals wanted to go gently, gently. We wanted to get the clinicians onside and the hospitals were right.

Have the first stage [run] done quickly, get hands-on experience within 3–4 weeks. Then generate some preliminary reports, then have another look at the data and the allocation statistics. Get it done quickly otherwise you will have to start from scratch again.

Just start playing with the Model, you can fine-tune it later.

You have the ability to go back and massage the data again. So whether you put things in this account or not is not material at this stage because the numbers are so small. In the final washout it really isn't going to matter.

In effect, different concepts of time were being evoked by the consultant to persuade. Emphasis was placed on learning to play "quickly", with the ability to "return" to the Model, with dealing with the "most urgent" problems. Such talk constructed two notions of time. Time as a scarce commodity did not exist within the HOSPITAL; the Model was always there, ready to give the "right" answers if "correct" data were appropriately entered. There were no restrictions at the HOSPITAL, it could be constantly revisited. Time within the Group, however, was limited; there were project deadlines, government agencies and senior managers to account to, other work roles to be accomplished. Besides, this was not the only difference between the world of the HOSPITAL and those of the hospitals. There

were numerous other gaps. As one accountant pointed out, "our cost centres were not set up to do cost modelling". Hospital E, for example, initially had two sets of cost centres that did not match; there was one set for salaries and wages and another for supplies. Also, across the hospitals, different labels were being attached to the same cost centre or the same label was being used for different cost centres. Further, the Model HOSPITAL initially could only process input data from a total of 186 cost centres. This limitation meant that trial hospitals (which had, on average, 300–400 cost centres) were encouraged to combine cost centres, particularly overhead centres that were allocated to final cost centres using identical cost drivers. In addition, information with respect to appropriate cost drivers also varied widely between cost centres and hospitals.

How were these gaps to be filled? Which should be attacked first? In answering these questions, the Group evolved a range of simple, everyday decision rules. First, it fixed fixable problems. The HOSPITAL was redesigned so that it was capable of processing information from more than 186 cost centres. Second, Group members considered the materiality of the gap. As Consultant R argued above, errors might not matter in the "final washout". Materiality, however, was not a constant notion and was defined in at least two different ways. An item was considered immaterial if it did not constitute a large proportion of the hospital's revenue or expenditure. Trust funds which were used to finance in-patient care production were thus excluded partly on this basis. Besides, each hospital had several hundreds of these trust accounts and their analysis was considered not "cost-effective". Materiality, however, was at times subordinated to another aim — acting practically. This happened on at least two occasions. Capital expenditures were not immaterial items. They made up a sizeable proportion of a hospital's expenses. However, the Group excluded such expenses from consideration — primarily because there was no method by which they could easily trace consumption of capital assets by individual

product lines. And thus like the designers of the American Prospective Payment System, the Group decided to put all items labelled "capital expense" in the "material but too-hard basket". A similar compromise was made with respect to service weights — the conversion factors used to allocate the costs of final cost centres to DRGs. These factors were to represent the proportion of the total value of the resources of each cost centre that were consumed by each DRG. There were, however, no Australian service weights. As a consequence, American (the so-called Maryland) service weights were substituted. This strategy implied that an Australian product line (say, DRG 302) consumed the same relative amounts of resources as an American DRG 302. The Group accepted that such an assumption of identical relative resource consumption might not be valid since differing treatment protocols could exist between the two countries. Professor E had further reservations about the American weights, "... the way Nursing is charged in the States is very arbitrary. It is not a very logical basis. The ICC (Intensive Coronary Care) weights are also very inaccurate. And there are only eight service weights" (Cost Modelling Group Meeting, 18 March 1991). Despite these misgivings, the Group accepted that there was no alternative but to use these American weights. Not to have done so would have meant abandoning the YCM and the Group was not ready to surrender.

A third decision rule was to seek consistency both within and across hospitals. Thus, where a hospital had dissimilar lists of cost centres, these were redrawn so that the hospital had one consistent map of its centres. Efforts were also made to standardize cost centre definitions across the hospitals, to collect data for the same time period and to use the same version of auxiliary software. Further, as indicated above, collective decisions were made to derive consistent rules for the representation of controversial objects, such as trust funds, capital expenditure, hospital teaching and research costs (these were factored out because the HOSPITAL only produced in-patient care), treatment of supply, drug, nursing and medical officer costs, etc.

Consistency, however, like materiality was a slippery notion. It did not only mean that a Group decision rule was consistently applied for the same activity in all hospitals. By the end of the first run, the concept had become associated with credibility because credibility came to be defined as generating valid comparative data:

Meeting of the Cost Modelling Group, 18 March 1991

Professor E: We are interested in the credibility of the numbers. It is not helpful to have different methods of calculation. We could be criticised for variety.

Hospital administrator: There is always some degree of uncertainty. The numbers are always subject to some limitations, always. But these guesstimates from clinicians ... When are we getting some standards from Canberra for product costing in hospitals? What about standard cost centre definitions. I can't wait till we get some standard from on-high.

Comparative cost reports have already been used to set one hospital against another. They are being used by the Department (State Health) to define relative differences ...

Another hospital administrator: But how comparable is the data from the first run? Our costing methodologies were so different. How will we know how to interpret the numbers? ... We need to trace back — what's in the cost centre? Separate out components that go into Wards (meaning ward costs). If we know the principles used by each hospital, then ...

Professor E: Before we can undertake these kinds of comparability, we need basic comparability about how costs are assigned ...

University computer specialist: But if we need consistency at every level of the trace back, we need a heroic achievement. I think it is important that totals are consistent ...

