**Report of the Inquiry Into The London Ambulance Service
(February 1993)**

**International Workshop on Software Specification and Design Case Study**

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# 1 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## Computer Aided Despatch Summary

1001 What is clear from the Inquiry Team's investigations is that neither the Computer Aided Despatch (CAD) system itself, nor its users, were ready for full implementation on 26 October 1992. The CAD software was not complete, not properly tuned, and not fully tested. The resilience of the hardware under a full load had not been tested. The fall back option to the second file server had certainly not been tested. There were outstanding problems with data transmission to and from the mobile data terminals. There was some scepticism over the accuracy record of the Automatic Vehicle Location System (AVLS). Staff, both within Central Ambulance Control (CAC) and ambulance crews, had no confidence in the system and were not all fully trained. The physical changes to the layout of the control room on 26 October 1992 meant that CAC staff were working in unfamiliar positions, without paper backup, and were less able to work with colleagues with whom they had jointly solved problems before. There had been no attempt to foresee fully the effect of inaccurate or incomplete data available to the system (late status reporting/vehicle locations etc.). These imperfections led to an increase in the number of exception messages that would have to be dealt with and which in turn would lead to more call backs and enquiries. In particular the decision on that day to use only the computer generated resource allocations (which were proven to be less than 100% reliable) was a high risk move.

1002 Whilst understanding fully the pressures that the project team were under to achieve a quick and successful implementation it is difficult to understand why the final decision was made, knowing that there were so many potential imperfections in the system.

1003 The development of a strategy for the future of computer aided despatch within the London Ambulance Service (LAS) must involve a full process of consultation between management, staff, trade union representatives and the Service's information technology advisers. It may also be appropriate to establish a wider consultative panel involving experts in CAD from other ambulance services, the police and fire brigade. Consequently the recommendations from the Inquiry Team should be regarded as suggestions and options for the future rather than as definitive recommendations on the way forward. What is certain is that the next CAD system must be made to fit the Service's current or future organisational structure and agreed operational procedures. This was not the case with the current CAD.

## Management and Operations Summary

1004 Under the NHS reforms, all parts of the National Health Service (NHS) have gone through major cultural changes in the past few years and it is evident that the LAS could not bury its head in the sand if it was to provide a professional and successful service in the 1990s.

1005 However, the result of the initiatives undertaken by management from 1990-92 did not revitalise management and staff as intended, but actually worsened what was already a climate of mistrust and obstructiveness. It was not a case of management getting the agenda wrong. The size of the programme and the speed and depth of change were simply too aggressive for the circumstances. Management clearly underestimated the difficulties involved in changing the deeply ingrained culture of LAS and misjudged the industrial relations climate so that staff were alienated to the changes rather than brought on board.

1006 The lesson to be learnt must be that the particular geographical, social and political environment in which LAS operates, and the cultural climate within the service itself, require a more measured and participative approach from both management and staff. Management must be willing to have regular and open consultation with staff representatives. By the same token staff and their representatives need to overcome their concerns about previous management approaches, recognise the need for change, and be receptive to discuss new ideas. If ever there was a time and opportunity to cast off the constraints and grievances of the past years and to start a fresh management and staff partnership, that time is now.

**Computer Aided Dispatch Conclusions**

1007 The main conclusions drawn by the Inquiry Team from its investigations of CAD, each of which is covered fully in the main text, are:-

a) the London Ambulance Service, and the people served by it, can benefit from the introduction of a CAD system;

b) Management and staff of LAS are supportive of the use of technology to enhance the service provided;

c) the CAD system implemented in 1992 was over ambitious and was developed and implemented against an impossible timetable;

d) LAS management ignored or chose not to accept advice provided to it from many sources outside of the Service on the tightness of the timetable or the high risk of the comprehensive systems requirement;

e) the South West Thames Regional Health Authority procurement rules were followed fully, but these rules emphasised open tendering and the quantitative aspects of procurement (obtaining the best price) rather than the qualitative aspects (will it do the job best?). It is an Inquiry Team recommendation that more comprehensive qualitative guidance be provided by the Regional Health Authority (RHA) for future major information technology procurements;

f) the project team did not show, or discuss with, the LAS Board independent references on the lead CAD contractor, that raised doubts on their ability to handle such a major project;

g) the LAS Board were given a misleading impression, by the project team, of the previous experience of the lead contractor in emergency service systems;

h) in awarding the contract for CAD to a small software house, with no previous experience of similar systems, LAS management were taking a high risk;

i) LAS failed to follow the PRINCE Project Management Method in the set up and operation of an Information Technology (IT) executive committee, project board, project management team and project assurance team; London Ambulance Service

j) project management throughout the development and implementation process was inadequate and at times ambiguous. A major systems integration project such as CAD requires full time. professional, experienced project management. This was lacking;

k) LAS management were under constant pressure to improve performance and to meet the ORCON standards. LAS believed that the implementation of CAD would do more than any other initiative to bring about such improvements. This contributed to the pressure on the project team to achieve the earliest implementation;

I) the early decision to achieve full CAD implementation in one phase was misguided. In an implementation as far reaching as CAD it would have been preferable to implement in a step wise approach, proving each phase totally before moving on to the next;

m) each stage of CAD development and implementation should be justified by, for example, an analysis of costs and benefits, qualitative and quantitative;

n) senior management, the project team, and the lead supplier had full commitment to the project and continually gave it their best efforts. However, they failed to identify or to recognise the significance of the many problems that were ultimately to cause it to fail;

o) there was incomplete "ownership" of the system by the majority of its users. The many problems identified with many of the system components over the preceding months had instilled an atmosphere of system distrust in which staff expected the system to fail rather than willing it to succeed;

p) satisfactory implementation of the system would require changes to a number of existing working practices. Senior management believed that implementation of the system would, in itself, bring about these changes. In fact many staff found it to be an operational "strait jacket" within which they still tried to operate local flexibility. This caused further confusion within the system;

q) training provided to CAC staff and to ambulance crews was incomplete and inconsistent;

r) the CAD system relied on near perfect information on vehicle location and status being available to it at all times. The project team failed to appreciate fully the impact that a higher level of imperfect information would have on the system;

s) the system was not fully tested to a satisfactory level of quality and resilience before full implementation on 26 October 1992;

t) the system relied on a technical communications infrastructure that was overloaded and unable to cope easily with the demands that CAD would place upon it, particularly in a difficult communications environment such as London;

u) LAS management constantly attributed CAD problems to wilful misuse of the system by some ambulance crews. There is no direct evidence of this, but the circumstantial evidence that does exist indicates to the Inquiry Team that it would have been only one of the many contributory factors that led to the CAD failure;

v) the LAS Board and RHA management, whilst realising that there were continuing problems with the implementation of CAD, consistently accepted assurances from Executive Directors that problems were being rectified and that successful implementation would be achieved. At no time was a full independent review commissioned of the true state of the project;

w) the 26 and 27 October 1992 were not exceptionally busy days in terms of emergency incidents or patients carried. The increase in calls on those days was largely as a result of unidentified duplicate calls and call backs from the public in response to ambulance delays;

x) on 26 and 27 October 1992 the computer system itself did not fail in a technical sense. Response times did on occasions become unacceptable, but overall the system did what it had been designed to do. However, much of the design had fatal flaws that would, and did, cumulatively lead to all of the symptoms of systems failure;

y) on 4 November 1992 the system did fail. This was caused by a minor programming error that caused the system to "crash". The automatic change over to the back up system had not been adequately tested, thus the whole system was brought down;

z) in the period leading up to and including 26 and 27 October 1992 there were insufficient control assistants taking emergency calls. This contributed to an unacceptable level of call ringing times. This has since been rectified.

**Management and Operations Conclusions**

1008    The main conclusions drawn by the Inquiry Team from its investigations into the management and operation of the LAS, each of which is covered fully in the main text, are:

a) London is a special case. The solution to the problems facing LAS cannot simply be copied from elsewhere in the UK;

b) by 1990, at the end of a very damaging national industrial dispute over pay, the LAS stood in need of major modification and change;

c) in 1990/91, the management team believed that they had to adopt a radical and fast- moving agenda of change. The overall aim was to improve substantially the provision of ambulance services to patients in London. However, the process adopted and the speed at which it was done were to cause an alarming level of demoralisation among managers and staff, and opposition from staff representatives;

d) the span of control of some Executive Directors was too great and as a consequence they became involved in issues which should properly have been dealt with by second line management;

e) LAS management had received over the years little or no effective management training.

f) poor communications between staff and staff associations and senior LAS managers have created an atmosphere of mistrust;

g) many managers and staff saw deadlines set by the top level of management as being rigid, inflexible and, more importantly, not to be challenged.

h) faced with concerted pressure from its managing RHA, MPs, the public, health service consumers and the media over improving performance times, it is by no means certain that the Service would have been allowed to adopt a more measured approach to introducing changes, particularly with CAD;

i) it is not possible to turn around LAS performance overnight - CAD will take perhaps four years to develop and implement fully; working relationships will need to be built up gradually.

j) the Inquiry Team would warn of the danger of setting unrealistic timetables without consultation with, and the commitment of, those involved;

k) the public and its representatives must be prepared to allow the LAS breathing space to put its house in order;

l) the NHS reforms necessitate a change in relationships.  The LAS and South West Thames RHA have to secure agreements on the level, quality and scope of A&E services that purchasing RHAs will purchase and fund;

m) there is a need to develop quickly an effective partnership between executive management and trade unions.

n) it is important that stress counselling is available promptly to all staff and is undertaken  by appropriately qualified professionals.

o) LAS management were depending very largely on the successful implementation of CAD, and the resulting management information, to obtain a complete and relevant analysis of resource requirements;

p) there are a number of priority tasks facing personnel management, including the reform of the IR consultative policy, manpower planning, examination of terms and conditions issues and training;

q) there is perceived lack of accountability for LAS actions;

r) while lines of accountability looked secure on paper, in practice the LAS Board was not given, nor did it seek, sufficient information to exercise the responsibilities delegated to it by South West Thames RHA for the day to day management of the LAS;

s) public confidence in the LAS is frail. The single most effective way of restoring public confidence would be for an actual and visible improvement in performance to take place, and be seen to have taken place;

t) there is a great deal of commitment amongst management and staff to ensure that LAS provides the quality of service that patients have a right to expect.

