Fact or Fraud?

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Abstract

Epidemic - a widespread occurrence of an infectious disease in a community at a particular time - outbreak, scourge, plague. About 1976 concerns emerged in Australia about the potential for new technologies to seriously reduce employment. The debate reached a peak in 1978 when industrial action taken by the Australian Telecommunications Employees Association (ATEA) threatened to shut down the Australian telecommunications network. From 1975 growth in calls to the directory assistance service rocketed as did the related operating costs. To maintain the quality of customer service and contain operating costs, Telecom began to deploy a nation-wide computer- based directory assistance system (DAS/C) from 1982. In 1983 an unexpected medical syndrome arose in one of Telecom's directory assistance centres. Over the next three years, the syndrome rapidly spread through other directory assistance centres, other areas of Telecom and some areas of the public service. The media, academia, legal practitioners and others attracted to the "problem" generally accepted the

union view that the DAS/C system was the cause and the syndrome was labelled Repetitive Strain Injury (RSI). Medical costs and compensation claims mounted reaching $130 million in 1989. While RSI has become a well-known syndrome over the last 40 years, no outbreaks of the extent and severity experienced in Telecom appear to have been recorded over that period anywhere in the world. There still appears to be little scientific evidence of the link between the injury of the reported scale and the workplace. This is the story of the rise of the RSI phenomena in Telecom over the period 1983-86.

Introduction

The Australian Telecommunications Commission (Telecom) was established in 1975 as a government owned business with open-ended regulated monopolies; building and operating the national telecommunications network and the sale, rental and maintenance of certain customer premises equipment. These monopolies allowed Telecom to maintain a share of the Australian telecommunications market approaching 90%.

The original intention was that the new Telecom operate on "commercial business principles", with personnel and other employment policies, including industrial relations, suited to the new business and independent of the Public Service Board. In fact, Telecom was implemented with minimal commercial experience, and the personnel and other employment policies, processes, and culture of the public service were retained.

The combination of the open-ended monopolies, the public sector legacy and policies, the public service culture, and the public service unions, unrestrained by competition, was to prove a major obstacle to innovation and progress in Telecom. Change was introduced within these limitations and within the management's preference for change on its own terms with minimal risk and, during the 1980's, within the tolerance of the Labor Government.

This background is crucial to understanding the sudden, unexpected, intense and prolonged appearance of RSI in Telecom and its far lower, sporadic appearances elsewhere.

Disclosure

This paper provides a reflective historical paper about the RSI occupational health and safety issue and a case study of the effects of concerns about RSI in Telecom in the first half of the 1980's.

The paper is supported by a number of records of the period, including business plans, business cases, and trading statements, as listed under "References". The records are incomplete but are sufficient to support the points made. A number of these records no longer exist or are not easily accessible such as those in the archives of the Australian Telecommunications Commission and Telstra.

The author has no qualifications, training or experience as a physician or in the fields of medicine, physiotherapy, or occupational health and safety. Opinions and judgments are within this context and are the author's unless otherwise stated. Those of Telecom are expressed using standard private sector criteria including growth, market share, customer service and profit, rather than using public service criteria.

The Directory Assistance Service

People needing a local telephone number to make a call could obtain the number from the local published directory or, if a local directory was not available, from the directory assistance 013 service. People needing an out-of-area number called the directory assistance. 0175/0171 service. Directory assistance employed operators, mostly women, to provide these two number services.

During the year, in a telephone service area, new services were connected, some existing services cancelled, and some services changed, each generating a change in the directory listing information - name and address etc - applying to the numbers for those services. By the time the published directory for the next year was delivered, the previous directory might be 20-30% in ?error?; wrong numbers or missing numbers, and this factor reinforced the need for the directory assistance service.

From 1976 Telecom made a major investment to improve the attractiveness, accuracy and availability of the published directories to encourage usage and to attempt to contain the growth in calls to directory assistance. In 1977 studies of calls made to directory assistance reported that, of all calls for numbers in the local area, about 70% of people asked for numbers correctly printed in the current directory; five years later the proportion was roughly the same. That is, either the customer did not have a copy of the local directory - less likely as distribution greatly improved - or the customer was too lazy to look up the directory. 80% of calls to directory assistance were for business numbers implying that some businesses were using the service as a reference for their operations; for example, verifying telephone numbers and addresses for credit applicants.

The Directory Assistance Process to 1981

In 1976 the directory assistance service was provided by 1650 operators working in about 100 call centres located around the country, with the largest centres in the capital cities.

The following is broadly indicative of the call handling process.

When a customer called for a number, the operator asked for the name and address and an indication (if known) of the rough time when the service was connected. If the number had been connected before the issue of the last directory, the operator consulted a copy of that directory. If the number had been connected more than a month ago, the operator consulted a printed ?monthly update? for the appropriate month. A number connected within the last month would be obtained from a printed ?weekly update?.

The ?monthly? and ?weekly? updates were provided by Telecom's directory publishing business through the directory printers. The delay between when a telephone was connected in the field to receipt of the number on a printed update in the directory assistance centre was typically 5-10 days.

The sight of a large metropolitan directory assistance centre was astonishing; apart from the air conditioning and modern lighting, the work process looked a throwback to a 19th Century workshop. Piles of paper directories, paper monthly updates and paper weekly updates were located around operators who could take up to a minute and a half to find and provide the requested number. Some requests for numbers could not be satisfied.