But by late May, even the computer specialist felt consistency at every level was important:

Meeting of the Cost Modelling Group, 28 May 1991

Computing specialist: We need some standardization of the data in the numbers. What are the elements included in the OT (Operating Theatres) costs? Porters? Are they in OT or Transport? What about clerk costs? Are CSSD (Sterile Supplies) charged back to the surgeon? Are prostheses charged to OT or wards? I need a list of how people have done it.

As the field quotes indicate, these concerns about credibility arose because (a) state officials were beginning to interpret the comparative numbers in particular ways, and (b) the Group knew that despite their attempt at consistent fabrication, the output of the first run contained numerous inconsistent treatments. Each hospital, for example, calculated their in-patient fractions differently. Hospital E essentially relied on estimates provided by professional staff, Hospital C used a particular formula for weighting some of their staff estimates while Hospital N used a different formula again for their calculations. Drugs at Hospital N were costed to individual wards and thus their cost centre labelled "Pharmacy" did not contain material costs. This practice was not always adopted by the other hospitals (Minutes of the Cost Modelling Group, 18 March 1991). There were also differences in the ways that hospitals rolled up and combined cost centres (Minutes of the Cost Modelling Group, 18 March 1991). These gaps continued to trouble the Group:

Cost Modelling Meeting, 18 March 1991

Professor E: Isn't the debate about the type of activity that is going on ... Rheumatology may be a different activity or Rehab (Rehabilitation). Rehab in spinal units is very different and this matters when hospitals roll (that is, combine cost centres with the same cost drivers) them up differently ...

Hospital administrator: Yes, like our Rheumatology. We really don't have Rheumatology because it is done at the (XYZ) Home and we put Rheumatology into General Medicine. Our Rheumatology would be very different to your (Rheumatology) department.

Cost Modelling Meeting, 24 April 1991

Professor E: We should have finer distinctions as the same cost centre may actually do different things. For example, Pharmacy, it may provide tertiary or secondary services. We just have one Pharmacy cost centre, but they provide essentially different services.

Hospital administrator: At our hospital we have a different method of calculating theatre costs. Some costs get allocated back to medical or surgical specialty by surgeon, also some VMO (visiting medical officer) costs, etc.

Computer specialist: You should let me know now what your different methods mean so that when I'm rolling up the cost centres, I know what I'm rolling together.

Hospital administrator: Some porters are just dogsbodies. Portering could be cleaning. A patient trolleyman is a porter. A general dogsbody is a porter. Our porters clean. Women can't clean for more than 6 hours, so our porters do it. We put porters in Cleaning. In the first run, they got applied the Nursing Weight. Now it appears they may be doing some non-in-patient work as well. . . And nurses, they should get multi-rated. Like we cost them to Ward 2 but they work 6 hours on Ward 5 but Ward 5 doesn't get that costed to them.

At the end of the first run then, the labourers had made a number of compromises of material items, differences remained and the data were inconsistent and inaccurate in numerous aspects. Why was the Group not sufficiently concerned to consider abandoning the Model? Why did they continue to negotiate with it?

I am not entirely sure of the answer to this important question. Some easy ones suggest themselves. The Group was largely composed of lower-level organizational members with little influence. Given that they had been instructed by their superiors to help develop a set of numbers and their hospitals had participated voluntarily in the consortium, they would have persisted with the Model whatever the difficulties encountered. Or the Group did not really understand the arithmetic or the statistics involved and was content to be led by university-accredited experts.

Giving superior pressure as an explanation is inadequate for a number of reasons. First, it assumes that the lower-level hospital-based members of the Cost Modelling Group were incapable of autonomous judgement (a problematic assumption) and knew that their superiors wanted DRG-based accounting from the start. Earlier, I had indicated that the interest of administrators in the University's projects was ambivalent and differed between administrators and over time. Administrative commitment, therefore, was by no means a foregone conclusion. This is not to deny that the continual support of senior administrators after the release of preliminary data did help to sustain the

network. But administrators were only one link in the chain and the same question could be asked at this level — why did they not abandon the Model? Additionally, why was superior pressure not outweighed by the anticipated opposition of doctors? Also, while hospital-based personnel were clearly unfamiliar with the intricacies of the YCM when they began, they learnt much during the first run and became quite critical of other costing consultants "peddling quick and dirty applications of DRG-based accounting". So, the answer(s) to "why no surrender" needs to be more complex and there appear several aspects to it.

First, nobody else within the Commonwealth Casemix programme was considering surrender. Not the Commonwealth, nor the many other workers within the casemix community located in universities, research institutes, hospitals and departments of health all over the country. Indeed, Commonwealth bureaucrats seemed more determined and there was talk of financing projects that would yield standardized knowledge; for example, a common version of the YCM that was more user-friendly. There was also the possibility of several future developments — standardized cost centre definitions, common formulae for the calculation of in-patient fractions and Australian cost weights. As a consequence, the Group's errors seemed temporary, justified on the basis that "one had to learn to walk before one could climb mountains". The actors were therefore content, able to defend their compromises along the following lines: they had struggled with the inadequacies of their hospitals, been guided by well-known experts and done what was best given constraints. The future could only bring continuous improvement, better quality data, more standardization and fewer errors. In the meantime, their preliminary data would not be used to actively manage their hospitals and the first run had constituted a useful learning experience.

There was also a sense in which the collective labour of producing the numbers instituted a certain solidarity and loyalty. The Cost Modelling Group had battled against numerous "enemies" (inappropriate database structures,

software limitations, uncommitted others), acquired a new language and explored the intricacies of a new territory. This it had achieved together. Now they too were experts, who took pride in their work, who wanted to get it right and who were prepared to collectively defend their output against new enemies ("sloppy" consultants offering quick fixes, uncooperative doctors, etc). However, although they had acquired a level of expertise, the Group was much aware of the limitations of their first run.