**Computer Aided Dispatch Recommendations**

l009    These are the main recommendations drawn by the Inquiry Team from its investigations into the CAD system, each of which is covered fully in the main text. We recommend:

a) that LAS continues to plan the implementation of a CAD system [3009];

b) that the standing financial instructions should be extended to provide more qualitative guidance for future major IT procurements [3032];

c) that any future CAD system must conform to the following imperatives:

i. it must be fully reliable and resilient with fully tested levels of back-up;

ii. it must have total ownership by management and staff, both within CAC and the ambulance crews;

iii. it must be developed and introduced in a timescale which, whilst recognising the need for earliest introduction, must allow fully for consultation, quality assurance, testing, and training;

iv. management and staff must have total, demonstrable, confidence in the reliability of the system;

v. the new system must contribute to improving the level and quality of the provision of ambulance services in the capital;

vi. any new system should be introduced in a stepwise approach, with, where possible, the steps giving maximum benefit being introduced first;

vii. any investment in the current system should be protected and carried forward to the new system only if it results in no compromises to the above objectives [5004];

d) re-training of CAC staff be carried out on the system to ensure that they are familiar with its features and that they are operating the system in a totally consistent way 50251;

e) a suitably qualified and experienced project manager be appointed immediately to co- ordinate and control the implementation of the proposed first stage of CAD [5027];

f) that a specialist review be undertaken of communications in the light of the final objectives of CAD and that any recommendations arising are actioned as part of the proposed second phase of CAD [5033];

g) the establishment of a Project Subcommittee of the LAS Board [5040];

h) that LAS recruit an IT Director, who will have direct access to the LAS Board [5041].

**Management and Operations Recommendations**

1010    These are the main recommendations drawn by the Inquiry Team from its investigations into the management and operation of the LAS, each of which is covered fully in the main text. We recommend:

a) that LAS management gives serious thought to how to demonstrate its commitment to, and appreciation of, its most valuable asset, namely, its staff [6008];

b) that consideration is given urgently to a further restructuring of management:

        i. to lessen the span of control of some Executive Directors;

        ii. to implement an experienced and effective level of management, with delegated responsibility and authority for decision-making, to deal with day to day operational issues on a divisional basis within London [6012];

c) the reinstatement of recognised uniforms to all levels of operational and control management, including, in appropriate circumstances, senior executive staff [6017];

d) single table bargaining by means of a small central joint staff committee, served by joint secretaries, and with the full commitment of full time officials and elected representatives. The trade union membership would be nominated by, and accountable to, the recognised trade unions. This committee will seek to agree upon matters of staff related policy developed in appropriate joint sub-committees introduced to plan the development and speedy implementation of such policies as equal opportunities, occupational health, health and safety matters and a range of essential training initiatives [6029]:

e) a second tier of divisional joint committees at which management and elected lay convenors will determine solutions to those issues (to be agreed) which have been delegated to them. The objective would be to resolve all issues of divisional responsibility at the lowest possible level [6029];

f) that the LAS urgently consider how best to obtain the necessary management information, in the absence of early information arising from the CAD system [6035];

g) that the capital monies necessary to fulfil the planned vehicle replacement programrne are ring-fenced; and that additional (non-recurring) revenue monies be identified to implement adequate preventative maintenance procedures until such time that the average age of the fleet is reduced, and the backlog of maintenance requirements met [6042];

h) that consideration be given to the employment of vehicle cleaners at stations [6045];

i) that the LAS undertakes in the near future a full study of the manpower needs of the LAS [6053];

j) that the LAS treats as a priority the introduction of a properly resourced training strategy for crews, CAC staff and management, developed as an integral part of personnel management [6062];

k) the precise role, function and responsibilities of the Chair and non-Executive Directors on the LAS Board are agreed in writing between those members of the Board and the South West Thames RHA. It is important that all non-Executive Directors have the time, commitment and experience to undertake the functions specified [6073];

l) the Chief Executive should remain accountable to the LAS Board, and its Chair, and through them to the RGM. The issues on which Board discussion and approval are required should be clarified as should the topics on which the Board should receive regular reports [6073];

m) Executive Directors should remain accountable to the Board, and personally accountable to the Chief Executive [6073];

n) personal objectives of the Chief Executive, Executive Directors and senior managers should derive from the corporate objectives agreed between the LAS Board and South West Thames RHA. Regular reviews would thus be undertaken as part of the two- way corporate review and Individual Performance Review (IPR) programme and difficulties in meeting agreed targets and objectives identified at an early stage. This will enable clarification of any additional support required or renegotiation of the timescale or even the target or objective [6073];

o) that LAS makes available to interested parties such as Community Health Councils, purchasers of the service and London MPs its performance levels in respect of:

      i. 999 telephone answering times;

      ii. activation percentage within three minutes;

      iii. response percentage within 8 minutes;

      iv. response percentage within 14 minutes [6082];

p) that LAS management adopt, within reason, an open approach to regular meetings with the media, outside bodies and representatives of the public, with the genuine intention of addressing issues raised [6085];

q) that the LAS devote adequate resources to answering complaints in terms of permanent staff trained in the complaints procedures, backed by the necessary administrative support [6089];

r) that all media outlets which ran stories concerning alleged patient deaths following the CAD breakdown should make it clear that in no case has a coroners' court concluded that the late arrival of an ambulance caused a patient's death [6091].

**Resource Implications of Inquiry Team Report**

1011      Finally, the Team recognises that a number of its recommendations have resource implications. The Team believes that LAS management will need to discuss with South West Thames RHA the immediate and future implications, and build this into the LAS' short and medium term financial strategy.

**2        BACKGROUND**

**Terms of Reference and Inquiry Team Membership**

2001      The terms of reference of the Inquiry Team were "To examine the operation of the CAD system, including:

a) the circumstances surrounding its failures on Monday and Tuesday 26 and 27 October and Wednesday 4 November 1992

b) the process of its procurement

and to identify the lessons to be learned for the operation and management of the London Ambulance Service against the imperatives of delivering service at the required standard, demonstrating good working relationships and restoring public confidence."

2002      The Inquiry Team membership consisted of:

a) Don Page, Chief Executive of South Yorkshire Metropolitan Ambulance and Paramedic Service NHS Trust;

b) Paul Williams, senior computer audit partner of BDO Binder Hamlyn;

c) Dennis Boyd CBE, former Chief Conciliation Officer of the Advisory Conciliation and Arbitration Service (ACAS).

2003      The Inquiry Team was established by the South West Thames Regional Health Authority (RHA) in November 1992, and was asked to report directly to that Authority by mid- February 1993.

2004     The Inquiry Team received support from Christopher Webb (BDO Binder Hamlyn), Margaret Goose (former Chief Executive, North Bedfordshire Health Authority) and Simon Lawton Smith (seconded from the Department of Health).

2005     Annex A lists those groups and organisations invited to provide evidence to the Inquiry Team, or who independently submitted evidence. All evidence was treated as confidential.

**Facts About the LAS**

2006     LAS was founded in 1930 - previously the service was run by the Metropolitan Asylums Board. In 1965, when the Greater London Council was established, the LAS was also enlarged to take in part or all of eight other services. As with other ambulance services, responsibility was transferred to the NHS in 1974. Since then, LAS has been managed by South West Thames RHA. It is broadly divided into an Accident and Emergency Service (A&E) and a non-emergency Patient Transport Service (PTS).

2007     LAS covers a geographical area of just over 600 square miles, and its area of operations is broadly coterminous with the London Fire and Civil Defence Authority and the Metropolitan Police. It is the largest ambulance service in the world. It covers a resident population of some 6.8 million, but its daytime population is larger, especially in central London.