Measurement of the performance of the directory assistance centres was unacceptable for such a poor service and costly operation. There were perhaps six main performance parameters for assessing the quality and efficiency of the service;

-the **number of calls entering the queue** at each directory assistance centre,

-the **number of calls answered**,

-the **speed or answer**; the elapsed time between when the call entered the queue and when the call was answered,

-the **average operator work time**; the elapsed time between connection of the call and disconnection of the call after the requested number was provided,

-the **number of calls for which the requested number was not able to be provided,**

-the **number of calls handled per operator per year**.

The striking fact was that, of the six parameters, only one was measured routinely (calls answered), three were measured by sporadic and doubtful sampling or estimates - speed of answer, average operator work time, number of calls handled per operator per year - and two were not measured at all. The union routinely refused to allow assessment of an individual operator?s performance, even to identify the need for further training.

Tables 1 and 2 provide some indication of performance. Note that the data is incomplete and was not available for some years from some centres; in 1980/81 data for three of the six states was not collected, including Sydney, the largest centre.

The Status of the Directory Assistance Service in 1981

The future performance of the directory assistance service looked bleak. The 22 million calls to the service in 1976 had increased to 78 million in 1981. The directory assistance service was very costly to provide and the costs were rocketing; operating costs were $4.3 million in 1971, $17.7 million in 1976, and $38 million in 1981, and were projected to reach $63 million in 1985. Costs were being driven by the rapid growth in calls, an obsolete manual process, the high labour intensity of the service, monopoly wages and conditions, union obstruction to productivity improvements, and union demands that operator numbers be increased to handle the ever-growing calls (rather than improve productivity).

Table 1: Directory Assistance - Speed of Answer for calls Connected to Metropolitan 013 Centres - 1977/81

Year ending 30th June	1977	1978	1979	1980	1981
		% of calls answered within 10 seconds			
Sydney	76.3	79.9	80.0	81.0	
Melbourne	-	72.1	79.1	74.7	77.9
Brisbane	76.4	82.6	80.0	71.0	
Adelaide	-	80.2	82.4	74.9	82.3
Perth	80.7	77.0	79.3	78.0	
Hobart	75.5	76.4	85.0	88.4	

Note 1. The standard for the speed of answer was 90% of calls to be answered within 10 seconds.

Note 2. Source: Network Operations Branch, Engineering Department, Headquarters.

Table 2: Directory Assistance - Average Operator Work Times - Metropolitan 013 Centres - 1977/81

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Year ending 30th June	1977	1978	1979	1980	1981
			seconds		
Sydney	-	49	48.7	55.0	50
Melbourne	-	-	-	-	50
Brisbane	-	83	-	65	69
Adelaide	-	54	-	50	50
Perth	-	52	52	47	46
Hobart	-	-	-	68	50

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Note 1. The average operator work time was the number of seconds between connection of the call to the operator and disconnection of the call after the requested number had been provided. The time for a caller to obtain a number was the waiting time in the queue plus the average operator work time. Note that a significant number of callers hung up before connection to the operator as they did not have time to wait for service, and these calls were not measured.

Note 2. Source: Network Operations Branch, Engineering Department, Headquarters.

The wages, conditions, working practices and working rules for the directory assistance service were significantly out of line with private sector standards, further inflating labour costs - see later.

Hindered by the union, the management approach was to attempt to reduce the growth in the number of operators which, as calls continued to climb, resulted in a degraded standard of service - longer wait times to answer the calls and more calls not answered. In 1981 the service quality and almost every other aspect of the operation was approaching unacceptable; among the stakeholders - Telecom, customers, management, staff, and the unions - the interests of the operators and the operators? union appeared to be the primary concern and the customers ranked last.

Unless aggressive action was taken to improve productivity, the only way to avoid a substantial rise in the number of operators and a higher rise in operating costs was to markedly improve productivity or further and significantly degrade the quality of service.

A Directory Assistance Computer-based System (the DAS/C System) from 1982

By 1981 advanced computer based switching systems were available for aggregating calls from around a region and distributing the calls to directory assistance centres according to rules set for managing the queue at each centre. Such systems coupled with far fewer call centres offered a far more efficient aggregation, distribution and queuing of calls that could provide an acceptable quality of service with 10-25% fewer operators with some margin for call growth. Reducing the number of centres and operators was rejected by union.

In 1977 a Telecom manager visited the two leading telecommunications businesses in the USA, AT&T and GTE. Their directory assistance operations were far superior to Telecom?s and their plans would transform the service over the next five years. The operators still used paper records but these were far better organised and provided a higher level of performance; for example, the speed of answer was usually 90% within 10 seconds and average working times of less than 50 seconds were common.

Central to their plans was a computer-based system being trialled which would revolutionise the service and produce a step function improvement in customer service and efficiency. **AT&T estimated that each second of average work time saved by AT&T in directory assistance was worth about $1 billion per year in cost savings.**

In 1979 a trial of the US computer system began in the Sydney 013 centre which quickly demonstrated the worth of the system. After calling for public tenders and against union opposition, a nationwide system from IBM was progressively installed in directory assistance centres around Australia from 1982 and was fully deployed in 1986.