It freely acknowledged that their data were tentative and subject to a number of measurement and sampling errors. However, not only was this public confession of inadequacy framed within the context of a better, more consistent, future, it became a source of competitive strength. In one of the Cost Modelling Group presentations, the University Project 1 team rhetorically asked "What is the true cost of a DRG?". To this they replied that true costs were "myths". Even if they did exist, it would not be cost-effective to discover them. True costs were thus "unknowable" and the YCM only attempted to "simulate reality" and generate estimates of costs that were useful for specific and defined purposes. Hence, the goal of the Group was not to "reveal" true costs but consistent, good enough approximations. Such an aim afforded a comparative advantage against rivals such as clinical costing, which was "relatively expensive to implement", and required the setting up of computerized feeder systems which produced a "greatly increased volume of activity and cost data about individual patients". Also, in places where clinical costing had been attempted, "there would normally be a delay of several years before the required data are generated and cost estimates by DRG can be produced" (University document, 1990). By contrast, the YCM "did not require the collection of additional service utilization data about individual patients" (University document, 1990). Competitors were thus found wanting. In any event, they were seldom serious threats as the Cost Modelling Group did not calculate costs using different costing technologies and then compared results. In short, from the viewpoint of

the Group there appeared few viable alternative forms of casemix accounting.

Furthermore, the types of reports (see Table 1) generated by the Cost Modelling Group placed the three hospitals and others in a hitherto unseen matrix of visibility. Listed down the left-hand column were lists of products which could be ranked in order of relative costliness and volume of output. Across the top were hospitals that could similarly be ranked in order of relative cost efficiency. These montages (Amann & Knorr-Cetina, 1988) included items of "substantial cost differences" that were first highlighted by the University team:

DRG 49, Major head and neck procedures, Hospital E. There is no apparent reason why the cost in this hospital is higher than in the others.

DRG 90, Simple pneumonia and pleurisy, age > 17, without CCs (Complications and Comorbidities), Hospital E. There is no apparent reason for the high cost in this hospital relative to the remainder.

DRG 172, Digestive malignancy with CCs, Hospital E. The average length of stay for the DRG is substantially higher in this hospital.

DRG 370, Cesarean section with CCs, Hospital D. There is no apparent reason for the higher cost for this hospital (University document, 1991).

Such types of comparative statements had not been produced before. They seemed to be saying something new, not about the HOSPITAL but each hospital. The centre of calculation had taken the specific detail of each hospital, laid it out in an ordered field in the generalizable HOSPITAL and produced specific comment on the past activities of each hospital. This particularistic narrative appeared useful to the Cost Modelling Group, for at the very least it promoted debate, instigated some form of investigation and promised interventionist action from a distance.

Finally, the Group's resolve to persist was probably strengthened when credentialed experts told them that the YCM was built on powerful knowledges that had defeated competitors:

It is all a bit confusing (now) but the mathematics of the YCM is impeccable (Professor E).

The inpatient fractions are clearly important. . . . But the Model works by averaging out errors, both internally and across hospitals. Including errors with inpatient fractions. The Model is very robust (Professor E).

The State Department of Health (pause) . . . Due to ignorance, it didn't understand how difficult it is to try and design a patient classification system. . . . Look, if I say "I believe that I can design a better system than DRGs." That's a stupid belief. There is no data available. The practical system is DRGs. Everybody is using it and it is pretty good. . . . (And discussing alternative measures of casemix, the speaker said) Disease Staging is not used in the US and interest is dying out. And the Patient Management Categories, it is a very difficult piece of software and there is no comparable data. . . . DRGs is better than all the other garbage (Costing Consultant Dr. O).

The data is not hard to get. How much time did you spend on research? How much on teaching? People can give the answers. The problem (of obtaining input data) is psychological not technical. Crude estimates will do. Pretty easy to do as long as people are committed to knowing the answers (Costing Consultant Dr. O).

(Individual patient costing relies) upon the production of a greatly increased volume of activity and cost data about individual patients. (It is) relatively expensive to implement from scratch and there would normally be a delay of several years before the required data are generated and cost estimates by DRG produced (University document explaining DRGs).

Here is a book (Russell, 1989) that is produced independently by a prestigious research institution that shows that the US Medicare scheme (which is reimbursed prospectively using DRGS) is working very well (Professor R).

These results [statistical correlations of Australian with American data] are very reassuring in that despite all the data problems and the other sources of error discussed above, the DRG cost estimates display a pattern of consistency between each hospital (University document, 1991).

Thus, experts legitimated and contributed additional degrees of credibility to the accounting numbers produced by the YCM. They correlated the sets of DRG costs from the different hospitals with each other and with DRG costs from South Australian and American hospitals and found extremely high positive correlations (ranging from 0.74 to 0.94) which

were all statistically significant. To the experts, these consistent patterns of inscriptions were comforting for they implied that there was something out there which had been hidden but which was now being measured at least approximately. Again the future promised improvement. With better measuring instruments, this something would be captured with greater precision and clarity.

And so, by mid-1991, the Group was preparing itself for a second run with the YCM. But the impending battle seemed easier, they had gone through the territory once before and many lessons had been learnt.