2008     LAS carries over 5,000 patients every day. It receives between 2,000 and 2,500 calls daily; this includes between 1,300 and 1,600 999 calls.

**Staffing**

2009     As at January 1993 LAS establishment was quoted as 2,700 staff (whole time equivalents) in total. This is broadly broken down as follows:

| | | |
|---|---|---|
| Operational staff A&E | 1,480 | 55% |
| Operational staff PTS | 560 | 21% |
| Control Assistants | 200 | 7% |
| Managers A&E | 115 | 4% |
| Managers PTS | 100 | 4% |
| Admin and Clerical | 100 | 4% |
| Maintenance | 75 | 3 % |
| Ancillary | 40 | 2 % |

2010     Of the A&E operational staff 326 (22%) are qualified paramedics. The ratio of A&E to PTS Control Assistants is approximately 2: 1.

*Vehicles*

2011     LAS vehicle resources consist of:

| | |
|---|---|
| A&E ambulances | 305 |
| PTS ambulances | 445 |
| Emergency Control Vehicles | 2 |
| Emergency Equipment Vehicles | 4 |
| Rapid Response Units | 9 |
| Driver Training Units | 8 |
| Motorcycle Response Units | 2 |
| Helicopter | 1 |

2012     The LAS makes 0.5 million A&E patient and 1.3 million PTS journeys each year.

*Finance*

2013    LAS is financed on the A&E tier by service agreements with the four Thames RHAs, and via contracts with some 80 hospitals and community units for PTS. In 1992/3 its budgeted income was £69.7 million, £53 million for AcE services and £16.7 million for PTS services.

**Computer Aided Despatch**

2014    A computer aided despatch (CAD) system provides one or more of the primary command and control functions of:

a) call taking, accepting and verifying incident details including location;

b) resource identification, determining which ambulance to send;

c) resource mobilisation, communicating details of the incident to the appropriate ambulance to be despatched;

d) ambulance resource management, primarily the positioning of suitably equipped and staffed vehicles to minimise response times.

2015    In addition a CAD system will provide management information to assess performance and help in medium and long term resource management and planning.

2016    Depending on the functions to be performed a CAD system consists of a combination of:

a) CAD software;

b) CAD hardware;

c) gazetteer and mapping software;

d) communication interface (RIFS);

e) radio system;

f) mobile data terminals (MDTs);

g) automatic vehicle location system (AVLS).

**LAS and CAD**

2017    LAS has attempted to introduce computer aided despatch on two occasions. The first project started in the early 1980s and a preliminary contract to supply a system without mobile data, but including a new radio infrastructure, was signed with IAL. The design specification was changed in 1989 to include mobile data. The project was abandoned in the autumn of 1990 after load test performance criteria could not be met.

2018    The second CAD project started soon afterwards. Key dates were:

a) writing of system requirement specification. Autumn 1990 to February 1991;

b) invitation to tender advertisement placed in the Journal of the European Communities, 7 February 1991;

c) Systems Design Specification, June and July 1991;

d) contract with Systems Options Ltd (SO) signed August 1991;

e) contract to supply mobile data equipment with Solo Electronic Systems Ltd (SOLO) signed September 1991;

f) original implementation planned for 8 January 1992.

**Report Description**

2019    As requested in its terms of reference, the Inquiry Team spent a significant amount of time investigating the reasons for the failure of the CAD system on 26 and 27 October and 4 November 1992. Section 3, "System and its Development", records the background to the events on 26 and 27 October and 4 November by examining. the:

a) rationale for a CAD system;

b) background to CAD;

c) concept/design;

d) supplier selection - the procurement process;

e) project management;

f) systems testing - implementation;

g) technical communications;

h) human resources and CAD training;

i) system structure.

2020    Having covered the system's background, Section 4 "26 and 27 October and 4 November 1992" details the events and their immediate causes associated with those dates.

2021    Section 5 prescribes the approach to future CAD system developments at the LAS.

2022    Section 6 reviews the management and operation of the LAS, which in a wider sense also had bearing on the events of 26 and 27 October and 4 November 1992.

**3      THE SYSTEM AND ITS DEVELOPMENT**

**Rationale For a CAD System**

3001    The LAS first considered introducing a computerised command and control system in the early 1980s. This was in line not only with many other ambulance services' but also with police and fire services. In order to understand the rationale behind the development of the Computer Aided Despatch System it is essential to understand the manual system that it would replace and its shortcomings.

The manual system operates as follows:

*Call Taking*

3002    When a 999 or urgent call is received in Central Ambulance Control the Control Assistant (CA) writes down the call details on a pre-printed form (AS 1 or AS2). The incident location is identified from a map book, together with the map reference co-ordinates. On completion of the call the incident form is placed into a conveyor belt system with other forms from fellow CA's. The conveyor belt then transports the forms to a central collection point within CAC.

*Resource Identification*

3003    Another CAC staff member collects the forms from the central collection point and, through reviewing the details on the form, decides which resource allocator should deal with it (based on the three London Divisions - North East, North West, and South). At this point potential duplicated calls are also identified. The resource allocator then examines the forms for his/her sector and, using status and location information provided through the radio operator and noted on forms maintained in the "activation box" for each vehicle, decides which resource should be mobilised. This resource is then also recorded on the form which is passed to a despatcher.

*Resource Mobilisation*

3004    The despatcher will telephone the relevant ambulance station (if that is where the resource is) or will pass mobilisation instructions to the radio operator if the ambulance is already

3005    According to the ORCON standards this whole process should take no more than 3 minutes.

3006    There are some clear deficiencies with a totally manual system including:

a) identification of the precise location can be time consuming due to often incomplete or inaccurate details from the caller and the consequent need to explore a number of alternatives through the map books;

b) the physical movement of paper forms around the Control Room is inefficient;

c) maintaining up to date vehicle status and location information from allocators' intuition and reports from ambulances as relayed to and through the radio operators is a slow and laborious process;

d) communicating with ambulances via voice is time consuming and, at peak times, can lead to mobilisation queues;

e) identifying duplicated calls relies on human judgement and memory. This is error prone;

f) dealing with call backs is a labour intensive process as it often involves CA's leaving their posts to talk to the allocators;

g) identification of special incidents needing a Rapid Response Unit or the helicopter (or a major incident team) relies totally on human judgement.

3007    A computer aided despatch system is intended to overcome most of these deficiencies through such features as:

a) a computer based gazetteer with public telephone box identification;

b) elimination of the need to move paper around the control room;

c) timely and (in the case of location information) automated update of resource availability information;

d) computer based intelligence to help identify duplicates and major incidents;

e) direct mobilisation to the ambulance on the completion of an emergency call thus potentially, in simple cases, achieving mobilisation inside one minute.

3008    These and many other potential advantages (including the collection and easy analysis of management information) make a convincing case for automation.

3009    In the Team's investigations, there was unanimous support for technology to be used to enhance the delivery of ambulance services to people in London. Computer aided despatch is the most clearly identified way in which this may be achieved. All parties were unanimous that the current paper based system is inefficient and, although reintroduced in November 1992 as a short-term expedient, should be replaced with a tried and tested automated system as soon as possible. We recommend that LAS continues to plan the implementation of a CAD system.

**Background to CAD**

3010    In the autumn of 1990, following the abandonment of the previous attempt to computerise the LAS Command and Control system, work commenced on the preparation of a requirements specification which would lead towards the implementation of a "state of the art" Command and Control system. It should be noted that the previous system was abandoned after load testing revealed that it would not cope with the demands likely to be placed upon it. The funding of this system was in the order of £7.5 million. Arbitration proceedings are still under way with a view to obtaining a financial settlement from the suppliers of this aborted system. Although these proceedings have not been reviewed in any detail by the Inquiry Team it is understood that there is currently no prospect of an early settlement. A major barrier to an early settlement is the extent to which the original specification for this system changed as the development project evolved.

3011    In order to prepare the requirements specification for the proposed new system, a team was assembled under the chairmanship of the Director of Support Services with the then Systems Manager, a contract analyst, and the Control Room Services Manager. Other individuals were also involved representing training, communications and other areas. Because of problems at the time with the staff consultation process there was little involvement at this stage from the ambulance crews, although invitations to participate were given to union representatives.

3012    The concept behind the system design was to create, as far as possible, a totally automated system whereby the majority of calls to CAC would result in an automatic allocation proposal of the most suitable ambulance resource. Only in the most complex cases would a human allocator need to identify and allocate the best resource. All other allocations would be done by the original control assistant who would take the call and see the incident through to completion. This was seen by LAS management to be the optimum way to create greater efficiency to the command and control process and to help to meet the challenge of the ORCON standards.

3013    It was recognised that a system such as this would be a "first". No other emergency service, certainly in the UK, had attempted at that time to go as far. It should be noted, however, that some UK services, having already achieved successful computer based call taking, and in some cases vehicle location mapping, are now giving active consideration to the generation of resource proposals, either for voice mobilisation or direct to mobile data terminals. A characteristic of these implementations is the proving and bedding down of the system at each stage before moving on to the next phase. The original LAS plan was to move from a wholly manual process to total automation in one phase. This would have been a quantum leap in the use of technology within the service and as such was always going to be high risk. However, LAS management had decided that to meet the challenge of London, this was the most desirable course of action for them.