The national system consisted of **three sub-systems**. A **national directory assistance data base** was supplied from the White Pages data base consisting of listings collected from around Australia which were compiled and edited by the directory publishing units. Every day the national directory assistance data base was updated from the White Pages data base. A **national call management system** collected calls to directory assistance from around Australia and dynamically and optimally distributed the calls to the directory assistance centres, depending on the call queue at each centre, and measured and recorded call data. At the directory assistance centres operators at **DAS/C computer terminals** answered the calls and interrogated the data base to find the numbers requested, and the system measured the inquiry and call handling characteristics and times.

The national system offered an enormous improvement in customer service and productivity, substantially lower operating costs, and for the operators, an easier work process, a more pleasant workplace and far higher work satisfaction. For the first time

a complete data base for the service was available including such as calls answered, calls completed, operator handling times and other operator statistics.

Computer generated voice announcements and related technology could further reduce the time for an operator to handle a call. For example, a recorded voice announcement at the start of each call could ask to "please state the name and area" related to the requested number, and "please have a pencil ready to record the number". At the end of the call a recorded voice sign-off such as "the requested number is " (with an option to repeat) provided the number to the caller when found (releasing the operator for the next call). In several years computer voice recognition technology could further reduce call handling times. Computer voice announcements and voice recognition were expected to be initially unpopular with customers and would generate complaints to a regulator. However, properly designed and introduced over time the announcements would likely become accepted, particularly as the published directories and the directory assistance service improved.

By 1986 the IBM DAS/C system operated in 55 directory assistance centres around Australia with 617 operator positions. The elapsed time between when a Telecom sales office recorded an order for a new, changed or cancelled telephone service and when the directory details were recorded on the DAS/C data base - to be available to directory assistance positions throughout Australia - was typically 24 hours; this compared to the old time of up to 10 days. The DAS/C data base was available to every operator position and was one of the largest in Australia.

The new DAS/C system was needed urgently. As previously mentioned, in 1982, the first year of the program, the directory assistance service was a struggling mess. Service quality and operator productivity were falling, and the number of operators had risen from 1650 in 1976 to 2300 (an increase of 39%). When installation had been completed in 1986 calls to directory assistance had climbed from 78 million in 1981 to over 145 million.

The average speed of answer of calls rose from 38-50% within 10 seconds to 59-86% within 10 seconds, and the average operator work times to complete a call fell from 51-78 seconds to 39-42 seconds.

However, this performance was still woefully short of the level others were achieving with a similar system, particularly in the USA.

The whole project was strongly opposed by the union at every stage.

The Industrial Relations Context

It is important to understand the technical and industrial climate within which the DAS/C system was planned and deployed.

Broadly, from 1975 until 1985 there was a revolution in the application of digital technology and software to telecommunications networks and computing. Digitisation offered a wide range of new telecommunications services, a higher revenue potential, a far higher standard of network performance and reliability, lower equipment and construction costs, lower operating costs, higher capital and labour productivity, and lower accommodation costs. The benefits of the new technologies prompted Telecom to launch three major projects towards the late 1970's.

The first project, automation of telephone exchanges and digitisation of the links between from 1978, threatened enormous changes in the technical and operator workforces. Exchange automation offered automatic connection of most long distance and international calls, eliminating most of the telephone operators in the Manual Assistance Centres (MAC) who manually connected those calls in the past.

The second project, the DAS/C system and future computer enhancements - the trial from 1979 - was facilitated by network automation, would completely change the skills required of the operators and could potentially reduce the number of operators by up to 30%.

The third project, was the District Customer Record Information System (DCRIS), a mainstream computer system launched in 1976 which processed telephone service orders and converted more than three million paper records to a computer data base. DCRIS completely restructured the work process and workforce in over 80 districts, changing the skills required and potentially significantly reducing staff.

These three projects and others would create huge changes in the network, service delivery, and the technical, operator and clerical workforces. There would be changes in the workforce structures, new skills would be required, obsolete skills would be discarded, some jobs would be de-skilled, and there would be large reductions in people employed. If the full potential of the technology was applied, unrestrained by industrial factors, over the 1980's the reduction in the workforce might exceed 10,000 and a similar number of jobs might have the skill mix changed, many radically. With a Labor Government in power for most of the 1980's, Telecom's network monopoly imposing no downside on industrial action, and the militancy of key Telecom unions, there was no prospect that this would occur.

The union covering the technicians working in the network was the Australian Telecommunications Employees Association (ATEA), a very strong union with a high membership which became highly militant after 1975.

Telecom announced in 1978 a $2 billion plan to computerise its exchange system. The plan would significantly reduce the number of technicians employed; some jobs would be up-skilled, many would be downgraded, a large number would be eliminated, and career opportunities would be seriously reduced or extinguished. For example, exchange automation eliminated the need for a maintenance crew at most exchanges - as many as 14 in an exchange crew.

The announcement triggered a blunt reaction from the ATEA. The union banned repairs and maintenance in a number of areas. Within one month the telecommunications networks in NSW and Western Australia were near collapse, and Telecom was losing $1 million a day in revenue; a few days later the network failures had spread to Victoria and South Australia.

The settlement was a triumph for the ATEA; a moderation of the workforce changes and reductions, some restructuring of the maintenance centres to preserve some job satisfaction, more career opportunities and job classifications, and back pay for about 70% of the workers who were stood down. The union also won a measure of control over new technology with concessions about prior consultation and involvement in trials of new technology.