CRITICAL REFLECTION

What matters of more general, theoretical interest may be gleaned from this specific story of account fabrication? At one level, it lends further support to existing arguments (Burchell *et al.*, 1980; Nahapiet, 1988) that accounting is a constitutive practice. In this case, accounting did not just passively reflect an unproblematic economic reality. Instead, it actively transformed existing representations of health organizations and their activities. Within the HOSPITAL, patients became products which consumed scarce resources, doctors — resource managers who determined resource demand, medical specialties — clinical directorates/product divisions, hospitals — multiproduct firms, and health-care provision — a manufacturing process. Administering a public HOSPITAL was seen as identical with managing a private enterprise. In addition, the Model made certain relationships possible and these appeared to cross all kinds of physical, space-time boundaries. Without the YCM and its accounting lens, there was no obvious connection between a Mr Packer in Sydney who suffered a massive heart attack, the unseen cook who prepared his meal, the medical records clerk who coded his file, the accountant who did numerous tabulations and the politician in Canberra who allocated health-care funds. With the Model Mr Packer became an example of a class of hospital products who consumed

scarce resources that reduced the “national cake”. Further, hospitals and even doctors could be placed on a single metric and compared in terms of their relative efficiency and effectiveness. Such equivalences and interpretations were relatively unknown in the trial hospitals prior to the advent of Project 1. They became more widely disseminated as the Cost Modelling Group was constituted, public lectures were held to explain DRGs and the YCM and specialist casemix conferences organized. In effect, the Model acted as a centre of calculation that directed the many types of information that had to be brought back to the centre and reduced. Fact-builders had to be instructed to look for certain cost objects and relationships, to treat certain activities as located in final cost centres and others as residing in intermediate cost centres; they had to feed in the data required in particular, preset formats and to make do with existing facilities when information was imperfect. The YCM did not passively reflect the trial hospitals, it actively reconstructed them in the image of the HOSPITAL.

At a second level, this case-study explores how accounting numbers persuade and command consent. Traditional management accounting texts have long argued that certain cost allocations (for example, of joint/common costs) possess an inherently arbitrary dimension. Why then do they persist in practice? Are decision-makers consistently uninformed as to their arbitrary nature? The answer has to be “yes” if the assumption is made that reality comes first and accounting numbers are used when they faithfully represent a pre-existing economic reality. However, if one dispenses with that assumption, cost allocations may be explained as the outcome of interests that are tied together. In my story, accounting numbers did not become usable facts because they faithfully represented reality. Indeed, fact-builders explicitly acknowledged them to be flawed approximations. Nature or reality was not the cause of the settlement of debate within the Cost Modelling Group nor of people’s willingness to persist with the Model (see Latour, 1987). Instead controversy and perseverance was

partly a function of historical interests which were managed, *inter alia*, by appealing to socially defined notions of credibility, materiality, practicality, consistency, etc. These terms were not theoretical principles that were known beforehand in determinate form. Instead, their meanings were cut out in practice. People persisted with the Model not because they knew with great certainty that, compared with rival technologies, it gave closer approximations to reality, but because they decided that the numbers generated were consistent/factual enough to hold together diverse purposes. The Commonwealth and State officials desired a rational, efficient method of resource allocation and an unspecified level of certainty about DRG cost information; hospital personnel wanted to come in on budget, better financial management, higher levels of cost consciousness among clinicians and cost information that was credible enough given resource constraints. And the University team? — it believed in DRGs, was prepared to improve the system and sought an ill-defined amount of academic credibility. All parties began with differing degrees of belief in the technology and subsequent problems required numerous decisions be made to stretch the limits of materiality and credibility to distances that could be traversed by the YCM. Despite these compromises, the end results were judged good enough for a first run. Nobody else was giving up on the Model, there did not seem many viable alternatives, the future promised only improvement. In short, account-fabrication was a decision-laden process rooted in faith and shot through with the Social. Reality did not come first but after socialized processes of making and judging representations.

The rules which were used in this process were no different from the everyday, economic rules of managing social life. Judgements were made as to which problems could be fixed quickest, which would yield more benefits for the same resource investment, which were too hard and would have to wait till the next run. Similarly, the persuasive strategies pursued essentially amounted to commonsensical efforts to marshall allies and defeat competitors in

order to defend and extend a conceptual territory. Sympathetic experts or interest groups (administrators, certain ranks of nurses) were called upon to attest (or educate) either to the necessity of informed resource management in general or to the adoption of DRG costing in particular. Software was redesigned to meet the demands of local users and hence work in more specific settings. At the same time these settings with their localized concerns were translated into habitats that were more conducive for the YCM. There was thus a process of mutual adjustment of both software and context such that numbers could be created by using everyday decision rules that explained by tying together as many settings as possible to as few elements (for example, cost drivers) as possible through as few representations as possible (see Latour, 1988b). Expertise thus appeared inextricably intertwined with commonsense or perhaps there was not much difference between expert and lay knowledge in the first place.

Third, the case-study supports recent arguments (Hopwood, 1987; Bhimani, 1993) that organizational accounting has diverse, contingent, extra-organizational origins. Apart from a handful of Commonwealth bureaucrats and academics, the need for accounting change did not present itself to network members as a glaring problem requiring immediate redress. Instead, the University's Project 1 emerged due to a particular complex of historically located interests, persuasive strategies, available experts and bodies of knowledge at a certain stage of development. Changing state involvement in health-care provision, economic recession, interprofessional struggles, the interests of academic experts, technological developments in computing and statistics and the rise of an economicistic rationality in government all contributed in some measure to the emergence of an interest in DRG-based accounting.