3014    During the systems requirement process in the autumn of 1990 contact was made with other ambulance services in the West Midlands, Oxford and Surrey, to determine whether or not their existing systems might be tailored or extended to meet the LAS "vision". All of these systems were rejected for the following reasons:

a) the Surrey system (SSL) was rejected as it would have provided only the front end of the LAS requirement. It was considered that the cost of extending the SSL system would be prohibitive;

b) the West Midlands system had been developed in-house and was catering for a service closer to the size of LAS than any other (approximately 1200 calls per day). However, a great deal of work would have needed to be done to meet the LAS needs and it was felt that the West Midlands IT section did not have the capacity to either develop or support the system at LAS. Thus this option was not pursued;

c) the Oxford system was the McDonnell Douglas system which was primarily designed for fire brigade use. Although McDonnell Douglas did later participate in the invitation to tender process they were apparently unwilling at the time to amend their system to meet the LAS need.

3015    Thus the existing systems in use by other ambulance services were all rejected as being inadequate for the LAS purpose. It was believed all along that the LAS was different and that systems that might be adequate for other services would not be adequate for LAS and that the cost of extending these systems would be prohibitive.

3016    Therefore work progressed on the systems requirements specification (SRS) which was finally completed in February 1991. The work was done primarily by the contract analyst with direct assistance from the Systems Manager. As part of the SRS development a companion paper was produced which constituted a revised Operational Method of Working aimed both at CAC staff and at ambulance crews. The proposed new system would impact quite significantly on the way in which staff carried out their jobs, yet in the case of the ambulance crews. there was little consultation on this new method of working.

3017    The SRS is very detailed and contains a high degree of precision on the way in which the system was intended to operate. It is quite prescriptive and provided little scope for additional ideas to be incorporated from prospective suppliers. However, as is usual in any SRS, there are certain areas that were not yet fully defined. In particular, there were few details on the relationship with, and interface to, other LAS systems, including the RIFS communication system and the PTS system (for handling AS3's).

3018    There is no evidence of any formal sign off of the SRS.

**Concept/Design**

3019    From the outset LAS management required a system consisting of the following elements:

a) Computer Aided Despatch;

b) Computer Map Display;

c) Automatic Vehicle Location System (AVLS).

3020    It was intended that these new elements would interface with the existing SOLO mobile data terminals (MDTs) installed as part of the previously aborted system and that integrated communications would be provided through the RIFS system also to be provided by SOLO. These components were to be the subject of a new contract with SOLO and not just a carry forward from the previous contract.

3021    There is little doubt that the full requirements specification is an ambitious document. As pointed out earlier its intended functionality was greater than was available from any existing system.

3022    The previous system abandonment allegedly was caused to a great extent by the supplier's inability to understand the complexity of the requirement. The new CAD system was intended to go considerably further.

3023    It is clear that the project team were fully aware of the leading edge nature of the proposed development. Executive management and through them the LAS Board were aware also of the fact that this would be a pioneering new system written specifically for LAS.

3024    It should be said that in an ideal world it would be difficult to fault the concept of the design. It was ambitious but, if it could be achieved, there is little doubt that major efficiency gains could be made. However, its success would depend on the near 100% accuracy and reliability of the technology in its totality. Anything less could result in serious disruption to LAS operations.

3025    In order to work effectively, the system would require absolute co-operation from all parties including CAC staff and ambulance crews. It would be necessary for all staff and management to have absolute confidence in the system as potential life and death judgements would be made by it. Any regular attempts to question or second guess the system would impair its performance. In order to engender this confidence the system would have to work perfectly all of the time. All information used by it in making its judgements would have to be complete, accurate, and up to the minute. Any failure in the integrity of this underlying information or in the resilience of the system would impair this confidence.

3026    It would also be necessary to have absolute confidence in the ability of the staff to work with the system. CAC staff would have to be fully trained in, and familiar with, the use of the facilities. Most importantly as the new system would change the operational method of working at the ambulance crew level it was particularly necessary to have their full co-operation and joint ownership of the system. If the crews did not press the right buttons at the right time and in the right sequence systems chaos could result.

3027    The quality and the reliability of the technical communications (both voice and data) would be a particularly important factor. If there were to be any delays in or corruption of these transmissions the system could similarly be thrown into disorder.

3028    If all of these elements came together (with of course appropriate quality software) the system would be extremely successful. However, it is probable that the development team did not have a full appreciation of the importance of these elements or, at least, of the consequences of failure, or less than perfect performance, of any one part.

**Supplier Selection - The Procurement Process**

3029    Having completed the requirements specification and rejected the possibility of adopting or extending an existing system from another service, the full procurement process commenced. A small sub-team was set up consisting of the contract analyst and the Systems Manager, with additional support from a supplies manager from Regional Procurement. The first stage was to prepare an advertisement for the Journal of the European Communities asking prospective suppliers to make contact if they were likely to have an interest in providing part or all of the system. This advertisement appeared in the Journal on 7 February 1991.

3030    Under the RHA Standing Financial Instructions which provide the regulatory framework within which such procurements may take place, there is little mandatory guidance. The basic rule is that contracts such as this have to be put out to open tender. This requirement was complied with.

3031    The standing financial instructions also state that the lowest tender should be accepted unless there are "good and sufficient reasons to the contrary". The lowest tender was taken.

3032    These standing instructions provide little qualitative guidance to procurement teams. The emphasis is very much on obtaining the best price. This may be appropriate when dealing with procurement of tangible products where the specifications may be similar, but it is arguably less appropriate when dealing with major IT procurements where it is often more difficult to make quality judgements. We recommend that the standing financial instructions should be extended to provide more qualitative guidance for future major IT procurements.

3033    The standing financial instructions also make reference to maintaining a list of approved suppliers from whom tenders should be sought. In the case of Command and Control Systems such a list did not exist.

3034    As a result of the advertisement, 35 companies expressed an interest in providing all or part of the system. Each of these companies was sent an outline requirements specification and was offered the full specification if they were still interested. Over the following weeks several meetings were held with prospective suppliers covering queries on the full specification and resolving other potential technical and contractual issues. These meetings were minuted by the project team and it is clear that most of the suppliers raised concerns over the proposed timetable - which was for full implementation by 8 January 1992. They were all told that this timetable was non-negotiable.

3035    The setting of this timetable is significant as many of the problems that were later to arise did so because of the tightness of the timetable. In order to appreciate why this timetable was set it is important to realise the pressures that the new LAS management were under to improve substantially the performance of the LAS. When the new management took over in 1990 they inherited a service where performance standards were extremely low and came nowhere near to meeting the nationally agreed ORCON standards for ambulance response. The Executive Board saw a new computer aided despatch system as the prime means of improving these standards. Thus there was a considerable self imposed pressure to implement a new system which they saw as being such an important factor in improved performance.

3036    It is worth noting that the Chief Executive commissioned Arthur Andersen (Management Consultants) in the autumn of 1990 to advise him on the action to be taken on the previous CAD development and to indicate the best way forward. In their report Arthur Andersen state that the old project should be abandoned and that work should start towards the specification and acquisition or development of a new system. They also state that if a packaged solution could be found a budget of £1.5 million should be provided and a timescale from specification to implementation of 19 months would be appropriate. Their report also states that if a package solution cannot be found then these estimates should be significantly increased. In setting the timetable LAS management ignored, or chose not to accept, this advice. This Andersen report was never shown to the new Director of Support Services who would be taking direct responsibility for the new system.

3037    Following discussions with prospective suppliers, 17 suppliers provided full proposals for all or part of the system. These proposals were reviewed in detail by the selection team. There is reasonable evidence of a thorough review as shown by annotations on the proposal documents, correspondence, and lists of queried items.

3038    An evaluation protocol was developed which comprised a checklist of the main LAS requirements (including ability to meet deadline and cost) and against which the proposals could be evaluated on a consistent basis. A points scoring system was developed under which suppliers could be ranked according to their perceived ability to meet the LAS needs.

3039    The principle factors against which prospective suppliers were judged were (in order of importance):

a) ability to perform the tasks required;

b) ability to handle throughput and response times;

c) ease of use by staff;

d) resilience;

e) flexibility;

f) ability to meet timetable;

g) cost;

h) additional features.

3040    It is clear from the actual procurement process that an inability to meet almost the total functional requirement or the proposed deadline would result in rejection of the proposal. In particular, it is evident that no proposal made the shortlist if the timetable could not be met. Therefore this factor actually had a higher ranking than was initially proposed. It is also clear that no specific weighting was given to the extent of supplier experience in Command and Control systems.

3041    It should be noted that most suppliers submitted very credible proposals and that several of them stated that the timetable could be met - albeit in some cases with difficulty. Some suppliers suggested a phased approach whereby a basic system could be implemented by the original deadline, but the full system might not be available until 1993.