The union covering the telephone operators, including the directory assistance operators, was the Australian Telephonists and Phonogram Officers Association (ATPOA).

Exchange automation allowed customers to dial most long distance and international calls automatically rather than through an operator, making redundant most of the operators who manually connected those calls. Telephonists in metropolitan areas fell as the demand fell for operator connected calls when a manual exchange were replaced by a computer controlled exchange. Telephonists in each country town vanished overnight when the manual telephone exchange was replaced. Telex operator numbers were declining as the service became obsolete. The trial of the DAS/C system in Sydney 013 centre and its deployment nationally from 1982 would potentially reduce the directory assistance workforce by 30%, change the skills of all the remaining operators and relocate as many as 50% of those operators.

Noting the example and success of the ATEA, the ATPOA had also become strongly militant. The ten-year period after 1975 saw aggressive, bitter and often prolonged confrontations between the union and management. By the early 1980?s few, if any, white collar unions

(counting the ATEA as ?blue collar?) in Australia had encroached into the managerial prerogative as far as the ATPOA.

The experience of Telecom's middle management during the 1978 technicians? industrial action indicated that support for middle management from top management (and the ruling Labor government) during any industrial action by operators was unlikely.

There were perhaps five main demands the ATPOA made regarding the MACs and DAS/C plans; the number of operators employed be maintained, wage increases, improved redundancy benefits for those who lost their jobs, working arrangements that improved output would be opposed, and acceptance of the "Green Book". The Green Book, agreed in 1984, was a detailed document listing Telecom?s obligations and commitments to telephone operators regarding employment policies, manual assistance management, and recruitment and redeployment which included most of the ATPOA?s demands. As a statement of principles, it was a breakthrough for the ATPOA similar to the technological change protocols agreed with the ATEA in 1978.

In the short term the Green Book maintained the MACs at their stated locations and a number of other operating arrangements until the end of the 1986/87. One clause proposed that new products be assessed which were intended to maintain the level of operator employment. One new product proposed by the union was a 24-hour Community Information Service providing information and referrals on a wide range of subjects such as bus timetables in Melbourne?s western suburbs, child care facilities in Fremantle, and Chinese painting classes in Townsville. The union?s concept was of ?the socially aware, helpful, local telephonist always at your service". The service was to be free and financed by Telecom's customers.

Over the five years to 1985 the union mounted a strong public relations and industrial campaign aimed at hindering the MAC and DAS/C plans and maintaining employment. Typical of the public campaigns was the Victorian members? use of the media and local events to build community and political support against the closure of manual exchanges in Hamilton, Horsham, Swan Hill, Dromana and Frankston which would eliminate around 120 operators. One result was that Telecom was forced to slow deployment of the MAC plan by delaying the closure of many exchanges.

With the MAC plan proceeding, albeit more slowly, the union became more inventive and aggressive with actions to slow or prevent the progress of the DAS/C system. Claims were made for an increase of 20% in wages justified as a share of the productivity improvement, reduced hours of work (from 34 hours per week) and an alleged "shriek" phenomenon in 1980.

Table 3: Telecom - Exchanges & Telephone Operators - 1982/88

		82/83	83/84	84/85	85/86	86/87	87/88
Exchanges	Metro Auto	531	541	535	586	586	N/A
	Country Auto	4087	4131	4204	4216	4333	N/A
Country Manual		735	622	488	360	237	N/A
	Telephonists	7518	7038	7070	7032	6315	6220

Source: ?Resistance on the Line? - the author has not validated the data.

The most damaging tactic was an alleged range of workplace injuries emerging in 1983 supposedly caused by working with the DAS/C keyboard; with the union's support the new condition was labelled Repetitive Strain Injury (RSI). RSI is covered in the next section.

The shriek was a high-pitched spike of electronic noise transmitted without warning through the network which was intensified in an operator?s ear by the close-fitting, insulated headset. Telecom?s 1981/82 Annual Report reported that there had been 174 reported cases of "acoustic trauma" while the union claimed that the real figure was over 4,000.

Despite the delaying tactics, from 1984 to 1987 the number of manual exchanges in rural areas dropped from 622 to 237, the number of telephone and directory assistance operators was in freefall, and the diminishing number of members threatened the survival of the union. By 1988 there were around 17% fewer telephonists than in 1983, with country closures the single largest cause of the losses, but full exploitation of the DAS/C system and voice messages and recognition could reduce operators by another 10-20%. In 1988 the ATPOA?s membership fell below a viable level and the union was merged into a branch of the ATEA, the technicians' union.

Repetitive Strain Injury - The Problem of Definition

Most definitions of RSI link symptoms such as pain with repetitive tasks. For example:

"RSI is a condition where pain and other symptoms occur in an area of the body which has done repetitive tasks (often the arms or hands)." And "Repetitive strain means strain related to actions which are frequently repeated."

RSI was used in the 1980s to describe the Telecom epidemic. It is still used for the condition in the UK and parts of Europe. Australia decided to adopt ?occupational overuse syndrome? in the late 1990s (rsi.org.au).

A more probing observation (Ewan, Lowy and Reid, 1991 [5]) was that "RSI (is) a non-specific and controversial constellation of work-related hand, arm and neck symptoms (which) became endemic in Australian industry in the early 1980s".