At the same time, the case-study also suggests that whilst the conditions of possibility and existence of accounting change may be many, not all conditions are of equal strength. Some matter more than others and are better to develop stronger metrological (Latour, 1987)

chains. In this case, Commonwealth state agencies played a central role in helping to place DRG cost accounting on the agendas of hospital administrators. It was Commonwealth officials who possessed the will to a certain truth who, waving the banner of rational resource allocation, ensured that money flowed to expert allies and spawned other converts. Given that the sample consisted of publicly funded teaching hospitals, this observation might not be of much theoretical interest. However, what the case does underscore is that whilst an analysis of government cannot be confined to the study of different administrative agencies, their interests and funding (see Miller & Rose, 1990), such analysis should not be down-played either. State agencies, after all, do distribute resources and influence many aspects of everyday life in today's societies. But as Miller & Rose (1990) and Miller (1991) point out, state rule is but one specific form of wider structures of governmentality and it may not originate directly or overtly from a single headquarters with predictable outcomes. The case illustrates this to the extent that Commonwealth interest in casemix control was uncertainly relayed through diverse networks of expert intermediaries and normalizing judges who independently developed particular regimes of truth. The Commonwealth did not invent DRGs or the YCM. It was not responsible for developments in computer technology that enabled their creation. Also, the University DRG experts started Project 1, already convinced that such a measure of casemix would enable more efficient and equitable resource allocation. They were not persuaded by the existence of Commonwealth interest. And within the hospitals, relatively little was known of DRGs and casemix accounting. Given this state of affairs, it would have been difficult to cast these protagonists (state officials, hospital personnel, academics) as acting out an explicit conspiratorial policy agenda to recast patients as products, whose consumption of scarce resources had to be continually and carefully monitored. There is, therefore, a particular contingency and arbitrariness in the plot.

At the same time, the state is not faceless either. It is not depicted as being devoid of agency or as an "invisible" (Davidson, 1991) apparatus that is shrouded by unintended, comprehensive practices of surveillance and control. Certain consequences of introducing DRG-based accounting in Australian hospitals may not have been intended or even thought of by key fact-builders. And, it may have been quite by chance that I became a member of the University Project Team. But localized interests also existed and links of a particular kind were deliberately set up. At certain levels, there were intentions of a kind. There were also people with unequal amounts of different resources — expertise, money, authority, etc., and these asymmetries have begun to give casemix accounting a larger space in Australian hospitals. But with what possible effects?

It is speculative to talk of effects because casemix accounting has not yet been implemented in Australian hospitals. Nevertheless, I would like to end by raising the question, for a similar ascendency of accounting in health-care sectors in the United Kingdom and United States has prompted recent critical comment (see Broadbent *et al.*, 1991; Chua & Degeling, 1993; Preston & Chua, 1991; Bloomfield, 1991; Cooper & Rea, 1992). These writers argue that such state-initiated attempts to manage fiscal crises through the rational use of invisible allocation mechanisms are fundamentally unjust, lead to inequitable distributions of health resources, colonize people's lifeworld through the perpetuation of a strategic rationality, fragment people's decision-making powers because of the rise of élitist experts and further disempower and make silent patients, who increasingly are represented by images made by doctor, nurse, accountant and lawyer experts. Some of these consequences may not occur here for the structure of the Australian health sector differs in important respects from that of the British or American. But the YCM does embody a managerialist "fetish of calculation" (Bloomfield, 1991) that helps construct health care not as a citizen's right but as a multi-product manufacturing process subject to the laws

of economics. This, in turn, consolidates bureaucratic tendencies to view health not as a social issue but as part of the macroeconomic problem of managing Australia's large current account deficit.

Further, in an informational society (Luke, 1989) like ours, accounting numbers such as those produced by the YCM may increasingly help create what Baudrillard (1984) calls a semiotic hyperreality — a reality that is both representation and reality. A costed DRG is not identical to a physical entity called Mr Packer who had suffered a heart attack. It is a paper construct — a result of a Mr Packer who had been codified into a set of inscriptions that were then displayed and manipulated in machines and finally printed on a page as part of a text. But the appearance of a number on a page allowed the Cost Modelling Group to talk about DRGs and their costs *as though* they were physical, tangible entities called products and this in turn made certain people (for example, patients and possibly doctors) subject to an instrumental, interventionist rationality. The numbers produced by the YCM enabled fact-builders to ask, for example, why Hospital X was taking less time to produce DRG 302 and whether this meant it was a more cost-efficient producer. In addition, although the results from the first run were considered preliminary and subject to errors of various kinds, hospital staff had begun to consider changing their existing information systems to accommodate the data requirements of the Model and to more directly monitor hitherto invisible processes; for example, time spent on certain procedures and the relationship between trust fund expenditure and cost centre productivity.

What is of concern here is that through the processes of quantification, visualization, and normalization a certain amnesia sets in when accounting information is used in organizations. Reports and tables, although titled as "subject to errors and omissions" come to be seen as windows (albeit small) on a hidden reality. The HOSPITAL is assumed to have been embedded within the hospitals all along, not *created* by the application of a certain accounting lens and the

putting in place of a whole series of relays, equivalences and spokespersons. What does this assumption obscure? The active manner in which the accounting technology *directed* the types of information that would be provided and manipulated in certain ways; the faith that supported the initial belief that the YCM is a simulation or good enough reproduction of a pre-existing reality; the fact that this reality is itself yet another set of representations (accounting costs extracted from the hospital's general ledger, patient data extracted from medical records) which are translated differently. In effect, representations (DRG costs) that refer to other representations (ledger accounts, medical records) are now accepted as approximations to the real thing. And experts gain greater confidence when one set of representations (Australian DRG costs) vary in a statistically consistent manner with another set of representations (American DRG costs). But what is so real about signs that make reference only to other signs? Is the Group not merely dealing with multiple sets of images that are repackaged under different classificatory rules, with a reality that is an already reproduced reality? Yet it is this fabricated hyperreality that is ironically being regarded as the hidden reality that is being brought to light. Luke (1989) points out that in democratic politics, a simulated hyperreality of public life emerges from public opinion polls, whose mathematical indices are substituted in practice for "the public" itself or its "silent majorities". With the YCM, one appears to have a similar simulacrum of organizational processes, a hyperreality which in simulating patients and hospitals becomes a reproduced and reproducible substitute.