3042    Throughout this phase it was clear that LAS management and the project team had a proposed budget in mind, for the complete system, of around £1,500,000. There does not appear to be any rational process by which this figure was established, although it is possible that it was based on misunderstanding the original Arthur Andersen estimate (which was for a package system and excluded the AVLS elements).

3043    Out of all of the proposals there was only one which met the total LAS requirement, including timetable and price, although if price was given less priority some other proposals were potentially acceptable. On the basis of the proposals as submitted, the optimum solution appeared to the project team to be the one proposed by the consortium consisting of Apricot, Systems Options (SO), and Datatrak. It is worth noting that the original Apricot proposal had included Terrafix for the AVLS part of the system but, as this element was deemed to be very expensive, Datatrak (who had independently proposed their own AVLS system) were substituted during the process. Their AVLS bid was significantly cheaper than Terrafix and, arguably, better proven at that time amongst the emergency services.

3044    In discussions with SO it is clear that they were initially unenthusiastic about bidding for this contract. They were resellers for Apricot and had bid with them unsuccessfully for a more basic system for the Cambridgeshire Ambulance Service. When the LAS requirement was advertised Apricot persuaded SO to propose to provide the CAD and mapping part of the system.

3045    The proposal from Apricot is very much a hardware led proposal. Compared with most of the other bids there is little detail on the application software proposed. This reflects very much the lack of enthusiasm at the time of SO to invest a lot of time in preparing a proposal in which they felt they had little chance of success. However, their proposal does state that they can meet the total requirement within the timescales proposed. Their proposal also superficially suggests that they have experience of designing systems for emergency services. This is a true statement, but their expertise hitherto had actually been in administrative systems for such organisations rather than mission critical systems such as Command and Control

3046    It should also be noted that the SO quotation for the CAD development was only £35,000 - a clear indication that they had almost certainly underestimated the complexity of the requirement (although it is recognised that as is common in the industry SO would also be making a small margin on the contract price for the hardware). It is worth noting also that, at a meeting between LAS and SO prior to contract award, it is minuted that SO were told that one of the reasons for abandonment of the earlier IAL system was the alleged inability of the software house to understand fully the complexity of the requirement.

3047    A review of the tenders received and of the evaluation process indicates that Apricot/Systems Options/Datatrak was not the only permutation of bidders that had expressed an ability to meet both the requirement and the timescale. Marconi Command and Control, Technical Software Designers, Surf Technology and Solo Electronic Systems Ltd (SOLO) amongst the CAD bidders, working with a variety of partners, were also able to meet the need. However, the main distinguishing feature between these and the Apricot consortium was price. Once Datatrak had replaced Terrafix in this consortium the Apricot bid at £937,463 was some £700,000 cheaper than the next nearest bid. Given the standing financial instructions, it might have been difficult to convince the LAS Board that the cheaper option should not have been taken.

3048    Amongst the papers relating to the selection process there is no evidence of key questions being asked about why the Apricot bid, particularly the software cost, was substantially lower than other bidders. Neither is there evidence of serious investigation, other than the usual references, of SO (or any other of the potential suppliers') software development experience and abilities.

3049    The prime responsibility for the technical evaluation of the tenders fell upon the contract analyst and the Systems Manager. The representative from Regional Supplies was unable to evaluate the tenders on technical merits as her experience was in procurement in its most general sense rather than being specific to IT. However, there is a probability that the LAS Board interpreted the Regional Supplies involvement as being more technically based than it actually was.

3050    It is worth examining here the expertise and the experience of the two key members of the evaluation team. The Systems Manager was a career ambulance man who had some years previously taken over responsibility for LAS systems (including communications). He was not an IT professional. Indeed the new Chief Executive had made it clear to him that it was his intention that, in due course, he would be replaced with a properly qualified systems manager. The contract analyst had already been working with LAS for some five years having originally been sent on secondment from the Regional Computer Centre. He was a competent analyst and programmer and had gained a thorough understanding of the LAS primarily through his close involvement with the aborted IAL project.

3051    Thus a contractor and an arguably unsuitably qualified systems manager (who knew that he was to be replaced and made redundant) were put in charge of the procurement of an extremely complex and high risk computer system with no additional technical expertise available to them. This added to the high risk nature of the procurement.

3052    Prior to making the formal recommendation to the LAS Board an "audit" of the selection process was carried out by the Systems Manager of the Scottish Ambulance Service who had previously worked in Scotland with the new LAS Chief Executive. The main purpose of this "audit" was to confirm the propriety of the selection process and to ensure that adequate evaluation of the tenders had been undertaken. Overall this "audit" report endorses the team's decision, but it also states:

"The LAS management should also satisfy themselves that the decision to choose a system which will be written specially is preferred to choosing an existing system. A value judgement has been made by the evaluation team, based upon valid technical reasons, that the circumstances in London make changing an existing package more risky than writing new software. This is a fundamental decision which requires management's explicit endorsement" .

3053    The report also states that at the time of this review references from existing customers of the proposed contractors had not been taken up. However, the report endorses the proposal to management and makes no reference to the price discrepancies between the different tenderer .

3054    The Recommendation to Purchase report prepared by the Director of Support Services and laid before the LAS Board at their May 1991 meeting lays out the basic facts of the selection process.

3055    In the recommendation for SO it makes one misleading statement.

"Systems Options have successfully developed systems for Police and Fire Authorities, including Staffordshire Fire and Rescue Service."

3056    Whilst true, this statement does not make clear that this experience is in less demanding administrative systems and does not closely parallel the much more complex LAS requirement. This statement although not questioned by the Board did give a false degree of comfort to the Board on the directly relevant experience of the CAD supplier.

3057    The Board paper does not raise the question, or provide the answer, on why the accepted bid is significantly lower than the nearest competitor and that some of the bids are more than 3 times the price. There is no evidence in the minutes of the Board meeting that this major issue was discussed. Neither is there any evidence that the issues raised by the "selection audit" report were discussed. This report was circulated to Board members only after the meeting had taken place. Although the Board minutes are brief in their coverage of the procurement recommendation debate, it is the clear recollection of Board members that the issue was discussed at some length and that all relevant assurances were provided by the Executive Board members directly involved in the procurement process.

3058    During the selection process it is worth noting that certain other bidders raised questions, that with hindsight, had more significance than perhaps was obvious at the time. In particular, doubts are raised as to the ability of the communications system to cope with the potential load to be placed upon it, and of the reliability and state of readiness of the RIFS system. Both of these were prophetic as they were indeed problems that would affect the final implementation of the system. However, there is no evidence to show that these concerns were heeded at the time. There is no evidence that either of these potential problems were identified by the Apricot consortium.

3059    The Board recommendation paper is ambiguous in stating who from the Apricot consortium is to be the lead contractor. The original proposal implies that Apricot would lead with SO becoming a sub-contractor to them. Although it is more common for a software house to act in the lead on projects such as this, there would have been a certain comfort factor in Apricot taking the lead in this instance. SO were a very small software house and Apricot, being wholly owned by Mitsubishi, were undoubtedly the stronger party. However, at the time the recommendation was made it was agreed in a joint meeting with LAS that SO would now be in the lead.

3060    LAS had made it clear in their original invitation to tender that the CAD supplier would be expected to lead the contract and take responsibility for the whole project as turnkey supplier. The original proposal from Apricot, because of its form, did imply that Apricot would take this role. Indeed it is clear from project team minutes at the time that this was the expectation. Apricot subsequently made clear that it is corporate policy to take on such a role only if it is in a position to control the project itself. In a project such as CAD this would not be possible as the success of the system depended heavily on the quality of the software to be provided by SO. However, throughout the procurement process and up to the project meeting of 21 May 1991, both LAS and SO believed that Apricot would prime the contract. Undoubtedly SO would have preferred Apricot to lead as this would have taken some of the pressure off them, particularly in terms of project management. Similarly LAS would have preferred to have a main contractual relationship with a company the size of Apricot. Although it can only be conjecture, it is probable that if the original bid had been a SO bid using Apricot hardware, rather than an Apricot bid using SO software, the proposal would have been perceived by the procurement team to have less credibility than in the event it had. What is not in dispute, however, is that the LAS Board at the time the recommendation was made were fully aware that SO would be the lead contractor.

3061    It is clear that SO were not keen to become lead contractors. Apart from their general nervousness about taking on this responsibility, they also felt that it might lead towards LAS awarding the contract against them. The Managing Director of SO wrote direct to the Managing Director of Apricot expressing his concern.

3062    SO were then invited to prepare a full Systems Design Specification (SDS) detailing in full how the final system would look and to give confidence to LAS that they really had understood the requirement. This exercise was carried out during June and July 1991.

3063    The fact that SO, a small software house, would be managing the project did give some concern to LAS management. Indeed, that concern was raised in a note to Regional Supplies stating that SO would need to demonstrate their previous experience and their ability to project manage a project of this size. This concern was not specifically followed up, but LAS gained implicit confidence from the fact that Apricot themselves must have had that confidence. In fact Apricot did no positive vetting of SO and their abilities to deliver on the contract.