A similar observation was that RSI is a poorly named condition usually applied to people with non-specific upper limb pain in occupational settings. In 1986 the Royal Australasian College of Physicians strongly discouraged the use of the term RSI as the "description and case definition of the syndrome without implying causality is a prerequisite for adequate clinical investigation into the pathophysiology of the disorder". In other words, the name contravenes the basic principles of taxonomy by assuming or implying findings and causality that have not been established.

The RSI Epidemic in Telecom

In 1983, within the first full year of implementation of the DAS/C system, some operators reported non-specific pain in the such as the fingers, hands, wrists, forearms, neck or shoulders.

In 1984 the union announced that there was a link between the repetitive nature of the keyboard activity and the alleged "injuries". With the following publicity, a number of names emerged from the medical and occupational health professionals and academics to describe this new medical disorder, including occupational overuse syndrome, occupational cervicobrachial disorder and the like. All of these terms and the label RSI enshrined the union's claim of a conclusive link between the repetitive physical activity and the reported range of injuries.

By February 1985 the union claimed that the number of reported RSI cases had risen to around 1,200, an increase of 630% in an eight-month period, due to the increasing usage of keyboards coinciding with cutovers to the DAS/C centres for the directory assistance service and cutovers from manual to automatic exchanges for the telephone call connection service.

Dr. Bruce Hocking (1989 [6]), Telecom's Director of Occupational Health, reported the following statistics in the Medical Journal of Australia in 1989.

In Telecom **between 1982 and 1985 there were 3,976 reports of ?RSI?.** The occupation most affected were telephonist operators with 1,886 complainants, a rate of 343 per 1,000 keyboard staff members over five years. Other Telecom occupations affected were clerical workers (1,421, rate 284 per 1,000), telegraphists (17, rate 34 per 1,000), and process workers (235, rate 116 per 1,000). Women accounted for 3330 (83%) of all reports. In the telephonist group, 27% of female and 20% of male staff members were affected; for women, younger staff members were more affected. 644 staff claimed to be affected for more than 26 weeks. The costs of the treatments, rehabilitation, compensation and redundancies exceeded $15 million, including $1.8 million in medical costs.

It is interesting that, as the peak approached in 1984, union records indicate that Hocking commissioned an occupational physician, Dr Colin Mills, to study and report on the incidence of RSI in Perth. Mills reported that **some 20% of the operators surveyed had a "diagnosed repetitive injury" and a further 24% displayed signs of an emerging problem".** ?Every day they continue to work in the same environment using the same techniques they risk progression of their injury?. Mills clearly had concluded that there was a link between the injury and the work.

Note that in an average directory assistance operator workforce of about 2,000 over four years some 1,886 operators complained of an injury, an extraordinary number; 34% of operators claimed to be stricken.

Reactions of the Stakeholders

Telecom's epidemic drew the media and professionals like flies to ordure.

Urged on by the union, supported by an uncritical, often sensationalist media, a new occupational health and safety industry emerged which was encouraged by certain elements of the medical profession, academia and personal injury lawyers, all focussed on Telecom's directory assistance centres.

At the height of the epidemic, a press agency was able to supply 40 to 50 clippings on the subject each month from major newspapers and periodicals, and there were articles in medical journals and other periodicals of all kinds. There were discussions about RSI on talk-back radio and documentaries on television, and numerous workshops, seminars, lectures, government papers, and several books on the subject. The issues were irresistible with all the features for successful reporting; widespread injury, incompetent or hostile doctors, controversy, unions, large awards of money to some workers, injustice, high emotions, new technology, and experts who disagreed. A woman with RSI was reported to have committed suicide by hanging in Adelaide, South Australia; it was the view of one medical expert in the subject that, contrary to the headline, it is likely she suffered from undiagnosed or improperly treated depression.

During this time, ergonomics consultants flourished in Australia. Remedial workplace actions were advocated such as ergonomic redesign of the workstation, keyboard layout, arm use and sitting posture, regular strengthening exercises, and regular rest breaks. There was an avalanche of advice with experts from various countries. For example, people claiming seating expertise gave different opinions; Coe of New Zealand advocated low seats which conflicted with conventional ergonomic advice from Cakir of Germany, while Mandal of Denmark advocated a forward tilted seat, and Grandjean of Switzerland advocated a more reclining back-support.

The most-often prescribed treatments for early-stage RSI included drug therapies such as anti-inflammatory medications combined with passive forms of physical therapy such as rest, splinting, massage, physiotherapy and similar.

This was followed by the rise of firms specializing in "rehabilitation" supported by government policy. One such business company grew from two physiotherapists to over 160 staff in almost a dozen regional offices around the country, only to suffer investigation by government agencies for irregular claims for payments, and then collapse seven years after starting.

Sociologists and others identified a number of models or stereotypes in their analyses. For example, the "Noble Worker" whose complaint was believed to be genuine; the "Migrant Arm" of a migrant worker thought to be a malingerer, similar to the bad back syndrome; the "Kangaroo Paw", for workers who reported a unique Australian (non) disease, a diagnosis of RSI but with no evidence of a disease process; and the "Featherbedded Worker" who was encouraged by unions to expect ever easier work conditions such as lower key-stroke rates, lengthy rest breaks, daily exercise programs and the like.