At issue here is not merely some minor confusion between representation and reality or loose talk on the part of a small group of fact-builders but the manner in which discursive appeals to reality can set the parameters of debate (in economic and accounting terms) and make one set of hyperreal images more taken-for-granted and legitimate than another. For once it is accepted that a certain semiotic montage rationally, objectively approximates

the real, that closer, more consistent approximations can be delivered in the future, effort is directed at supplementing the technology by, for example, constructing a set of Australian cost weights, standardizing definitions of cost centres, and developing similar classification systems for ambulatory care. Attention is thereby deflected from questioning the very basis on which that debate was first initiated. As Chua & Degeling (1993) point out, the reproduced reality of average accounting costs, efficiency, etc., is only one of a number of possible realms of social life — there are also moral and aesthetic realities. What of them? What are the moral and aesthetic consequences of conceptualizing patients as costed products, hospitals as factories and doctors as product-line managers? When these other realities are considered, the results may be quite ironical. Chua and Degeling, for example, argue that although casemix accounting was implemented in the United States in the name of instrumental goals, it was not possible to determine whether these had been achieved. Instead accounting appeared to succeed as a moral mediator (by helping to change the moral basis of health-care debates) and as a power-knowledge that could potentially institute new forms of panopticon discipline upon doctors and patients (Foucault, 1977). An appeal to rational science, thus, did not appear to banish the hard questions. Not only was it not possible to answer the instrumental questions — have costs been decreased without affecting the quality of care, who is an efficient or inefficient producer? — issues of ethics remained — how much health care should be provided to whom at whose expense, who should be paid how much for providing what types of service and how can patients represent themselves in debates that ultimately influence what types of care they receive and how long they stay in hospitals?

EPILOGUE

The case-study finished at the end of the first run of the Model. At that point, the casemix data

generated had not been widely circulated to doctors or nurses and none of the hospitals used it for internal management purposes. The data had essentially been presented to some senior administrators. A second run of the Model was actively being planned. In mid-1992, the three Universities' projects formally finished. At present, the Commonwealth Casemix Development Programme continues to fund numerous projects and the University team² remains actively involved. In addition, one of the Big 6 accounting firms has been sponsored to develop a set of Australian service weights. It is widely expected that the Commonwealth will implement some form of

casemix funding in the near future. Nurses (at least those within the original consortium hospitals) appear to support casemix management systems believing that they will enable them to highlight their contribution and better procure resources (Degeling, 1992). Doctors, while resistant to the use of casemix reports to focus on their modes of practice, are also not campaigning actively against some form of casemix control. They are supportive of the ideas of clinical directorates and the "freedom to manage their own resources". They too perceive that casemix reports would assist in resource acquisition (see Degeling, 1992).

BIBLIOGRAPHY

- Amann, K. & Knorr-Cetina, K., *The Fixation of (Visual) Evidence*, in Lynch, M. & Woolgar, S. (eds), *Representation in Scientific Practice*, pp. 85–121 (Cambridge, MA: MIT Press, 1988).
- Ansari, S. & Euske, K. J., Rational, Rationalizing and Reifying Uses of Accounting Data in Organizations, *Accounting, Organizations and Society* (1987) pp. 549–570.
- Arrington, C. E. & Schweiker, W., The Rhetoric and Rationality of Accounting Research, *Accounting, Organizations and Society* (1992) pp. 511–533.
- Barnes, B., On the "Hows" and "Whys" of Cultural Change, *Social Studies of Science* (1981) pp. 481–498.
- Baudrillard, J., The Structural Law of Value and the Order of Simulacra, in Fekete, J. (ed.), *The Structural Allegory: Reconstructive Encounters with the New French Thought* (Minneapolis: University of Minnesota Press, 1984).
- Berry, A. J., Capps, T., Cooper, D., Ferguson, P., Hopper, T. & Lowe, E. A., Management Control in an Area of the NCB: Rationales of Accounting Practices in a Public Enterprise, *Accounting, Organizations and Society* (1985) pp. 3–28.
- Bhimani, A., Indeterminacy and the Specificity of Accounting Change: Renault 1898–1938, *Accounting, Organizations and Society* (1993) pp. 1–39.
- Bloomfield, B. P., The Role of Information Systems in the U.K. National Health Service: Action at a Distance and the Fetish of Calculation, *Social Studies of Science* (1991) pp. 701–734.
- Bloomfield, B. P. & Best, A., Management Consultants: Systems Development, Power and The Translation of Problems, *Sociological Review* (1992) pp. 533–560.
- Bloomfield, B. P., Coombs, R., Cooper, D. J. & Rea, D., Machines and Manoeuvres: Responsibility Accounting and the Construction of Hospital Information Systems, Working paper (July 1992).
- Broadbent, J., Laughlin, R. & Read, S., Recent Financial and Administrative Changes in the NHS: A Critical Theory Analysis, *Critical Perspectives in Accounting* (1991) pp. 1–29.
- Burchell, S., Clubb, C., Hopwood, A., Hughes, J. & Nahapiet, J., The Roles of Accounting in Organizations and Society, *Accounting, Organizations and Society* (1980) pp. 5–27.
- Caiden, G., Australia's Changing Administrative Ethos: An Exploration, in Kouzmin, A. & Scott, N. (eds), *Dynamics in Australian Public Management. Selected Essays* (1990) pp. 29–49.
- Callon, M., Some Elements of a Sociology of Translation, in Law, J. (ed.), *Power, Action and Belief. A New Sociology of Knowledge* (London: Routledge & Kegan Paul, 1986) pp. 196–233.
- Callon, M., Law, J. & Rip, A. (eds), *Mapping the Dynamics of Science and Technology: Sociology of Science in the Real World* (London: Macmillan, 1986).