3064    There is no evidence of any RHA involvement in the procurement process other than through Regional Supplies. There is no technical review of the recommendation by any South West Thames representative. It is clear with hindsight that such a review would have been useful in providing an objective independent technical examination of the recommendation being made of this high risk and high profile procurement. Under existing Standing Financial Instructions there was no requirement for such a review, neither was such a review sought by LAS.

3065    The subject of supplier references has been raised in an earlier paragraph. At the time of the procurement recommendation references were being sought on SO from certain of their existing customers. These references were very favourable as far as the technical quality of their work was concerned. However, the reference from the Staffordshire Fire and Rescue Service expressed some concerns over the continuing ability of the company to deliver results on time. There are two reference letters from Staffordshire and both refer to the extent to which SO's resources were now stretched. These references should have raised warning bells with LAS management, but apparently failed to do so. Indeed both executive and non-executive members of the LAS Board have confirmed that they were not informed of adverse references having been received even though one of them was received by the LAS systems team on 24 May 1991, four days before the Board meeting at which the recommendation was endorsed.

3066    The reputation of SO within the software services industry has taken a serious jolt as a result of the publicity surrounding the very public failure of CAD. The Inquiry Team believes that, within the time constraints imposed on the project and the scope of the requirement, no software house could have delivered a workable solution. More experienced

software houses might (and many did) have recognised this earlier. SO are a well established, small software house with a good reputation amongst their many satisfied customers for technical quality. However, in taking on the LAS project, which was far larger than anything they had previously handled, we believe that they rapidly found themselves in a situation where they became out of their depth.

**Project Management**

3067    The intention with the award of the contract to SO was for them as the lead contractor to take on the overall project management responsibility although there is no specific reference to this in the contract. This role later became ambiguous as SO struggled to manage their own input to the project and LAS became more responsible by default for project management. The suppliers are clear that it was in reality LAS, through the Director of Support Services and the contract analyst, who were providing project management.

3068    The PRINCE Project Management Methodology was chosen to be used. However, no LAS staff member had direct experience of applying this methodology and neither had the suppliers. A course was run for the principal members of the team to teach them the rudiments of PRINCE, but it is clear that there was no real project management experience on the team. Although certain elements of the PRINCE methodology were used, at least in the initial stages, it was not used in a properly structured way through the duration of the project.

3069    As the project moved from definition of requirements and selection of suppliers through to development and implementation the constitution of the project team changed. The new group continued to be chaired by the Director of Support Services. Other members included:

LAS Contract Analyst
Control Room Services Manager
Director of Operations
Training Manager
Public Affairs Manager
CTS representative (communications)
Administrative Support
Supplier representatives.

3070    At the project group meeting on 17 June 1991 a number of issues of potential concern were raised and minuted. These minutes stated:

a) the fact that LAS had no full time participants assigned to the project;

b) the lack of formal clarification of how the PRINCE methodology was to be applied;

c) the lack of a formal programme for project group and other meetings;

d) the fact that "the timescale of six months was somewhat less than the industry average for this sort of project which would be more like eighteen months";

e) the draft project plan as provided by the supplier left no time for review and revision.

3071    Although these issues were discussed at this early stage, there is no evidence that any of them were followed up. There is also no evidence that these concerns were communicated to senior management other than through the medium of the minutes.

3072    There were regular project management meetings throughout the project. From the correspondence it is clear that actual project management was being exercised by the Director of Support Services and the contract analyst. In particular the chasing up of errant suppliers appears to be have been done in most cases by the Director of Support Services himself. There is no evidence of SO exercising any project management responsibility other than providing project planning

schedules to the early project group meetings. Indeed SO never regarded themselves as actual project managers and the evidence shows that they did not carry out this role. Although it may have been LAS's original concept that the lead contractor should also be project managers, this was not covered explicitly in the contract nor, was it seen to happen.

3073    There is evidence that SO were regularly late in delivering software to LAS. They state that this was partly due to the two month delay in commencing programming whilst the SDS was done (although this had always been incorporated in the timetable) and by delays in the final delivery of the RIFS specification and protocols into which the CAD system had to interface. In this latter point SO do have some credibility. There is little doubt that the delivery of RIFS was delayed. There is correspondence between the Director of Support Services and SOLO (RIFS providers) to prove this. Indeed the contract with SOLO was only signed on 16 September 1991, some three months after the original systems design contract was

3074    Up to early December 1991 it was still hoped that the original deadline of 8 January 1992 for full implementation would be met. However, by mid December it was clear that this could not be achieved. At that point the CAD software was incomplete and largely untested, the RIFS hardware and software was not fully delivered and tested, the installation of the Datatrak equipment was incomplete and its reporting accuracy still under question.

3075    In October 1991 a new Systems Manager was recruited by LAS. Although he would not become directly involved in the project, at the request of the Board, he carried out a review of the project progress in early November. This report recommends that the planned implementation date should not be changed (in order to maintain pressure on the suppliers) although it recognised that there were many problems causing delay. The report stresses the continuing need for quality, but it does not contain any real conclusions. It makes the point that the timetable allows no time for review and rework and that there is a general reliance on everything coming right first time. The report has a somewhat "cosy" feel to it and although some problems are identified, the reader is left with the impression that, even with the identified problems, there is a probability that success will be achieved. However, reading between the lines it is clear that there is much doubt about meeting the planned implementation date, notwithstanding the recommendation that the published date should not be changed.

3076    More experienced and professional project management would have been unlikely to have enabled achievement of the original implementation date, but many of the problems would probably have been identified earlier and matters such as continued delivery of software with bugs may have been minimised. It should be said that the Director of Support Services in particular appears to have done the best job possible in trying to manage the project and sorting out problems and disputes between suppliers, but with no real experience of controlling major software development projects and the need to perform his normal duties, he must have found his time increasingly under pressure.

3077    There is absolutely no doubt that a professional independent project manager would have been of considerable assistance with this project. Any project such as this which is highly technical, time critical, and involves significant systems integration of different technologies from different suppliers is a full time job to manage. In the LAS case these problems were compounded by the fact that the development was taking place under the media spotlight and with LAS management under considerable political pressure to succeed. Professional project management might have resolved disputes between suppliers more quickly and would have identified the fact that suppliers were often providing optimistic reports of their progress. It is probable also that a professional project manager would have questioned and "got behind" some of the cosy assurances on project progress that were being given by suppliers. Throughout the project there is a great deal of reliance placed on such assurances without, in the early months at least, proper questioning of these assurances.

3078    The early decision to give the project management responsibility to SO was basically flawed. They were not experienced in PRINCE, or in systems integration projects of this size and complexity and there would always have been a conflict of interest in managing their own part in the project as well as the other suppliers.

3079    Although there is little doubt that SO were late in delivery of software and, largely because of the time pressures under which they were working, the quality of their software was often suspect, it should be pointed out that other suppliers also had their problems. The design and positioning of the SOLO MDTs had to be changed following consultation with ambulance staff and SOLO were late in delivering the RIFS technology. However, unlike SO, they kept LAS project

management fully informed of the true state of their progress. There were also continuing problems with data transmission, many of which are still not totally resolved. Datatrak also had problems with their installations.

3080    Although there is only circumstantial evidence of sabotage of their equipment by some ambulance crews there were also instances of poor quality equipment installation by Datatrak subcontractors. There were also difficulties with reception of Datatrak signals by LAS base stations, thus resulting in Datatrak also having to provide LAS with an equivalent feed of information from their own base stations.

3081    These problems would still have been encountered even with a full time project manager, but such an individual working full time on the project would have been able to identify and resolve many of these problems earlier.

3082    Strong project management might also have minimised another difficulty experienced by the development. SO, in their eagerness to please users, often put through software changes "on the fly" thus circumventing the official Project Issue Report (PIR) procedures whereby all such changes should be controlled. These "on the fly" changes also reduced the effectiveness of the testing procedures as previously tested software would be amended without the knowledge of the project group. Such changes could, and did, introduce further bugs.

3083    A critical system such as this, as pointed out earlier, amongst other prerequisites must have totally reliable software. This implies that quality assurance procedures must be formalised and extensive. Although SO had a part-time QA resource it was clearly not fully effective and, more importantly, not independent. QA in a project such as this must have considerable power including the ability to extend project timescales if quality standards are not being met. This formalised QA did not exist at any time during the CAD development.

3084    It is worth noting that ISL (a consultancy firm originally working for one of the unsuccessful tenderers) did, following a later direct approach to LAS and a subsequent invitation from the Director of Support Services, submit a proposal for QA. They did not receive a response. The project team felt at the time that SO could be responsible for their own QA and that the external cost should be avoided.

**Systems Testing/Implementation**

3085    Throughout the project there are references to functional testing, whereby the system is tested to ensure that it does what is expected, and load testing which is designed to test the ability of the complete system to perform under maximum load. Unfortunately, the completeness and quality of system testing is in doubt, owing to the eventual piecemeal delivery and implementation of the system.