Doctors too were stereotyped such as "The Caring Doctor" who leaned towards comfort and support rather than objective diagnosis and treatment; the "Jeremiah Doctor" who provided bleak diagnoses with insufficient empathy; and the "Insurance Doctor" who was considered biased towards the principal.

There was a vigorous debate among the academics and health professionals about the causal factor in the rise of RSI in Australia with a number nominated as important or possibly important. These included work and work characteristics such as changing work organization, worker factors such as migrant workers, and white middle-class female workers. Other possible causes included Australian trade unions, laws on workers' compensation, the medical profession, the legal profession, and the media.

One view was that this was a genuine condition, recognised by many medical professionals and organisations around the world, including the UK's NHS and the World Health Organisation; RSI was a medical condition that could be diagnosed, and biomechanical factors must be rectified to prevent further injury. Others argued that psychosocial factors within and outside the workplace caused a neurosis that was not occupational in origin and not liable for compensation. A third group argued that RSI was a hoax consciously used by workers and encouraged by the union to gain concessions including compensation, sick leave payments and more generous redundancy conditions and payments. A fourth theory was that the RSI afflicted people who are, in essence, healthy but experience pain or were encouraged to become patients with pain, redefining a state of health to one of illness. Yet another view was that, as no link could be found, inaccurate presentation by the media of the condition and the causes could increase the prevalence of RSI; some research reported that "failure to provide a balanced scientific analysis of RSI can stigmatize individuals" and can create contagion in colleagues.

A more scathing view was that for claims of RSI the degree of repetition was never quantified and injury was simply assumed because the claimant was a worker; some claimants alleging RSI did work which had little or no repetitive component and strain was never demonstrated. At the time of these claims, workers doing similar tasks in the same or comparable businesses did not report symptoms. In most cases, if not all, no physical injury was ever demonstrated by such as through organ imaging.

Two strongly different views emerged from the debate:

- physical injury occurred in practically all cases. The injury was in muscle and due to some unspecified pathology caused by overuse or could be confirmed by electron microscope studies, or came from the neck and could be demonstrated by a nerve stretching test, or was due to excess muscle tension.
- there was no evidence of injury in these cases, and complaints of pain and other symptoms were due to psychological causes. Such views were put forward by the Royal Australian College of Physicians, the Australian Hand Club (Australian surgeons specializing in surgery of the hand and forearm), orthopaedic surgeons, rheumatologists, psychiatrists, and others.

Supporters of each theory appeared to ignore the others. Physicians supporting the second view were regarded by the first group as either being ignorant, in the pay of employers and insurance companies, or politically biased.

Many other groups put forward opinions, including physiotherapists, ergonomists, management consultants, furniture manufacturers, chiropractors, and keyboard designers, each promoting their own specialty as the main factor in diagnosing and solving the problem.

Some Observations about the Status of RSI

The following are notes resulting from a short and incomplete layman's survey of the history and status of RSI in the 30 years after the Telecom epidemic:

- the DAS/C incident in Telecom from 1983 has been frequently reported in articles and research about RSI, and appears a "landmark", unique around the world in magnitude and severity.

- Although keyboard related work has rocketed since 1983, no comparable incident appears to have been reported.
- Hocking's (1989 [6]) published research is frequently cited in articles and research papers about occupational health.
- The label for the complaint appears to be fluid. Prior to the Telecom incident, in the early 1980's one label used was ?tendinitis", implying that the problem is "mainly inflammatory", a view that is often disputed.
- One emerging umbrella term appears to be ?overuse injury (or syndrome)? or "occupational overuse syndrome" (OOS). Some different terms are used between countries; the Netherlands uses ?complaints of the arms, neck and shoulders (CANS)? and the USA commonly uses ? cumulative trauma disorder?, a term that includes back problems as well as RSI.
- a common set of symptoms are usually used to describe the condition. For example, "the condition mostly affects parts of the upper body, such as the neck, shoulder forearms, elbows, wrists and hands".
- The symptoms are said to range from mild to severe and usually develop gradually. They often include pain, aching or tenderness, stiffness, throbbing, tingling or numbness, weakness and cramp
- a common set of preventative actions and treatment are usually offered. These include changing the sitting position, mouse and keyboards settings, and posture. Treatments include rest, exercise, medications (anti-inflammatory, pain alleviators and some forms of antidepressants [7]), physiotherapy and injections.
- There appears widespread agreement that in the vast majority of cases treatments are effective.
- For such a serious and recurring condition claimed to cause widespread work-related losses and suffering, there are minimal statistics on RSI complaints.
- There appears to be no standard definition for the syndrome in "official" occupational health and safety statistics. Statistics compiled in Australia and around the world usually do not list RSI as a separate condition. Data for neck, shoulder and hand, fingers and thumb injuries and diseases are often used as an indication of the problem and for information on workers? compensation claims for the condition.
- While there is agreement about the areas of the body affected, the symptoms and the treatments, there are opposing views about the link, if any, between repetitive hand use and physical injury - see the previous discussion.
- Despite the debate about the cause of the syndrome, there has been a steady increase in the cost of workers? compensation injuries.
- After some 30 years there still appears to be little scientific evidence that the DAS/C system and similar systems were the cause of the range of RSI symptoms listed.

So what caused the Epidemic?

Some of the main factors suggested as a cause of RSI are the workplace, the work station, the working conditions, the workload and the lack of worker satisfaction. Each of these is examined below.