² The author was not part of this team.

- Chapman, R., *Simple Answers, Complex Problems: Administrative Reform in Australia, 1970–85*, in Kouzmin, A. & Scott, N. (eds), *Dynamics in Australian Public Management: Selected Essays*, pp. 200–221 (Melbourne: Macmillan, 1990).
- Chua, W. F. & Degeling, P., Interrogating An Accounting-based Intervention on Three Axes: Instrumental, Moral and Aesthetic, *Accounting, Organizations and Society*, (1993) pp. 291–318.
- Clifford, J., Introduction: Partial Truths, in Clifford, J. & Marcus G. E. (eds), *Writing Culture*, pp. 1–26 (Berkeley: University of California Press, 1986).
- Clifford, J. & Marcus, G. E. (eds), *Writing Culture* (Berkeley: University of California Press, 1986).
- Cooper, D. J. & Rea, D., Struggling with Accounting and Reason: Resource Management in the National Health Service, Working paper, University of Alberta (1992).
- Covaleski, M. A. & Dirsmith, M. W., The Use of Budgetary Symbols in the Political Arena: An Historically Informed Field Study, *Accounting, Organizations and Society* (1988) pp. 1–24.
- Crichton, A., *Slowly Taking Control? — Australian Government and Health Care Provision, 1788–1988* (Sydney: Allen & Unwin, 1990).
- Daniel, A., *Medicine and the State: Professional Autonomy and Public Accountability* (Sydney: Allen & Unwin, 1990).
- Davidson, A., *The Invisible State. The Formation of the Australian State 1788–1901* (Cambridge: Cambridge University Press, 1991).
- Degeling, P., Policy as the Accomplishment of an Implementation Structure, Working paper, University of New South Wales (1992).
- Fetter, R. B. & Freeman, J. L., Diagnosis Related Groups: Product Line Management Within Hospitals, *Academy of Management Review* (1986) pp. 41–54.
- Fetter, R. B., Mills, R. B., Riedel, D. C. & Thompson, J. D., The Application of Diagnostic Specific Cost Profiles to Cost and Reimbursement Control in Hospitals, *Journal of Medical Systems* (1977) pp. 137–149.
- Fetter, R. B., Thompson, J. D. & Mills, R. E., A System for Cost and Reimbursement Control in Hospitals, *Yale Journal of Biology & Medicine* (1976) pp. 123–136.
- Foucault, M., *Discipline and Punishment. The Birth of the Prison*, Sheridan, A. (transl.) (London: Penguin Books, 1977).
- Foucault, M., in Gordon, C. (ed.), *Power/Knowledge. Selected Interviews and Other Writings 1972–1977*, (Brighton: Harvester Press, 1980).
- Forester, J., On Fieldwork in a Habermasian Way: Critical Ethnography and the Extraordinary Character of Ordinary Professional Work, in Alvesson, M. & Willmott, H. (eds), *Critical Management Studies* (London: Sage, forthcoming).
- Freeman, J. L., Fetter, R. B., Newbold, R. C., Rodrigues, J-M. & Gautier, D., Development and Adaptation of a Hospital Cost and Budgeting Method for Cross-National Use, *Journal of Management in Medicine* (1986) pp. 38–57.
- Gardner, H. (ed.) *The Politics of Health: The Australian Experience* (Melbourne: Churchill Livingstone, 1980).
- Gilbert, G. N. & Mulkay, M., *Opening Pandora's Box. A Sociological Analysis of Scientist's Discourse* (Cambridge: Cambridge University Press, 1984).
- Hacking, I., *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science* (Cambridge: Cambridge University Press, 1983).
- Health Care Financing Administration, *Grants and Contracts Report; The New ICD-9-CM Diagnosis-Related Groups Classification Scheme* (Baltimore: United States Department of Health and Human Service, 1983).
- Hicks, R., *Rum Regulations and Riches: The Evolution of the Australian Health Care System* (Sydney: The Australian Hospitals Associations, 1981).
- Hines, R. D., Financial Accounting: In Communicating Reality, We Construct Reality, *Accounting, Organizations and Society* (1988) pp. 251–261.
- Hopper, T. & Armstrong, P., Cost Accounting, Controlling Labour and the Rise of Conglomerates, *Accounting, Organizations and Society* (1991) pp. 405–438.
- Hopwood, A. G., The Archaeology of Accounting Systems, *Accounting, Organizations and Society* (1987) pp. 207–234.
- Knorr-Cetina, K., *The Manufacture of Knowledge* (Oxford: Pergamon, 1981).
- Kouzmin, A. & Scott, N. (eds), *Dynamics in Australian Public Management: Selected Essays* (Melbourne: Macmillan, 1990).