3086    In January 1992 a first attempt was made at both types of testing. However, as the software was incomplete at the time and not all elements of the system were available, these tests were inconclusive. Over the following months various systems elements (eg CAD software and Datatrak performance) were tested, but never as a fully integrated whole.

3087    It is recognised that testing a complete system such as this was never going to be easy, particularly where certain things such as Datatrak location fixing inconsistencies and communication failures can only really happen in real time and cannot easily be simulated. However, it should have been possible to factor in to an automated test script an appropriate number of such failures and inconsistencies. There is no evidence that this was ever done. As pointed out earlier a system such as this needs near perfect information at all times. The piecemeal implementation should have proved that this information was likely to often be less than perfect. The impact of this on the system and the knock on effects into exception messages, call backs etc. was never fully appreciated or tested.

3088    Following the failure to meet the original 8 January 1992 deadline for implementation of the full system, a decision was taken by the project group to implement a partial solution during January 1992 whereby the call taking routines would be implemented and the incident reports printed out for manual allocation and voice despatch. The gazetteer was also to be brought into service thus enabling control assistants to identify more easily the locations of incidents. Accordingly printers were installed to enable this to happen. This partial implementation was broadly successful although problems were experienced of screens locking up, occasional server failure, and on one day the failure to despatch a resource because a printer was turned off thus losing the incident in the printer memory buffer. Occasional problems such as

these continued to occur thus undermining staff confidence in the system. Many of these problems stemmed from the fact that printers being used in this way were never part of the original specification, but were added in haste as a short term expedient to show some positive progress at an already published implementation date.

3089    Over the following months, whilst work on all aspects of the system continued various elements of the system were trialled. Following the partial success of implementing the computerised call taking and the gazetteer the next stage was to report the Datatrak locations to supplement the information available to allocators. This was done in conjunction with status reporting via the SOLO terminals by ambulance crews. This combination was trialled initially in the North East Division where the crews were deemed to be the most supportive.

3090    Over the months of this partial trial many problems were identified including:

a) frequent incomplete status reporting by ambulance crews caused by inadequate training, communication failures and alleged wilful misuse;

b) inaccurate Datatrak location fixes caused by faulty equipment (poor installation or alleged sabotage), transmission blackspots, or software error. In this latter case an example of problems was the failure to identify every 53rd vehicle in the fleet. This was caused by an error in a formula provided by Datatrak to SO and not cleared until October 1992;

c) the inability of the system to cope easily with certain established working practices (eg the taking of a vehicle different to the one allocated by the system) - this causes exception messages to be raised for manual exception rectification - in itself a somewhat laborious process;

d) overload of the communications channels, particularly at crew shift change, resulting in late update of status information or failure of other messages to be received;

e) continued occasional problems with CAC hardware, particularly the freezing of workstations and the perceived system slowness;

f) software bugs in the resource proposal software causing it sometimes to fail to identify the nearest available resource;

g) continued difficulties with mobile data through failures to transmit or receive signals and, occasionally, through MDT lock up.

3091    These and other difficulties resulted in the perceived and sometimes actual misallocation of vehicles as the system would always propose the nearest available resource with the correct status as known to tbe system. Many of the problems referred to above would contribute to an inappropriate vehicle being sent to an incident.

3092    Under the rules of the system the software was able to recommend, and the call taker to accept and subsequently mobilise, a resource proposal if the resource was within 11 minutes of the incident. Only if this requirement could not be met would human judgement he required.

3093    Over the first nine months of 1992 the system was implemented piecemeal across the different LAS Divisions in the following phases (although there were some variations within each phase):

*Phase I*

3094    Using the call taking software and the gazetteer to help with the recording and location fixing of incidents. Printers then used to pass information to allocators who, using their traditional activation boxes, would identify the optimum resource and the crews or stations would be mobilised by radio or by telephone.

*Phase 2*

3095    Call takers would take details using the computer system. The incidents would then be passed to the allocators' terminals. The system would be used to track vehicle locations using Datatrak and the MDTs would be used to notify status. Crew activation would be done by messages to the MDTs. This phase was implemented by varying degrees across different Divisions and shifts. In all cases within this phase the human allocators would determine the optimum resource using the system information being passed to them and their traditional activation box

*Phase 3*

3096    Full implementation whereby call takers would allocate using automated resource proposals if a resource would arrive within 11 minutes of activation. Otherwise the allocators would identify and allocate the most suitable resource. Phase 3 was designed to operate without paper backup.

3097    Phases 1 and 2 would always operate on a Divisional basis (North West, North East, and South) whereas phase 3 would eventually operate pan-London. This is in effect what happened for the first time on 26 October 1992

3098    During these months the system was never stable. Changes and enhancements were being made continually to the CAD software. The Datatrak system was being similarly amended and enhanced. The MDTs and the RIFS system were also undergoing continuous changes. Thus there was never a time when the project team could stand back and commission a full systems test. Ideally a phased implementation should have been planned for in the first place rather than added out of desperation. A properly phased and controlled implementation, under strong project management, would not have allowed the next phase to be implemented until there was total confidence in the integrity and acceptance of the current phase.

3099    However, although a phased implementation was considered by LAS management at the commencement of the project, a positive decision was taken to go for full implementation in one phase. This was seen to be the only way in which the planned improvements in resource activation performance could be achieved.

3100    In March 1992 the LAS Systems Manager was asked to carry out a further independent review of project progress. In his report he makes the following observations and recommendations:

a) the RIFS software was failing almost daily thus reducing confidence in the system;

b) volume testing of the whole communications infrastructure still had to be carried out (the report stresses how essential this is);

c) a fully documented implementation strategy should be prepared and signed off by all parties before moving the implementation forward:

d) the change log (the PIR system) should be under the formal control of the Systems Team and CAC should not be allowed to agree piecemeal changes with SO outside of this formal system;

e) the training of CAC and ambulance staff should be reviewed.

3101    There is no evidence that any of these points were taken up by project management. Indeed the report was never submitted to the Board, who had originally asked for it as an update to the review of November 1991. Instead it was used as input to the Chief Executive's report to the Regional General Manager (RGM) of 1 April which refers also to the need to test the reliability of the communications. His report also states that no further operational developments should take place until the system is fully tested and approved by the project team.
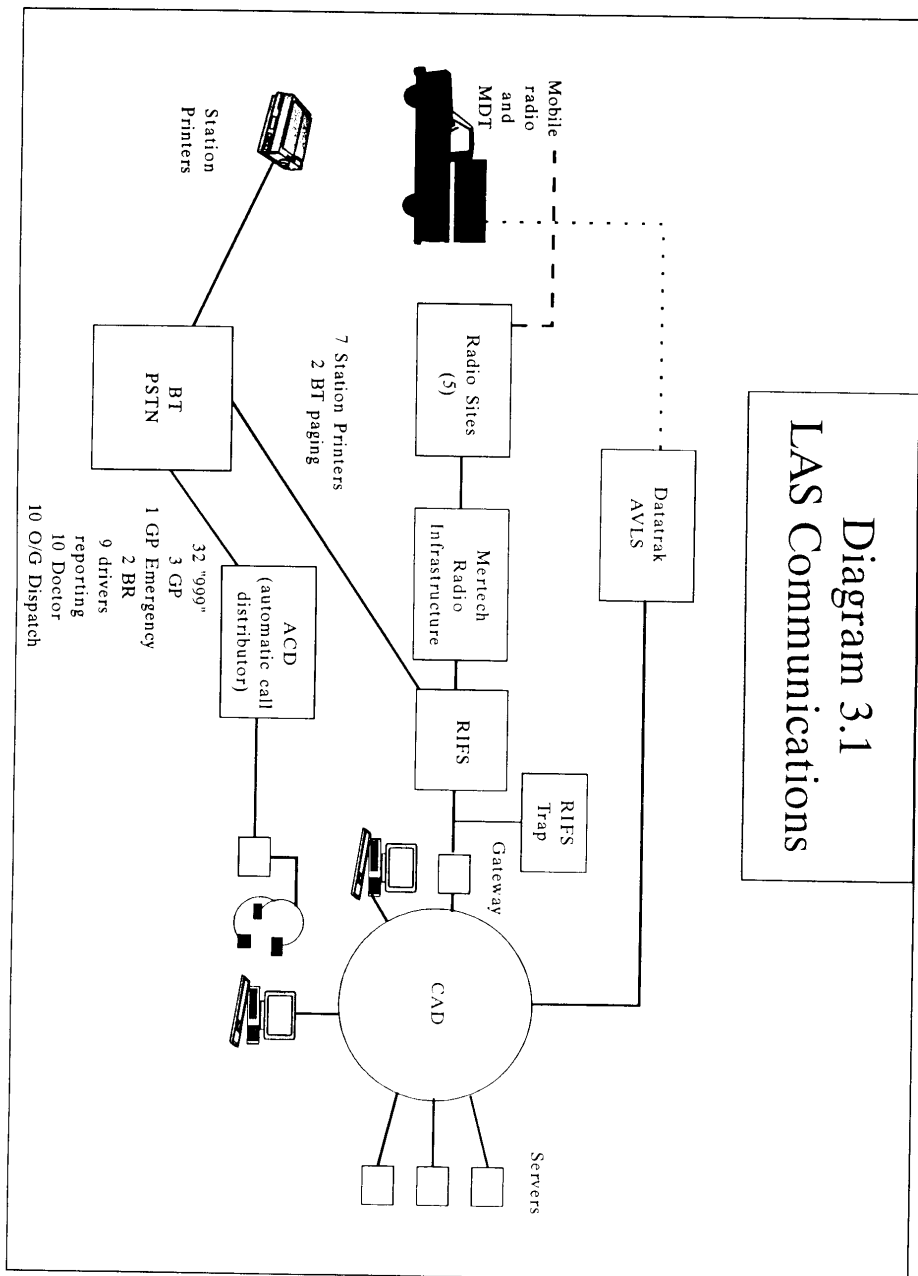
3102    The Chief Executive's report also states that "there is no evidence to suggest that the full system software, when commissioned, will not prove reliable.". In mission critical systems negative assurance is not enough. There should always be positive assurance through QA and testing that the system will perform to specification. Such positive assurance was never sought or obtained.