In 1988, Booz Allen & Hamilton (BAH) (1988 [8]) conducted a benchmarking study comparing the performance of Telecom's DAS/C directory assistance service with similar services operating in four of the Regional Bell Operating Companies (RBOCs) in the USA. The results are shown in Table 4. Briefly, Telecom delivered a clearly inferior service at a significantly higher cost with RBOCs reporting minimal incidences of RSI. Differences are mentioned in the analysis.

The Workplace Centres were not a cause of RSI

The DAS/C centres provided far superior working conditions.

The quality of the old paper based workplaces varied around Australia, largely depending on the age of the centre. The metropolitan centres were well lighted and air conditioned, but were cluttered by the paper records which were heavy and awkward to use. All of the interiors of the DAS/C workplaces were new, professionally designed with lighting compatible with screen based work, open plan, and clean with relaxing colour schemes.

The Work Stations were not a cause of RSI

Telecom's IBM work stations were ergonomically designed with a ?light touch? keyboard.

By 1982 there were over 2,000 workstations operating in computer-based directory assistance centres around the world supplied by IBM and other vendors similar to Telecom's DAS/C stations. By 1985 it is estimated that there were over 20,000 stations operating, mainly in the USA and Canada. In that year complaints about Telecom's DAS/C system with about 600 work stations reached a peak. Over the three-year period 1982 to 1985 there were minimal complaints of an RSI nature from the overseas centres.

The Frequency of Key Strokes on the IBM DAS/C Work Station was not the cause of RSI.

The DAS/C system required directory assistance operators to perform at a relatively low keying rate; an average of perhaps 20 keystrokes a minute with regular rest breaks.

A large number of occupations around the world performed keyboard-type work at consistently and far higher keying rates than the DAS/C system, many with shorter formal rest breaks and many with equipment that was not ergonomically designed. Examples include data entry keypunch operators producing Hollerith cards from the late 1800's and IBM cards from the late 1920's (in data entry centres); typists from the late 1800's (in typing pools); word processors from the 1960's and desk tops from the 1980's. The keying rate performed by Telecom's telegraphists was far higher with no RSI complaints until the arrival of the DAS/C system.

All of these various keyboard operators raised minimal complaints of an RSI nature over more than 100 years.

The Work Load was not a cause of RSI

The BAH (1988 [8]) benchmark study - see Table 4 - found that Telecom's directory assistance operators had a far lower work load than the RBOC operators.

During the year Telecom's operators worked only about 70% of the on-line hours per year of those worked by the RBOC operators, and during that much shorter time handled less than 70% of the calls per on-line hour. The RBOCs experienced minimal complaints of an RSI nature.

The Conditions of Employment were not the cause of RSI

The BAH benchmark study - see Table 4 - found that Telecom's directory assistance operators had far more generous conditions of employment than the RBOC operators, and on the evidence, a far less stressful existence.

Table 4: Some Results from the Booz Allen Hamilton Benchmarking Study - Directory Assistance - 1988

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		Telecom	US RBOC's
Service Quality	**Calls Dropped**	17%	less than 1%
	Average Speed of Answer	12 seconds (est)	3-6 seconds
	Customer Perceived Quality - very satisfied	86%	97%
Working Arrangements	**Work Hours**	34	37.5
	Relief Time/Planned Breaks	5.0	2.5
	Unscheduled Breaks (hours)	1.25 (est)	0.8
	Effective on-line Time (hours/week)	27.75	34.2
	On Duty Hours (duty hours/total hours)	82%	91%
	Initial Roster Drawn (days in advance)	90 days	14 days
	Final Roster Adjustment	7 days notice	? hour in advance
	Roster Traffic Basis	one week average on past 4 weeks	weekly daily or traffic data
	Use of Part Time/Casuals	10-15%	30%

Working Days per Year			
	Working Days in a Year	260	260
Less	Vacation Days	20	15
	Sick Days	15	5
	Holidays	13	10
	Averaging Long Service Leave	9	-
	Averaging Days Off due to working on a Sunday	4	-
	Other Leave without Pay	2	-
	Average Working Days per Year	197	230

Output		Telecom	NY Tel	Pacific Bell	Bell Atlantic
	Operators	2,248	2,195	5,200	7,180
	Total Call Volume millions	166	350	873	1,217
	On-line Hours /Operator/Year	1,093	1,573	1,573	1,573
	Calls/On-line/Hr /Operator	68	101	107	108

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Telecom's operators had a shorter working week (34 hours vs. 37.5), up to 33 less days worked per year (197 vs. 230), more relief time and planned breaks per day (5 vs. 2.5), more unscheduled breaks per day (1.25 vs. 0.8), and fewer effective on-line hours per week (27.75 vs. 34.2), more vacation days (20 vs. 15), more sick days (15 vs. 5), more public holidays (13 vs. 10), more advanced notice for rosters (90 days vs. 14), and enjoyed long service leave while the RBOC operators received none.

Also, Telecom operators, on average, were paid more than RBOC operators; while the base pay for Telecom operators was lower than the US, higher penalty rates caused a higher average cost per hour; $25.62 per hour for Telecom operators compared to $24.50 for the US. The union encouraged Telecom operators **to work non-busy hour shifts to earn penalty payments.**

Again, the RBOC operators raised minimal complaints of an RSI nature.