- Latour, B., Give me a Laboratory and I Will Raise The World, in Knorr-Cetina, K. D. & Mulkay, M. (eds), *Science Observed: Perspectives on the Social Study of Science*, pp. 141–170 (London: Sage, 1983).
- Latour, B., *Science in Action. How to Follow Scientists and Engineers Through Society* (Cambridge, MA: Harvard University Press, 1987).
- Latour, B., Drawing Things Together, in Lynch, M. & Woolgar, S. (eds), *A Representation in Scientific Practice*, pp. 19–68 (Cambridge, MA: MIT Press, 1988a).
- Latour, B., The Politics of Explanation: An Alternative, in Woolgar, S. (ed.), *Knowledge and Reflexivity. New Frontiers in the Sociology of Knowledge*, pp. 155–176 (London: Sage, 1988b).
- Latour, B. & Woolgar, S., *Laboratory Life: The Social Construction of Scientific Facts* (London: Sage, 1979).
- Lehman, C. & Tinker, T., The "Real" Cultural Significance of Accounts, *Accounting, Organizations and Society* (1987) pp. 503–522.
- Luke, T.W., *Screens of Power. Ideology, Domination and Resistance in Informational Society* (Urbana: University of Illinois Press, 1989).
- McMahon, L., Fetter, R. B., Freeman, J. L. & Thompson, J. D., Hospital Matrix Management and DRG-Based Prospective Payment, *Hospital & Health Services Administration* (1986) pp. 62–74.
- Miller, P., Accounting Innovation Beyond the Enterprise: Problematizing Investment Decisions and Programming Economic Growth in the U.K. in the 1960s, *Accounting, Organizations and Society* (1991) pp. 733–762.
- Miller, P. & O'Leary, T., Accounting and the Construction of the Governable Person, *Accounting, Organizations and Society* (1987) pp. 235–266.
- Miller, P. & Rose, N., Governing Economic Life, *Economy and Society* (1990) pp. 1–31.
- Nahapiet, J., The Rhetoric and Reality of an Accounting Change, *Accounting, Organizations and Society* (1988) pp. 333–358.
- Nencel, L. & Pels, P. (eds), *Constructing Knowledge* (London: Sage, 1991).
- Ong, W. J., *The Presence of the Word* (New Haven, CT: Yale University Press, 1967).
- Ong, W. J., *Interfaces of the Word* (Ithaca, New York: Cornell University Press, 1977).
- Opit, L., Wheeling, Healing and Dealing: The Political Economy of Health Care in Australia, *Community Health Studies* (1983) pp. 238–246.
- Painter, M., *Steering the Modern State* (Sydney: Sydney University Press, 1987).
- Palmer, G. R., The Economics and Financing of Hospitals in Australia, *Australian Studies in Health Administration* (1987) pp. 1–21.
- Palmer, G. R. & Short, S., *Health Care and Public Policy: An Australian Analysis* (Melbourne: Macmillan, 1989).
- Poster, M., *The Mode of Information. Poststructuralism and Social Context* (Chicago: University of Chicago Press, 1990).
- Preston, A. & Chua, W. F., The Diagnosis Related Group Prospective Payment System and the Tragic Choice of Rationalising Health Care to the Elderly, Paper presented at the Third Interdisciplinary Perspectives in Accounting Conference, Manchester (8–10 July 1991).
- Preston, A. M., Cooper, D. J. & Coombs, R. W., Fabricating Budgets: A Study of the Production of Management Budgeting in the National Health Service, *Accounting, Organizations and Society* (1992) pp. 561–593.
- Pusey, M., *Economic Rationalism in Canberra* (Cambridge: Cambridge University Press, 1991).
- Rees, S. J. & Gibbons, L., *A Brutal Game: Patients and the Doctors' Dispute* (Sydney: Angus & Robertson, 1986).
- Robson, K., On the Arenas of Accounting Change: The Process of Translation, *Accounting, Organizations and Society* (1991) pp. 547–570.
- Robson, K., Accounting Numbers as "Inscription": Action at a Distance and the Development of Accounting, *Accounting, Organizations and Society* (1992) pp. 685–708.
- Roes, S. J. & Gibbons, L., *A Brutal Game: Patients and Doctors' Dispute* (North Ryde: Angus & Robertson, 1986).
- Rose, N., Governing by Numbers: Figuring out Democracy, *Accounting, Organizations and Society* (1991) pp. 673–692.
- Russell, L., *Medicare's New Hospital Payment System. Is it Working?* (Washington, DC: The Brookings Institution, 1989).
- Scott, P., Levers and Counterweights: A Laboratory that Failed to Raise the World, *Social Studies of Science* (1991) pp. 7–35.
- Shapin, S., Following Scientists Around, *Social Studies of Science* (1988) pp. 533–550.

- Thompson, G., Is Accounting Rhetorical, Luca Pacioli and Printing? *Accounting, Organizations and Society* (1991) pp. 572–599.
- Thompson, J. D., Averill, R. F. & Fetter, R. B., Planning, Budgeting and Controlling – One Look at the Future: Case-mix Cost Accounting, *Health Services Research* (Summer 1979) pp. 111–125.
- Thompson, J. D., Fetter, R. B. & Shin, Y., One Strategy for Controlling Costs in University Teaching Hospitals, *Journal of Medical Education* (1978) pp. 167–175.
- Wickings, I., Planning Clinical Budgets Using DRGs, in Bardsley, M., Coles, J. & Jenkins, L. (eds), *DRGs and Health Care*, 2nd Edn, pp. 147–159 (London: King Edward's Hospital Fund for London, 1987).
- Yeatman, A., Public Management and the Australian State in the 1980s, *Australian Journal of Public Administration* (1987) pp. 339–356.