Lack of Work Satisfaction was not the cause of RSI

The DAS/C system provided a far higher work satisfaction than the old paper process.

As the quality of the paper-based service declined, callers became more frustrated and irritated when calls could not be connected, waiting times in the queue increased, searching times were too long, and when a number could not be provided. Searching the paper listings was physically arduous and often frustrating when the number requested could not be found.

The DAS/C system allowed the operator to provide a far higher quality of service; almost all calls were answered, call waiting times were markedly reduced, the time to find the number was far shorter, it was rare that the requested number could not be provided, the ergonomic work station required far less effort, fewer customers were frustrated and most callers were satisfied.

So what was the cause of RSI? A Sceptical Layman's View

Almost every worker feels a pain, aching or tenderness, stiffness, throbbing, tingling or numbness, weakness or cramp at some time during their working life.

Consider a Telecom directory assistance operator towards the end of 1982, the first year of deploying the DAS/C system. She (the majority of operators were women) has completed training and has been working on the DAS/C system. She has noted the number of positions in this DAS/C centre is less than the number of manual positions before, perhaps by up to 30%, and feels threatened.

She rises on a working morning and experiences a pain in her neck. She reflects that the pain may be caused by her new job on the DAS/C system; at this point there is no scientific causal evidence.

She visits her physician who asks what has she been doing lately? Has anything changed in her life that might have triggered this pain? Well, she has just started as a DAS/C operator and this involves repetitive keystrokes, an activity not needed in her previous work. The physician may consider this as a possible reason, and in any event, advises to take a few days off and a course of Aspros. At this point, there is no scientific causal evidence.

At work during next week the operator shares her experience of pain and the physician's diagnosis and advice. Some of her colleagues volunteer a similar experience. A union official, concerned about the steady fall in membership and the related effect on dues and income, has been assessing ways of obstructing deployment of the DAS/C system and the related fall in the operator workforce. The gossip among the operators is a blessing.

The union calls in the media and accuses Telecom of thoughtlessly and recklessly implementing a new system which injures the operators. At this point, there is still no scientific causal evidence.

The union's logic is that ?because I have a pain, my new work must be the cause of my pain?, and this is reported by the media unchallenged. Other operators report pain and relate it to the new work. Yet more operators, whether they experience pain or not, realise the opportunity for workers compensation. The legal profession come to the same conclusion and adopts the allegation of cause. Other professions with an interest in occupational health and safety are also attracted including physicians, physiotherapists, and academics. The issue soon reaches the Labor government which intervenes on the side of the unions and compensation. The allegation of "injury caused by the work" becomes a tsunami beyond the rational.

The BAH (1988 [8]) benchmarking study was not available during the period 1982 -85. The less demanding life of the Telecom directory assistance operators compared to similar keyboard occupations in Australia and directory assistance operators in the USA was well known within Telecom but not documented. Telecom's management did not seek this comparative data and consequently could not present a sufficiently strong objective rebuttal. Ignored was the fact that some Telecom workers claimed compensation for suffering RSI symptoms under working conditions that had not changed during the same period; for example, word processors, telegraphists and clerical workers. Also ignored was the fact that some claimants did work with little repetitive element.

The alleged pain might have been a genuine condition for some operators but the lack of scientific data supporting the causal relationship had no influence on the mounting hysteria; the DAS/C system was the cause of an epidemic.

Conclusion

Most people experience pain at some time. It is clear that some have experienced pain caused by repetitive activity. The issue is how many and why?

From 1982 within Telecom the dominant concerns in the operator workforce was the operators' fear of job loss and the ATPOA's fear of a substantial fall in membership.

Pain reported by some directory assistance operators was attributed to the new DAS/C system by operators, the union, and contestable medical diagnoses by physicians and other professionals, with no objective evidence of a causal link of the injury to the work.

The claim that DAS/C caused the injury was sensationalised by the media and adopted by other employees, some members of the medical and legal professions, and some academics and others in the occupational health industry. These constituencies were undaunted by the fact that syndrome was occurring minimally, if at all, in similar workplaces elsewhere, and that occupations with far higher levels of keyboard repetition had been in existence for more than 100 years with minimal reports of injury.

The argument is that the union grasped the opportunity to ride the RSI phenomena as an industrial tactic to slow the deployment and limit the capability of the DAS/C system, negotiate an additional payout to redundancy, generate ?injury? compensation, and at the same time slow the loss of members.

The Telecom epidemic was unique. It was likely triggered by a combination of factors; Telecom's monopoly which allowed the union to take action with no consequent loss of jobs (to competitors); the lack of strong leadership within Telecom's management to contest the unproven pain/cause allegation; the declining membership of the union; a Labor Government which could be relied on to support the union, and the opportunism and self interest of the media and some members of the professions.

In the 30 years since the Telecom epidemic there still appears little scientific basis for linking pain reported by directory assistance operators' with working on the DAS/C system.

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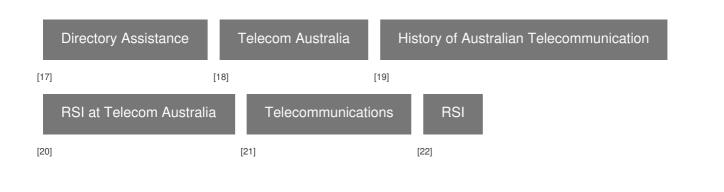
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