3103    The Inquiry Team examined the role of SW Thames RHA during the development/implementation process. As covered elsewhere, the LAS was a quasi independent body with its own Board, being managed only at "arm's length" by the RHA. Thus there was no requirement for the Region to provide technical input to the CAD project. It is also important to note that LAS never sought any assistance. Throughout 1992, leading right up to the events of 26 and 27 October, many concerns were expressed by the RGM in writing and at minuted meetings about the progress of CAD. Many specific CAD related issues were discussed yet in each case evidence suggests that fairly bland assurances from the Chief Executive that everything will satisfactorily be resolved are accepted by RHA management. Given the nature of these concerns and the regularity with which they arise the Inquiry Team, with hindsight, would have expected the RHA to commission an independent, in depth technical review of the project and its true status. Such a review would not have led to an earlier satisfactory implementation of the complete system but, if carried out thoroughly, it should have identified many of the problems that later were to materialise.

**Technical Communications**

3104    It is clear that in a system such as this where voice and data transmissions are so important it is vital that the communications infrastructure is beyond reproach. It has already been pointed out that some of the unsuccessful tenderers had expressed their concerns about the viability of the communications structure and its ability to cope with the load to be placed upon it. There is also much circumstantial evidence from both CAC staff and from ambulance crews that messages were not always getting through and that congestion of the airwaves led directly or indirectly to mistrust in the system and to many of the problems on the 26 and 27 October 1992. The components of the communication system are shown on Diagram 3.1.

3105    The major impact on the CAD system from communications problems are direct delays to mobilisations and that the system often did not have the correct location or status of the vehicles/crews. The five major communications problems impacting on the CAD system and associated causes are shown on Diagrams 3.2 and 3.3, and on the Communications Summary, Table 3.1.

# Diagram 3.1
# LAS Communications

Mobile
radio
and
MDT

Station
Printers

7 Station Printers
2 BT paging

Radio Sites
(5)

BT
PSTN

32 "999"
3 GP
1 GP Emergency
2 BR
9 drivers
reporting
10 Doctor
10 O/G Dispatch

Datatrak
AVLS

Mertech
Radio
Infrastructure

ACD
(automatic call
distributor)

RIFS

RIFS
Trap

Gateway

CAD

Servers

Diagram 3.2

**Causes**

- Swapped or missing call signs
- Crews don't push buttons
- Radio black spots
- Manual retransmits
- Radio (data) congestion
- Crews use different vehicles
- No PSTN lines free
- Calls to check on vehicle status or if mob's actually failed
- Lack of trust
- Poor radio procedures & discipline
- Lengthy procedures
- Messages sent by voice & data
- Voice comm's blocking data

**Problems**

- Correct and timely status not known
- Failed Mob's
- Voice congestion

Diagram 3.3

Causes

Problems

Interference from vehicle equipment

AVLS equipment not working

Swapped callsigns se/call fleet numbers AVLS numbers

No AVLS exception reporting

Too few call takers

Longer than necessary calls owing to call backs or poor operator discipline

Correct vehicle location not known

Long caller ring times

| Problem | Cause |
|---|---|
| Congested voice communications | Lack of trust in the system causing messages to be sent by data and voice.<br>Calls to check on vehicle status or to determine if mobilisations have actually failed.<br>Lengthy procedure for reading over mobilisations.<br>Poor radio procedures and discipline. |
| Correct and timely vehicle status not known by CAD | Crews don't press status buttons.<br>Radio channel congestion and black spots which result in crews having to re-transmit an excessive number of times. This cause is particularly bad at crew log on/off.<br>Swapped or missing callsigns. |
| Failed mobilisations to vehicles and stations | System failures caused mainly by:<br>a) voice communication blocking the channel thus resulting in data system time outs;<br>b) radio black spots;<br>c) no free PSTN lines to station printers.<br>Radio channel congestion and black spots which result in crews having to re-transmit an excessive number of times. This cause is particularly bad at crew log on/off.<br>Crews don't press status buttons.<br>Swapped or missing callsigns.<br>Crews use different vehicles from those allocated by CAD/CAC. |
| Correct vehicle location not known by CAD | AVLS equipment not working.<br>Interference from vehicle equipment.<br>Swapped callsigns/selcall/fleet numbers/AVLS numbers.<br>No AVLS exception reporting. |
| Long ring times for 999 and urgent calls | Too few call takers.<br>Possible longer than necessary calls owing to call backs or poor operator discipline. |

3106    The communications problems were not predicted as:

a) the impact of CAD upon the existing communications infrastructure was never properly and systematically considered;

b) no formal calculations were ever done to show how the CAD system would impact on the communications system. A memo from the Assistant Director of Operations to A&E Operations Team dated 23 December 1991 states "Following the initial operating period (post full implementation) of the CAD system, a full review of the radio network capability will be carried out...". This should have been carried out prior to implementation not after.

**Human Resources, and CAD Training**

3107    This is an area which has been looked at in depth in relation to CAD and other matters within LAS. It is important to understand that in any system implementation the people factor is as important, and arguably more important, than the technical infrastructure.

3108    It is worth noting that in general the attitude to the use of information technology amongst the CAC management and staff, and the ambulance crews, is overwhelmingly positive. All recognise that computerisation of this area is essential in enhancing efficiency. However, there is an equally unanimous feeling that the current CAD system, and particularly the way in which it was introduced, is not the way ahead. There is no confidence in the system with the result that staff expected it to fail rather than willing it to succeed. There is no doubt that a major confidence rebuilding job needs to be done before any future CAD may be successfully implemented.

3109    There are ambiguities over the extent to which ambulance crews were consulted or involved in the setting of the original requirements specification or in the revised operational method of working. It is apparent that in the early stages the trade unions were not keen for their members to be involved although this attitude did loosen up as the project progressed. However, there is no evidence of the ambulance staff having joint "ownership" of the system as one of the key stakeholders.

3110    There was patchy resistance to the installation of Datatrak equipment in the vehicles. There is much circumstantial evidence of wilful damage to or misuse of Datatrak equipment. However, Datatrak themselves state that resistance at LAS in general was no greater than that experienced by them at other organisations.

3111    There is also circumstantial evidence of some crews deliberately attempting to confuse the system by not properly notifying status changes. It is probable that there was a small element of this, but it is likely to be no greater a problem than has been caused by transmission difficulties.

3112    Crew training and CAC staff training is a key issue. Much of the training was carried out well in advance of the originally planned implementation date and hence there was significant "skills decay" between then and when staff were eventually required to use the system. There are also doubts over the quality of training provided, whether by SO or by LAS's own Work Based Trainers (WBTs). Within CAC, staff underwent training primarily through WBTs, on a competence basis. This competence basis meant that at the completion of training both the WBT and the individual had to sign off to say that the agreed level of competence had been reached. Different competence levels were required as relevant for each job (eg call taking, exception rectifying etc.). This training was not always comprehensive and was often inconsistent. The problems were exacerbated by the constant changes being made to the system. London Ambulance Service

3113    A key feature of the failure of the CAD system is the inability of CAC and ambulance staff to fully appreciate each other's role in providing a service to London. This problem was probably exacerbated by totally separate training of these two functions. Greater "buy in" to the system would have been achieved had at least certain elements of the CAD training been given jointly to both sides. This would have enabled them each to understand how successful operation of the system could only come about through CAC and the crews operating in full partnership. It would also have enabled them each to better understand the stresses that the other works under.

3114    There is no doubt that human resources and industrial relations issues do have an impact on the failure of the CAD implementation, but even with the best IR practices it is unlikely that this system would have succeeded in the incomplete and unstable state in which it was implemented. However, the unstable industrial relations environment provided an unsound foundation upon which the system was built.

3115    An important factor was almost certainly the culture within the LAS of "fear of failure". Given the management changes of the last two years senior management were continually under pressure to succeed. This may have put undue pressure on management directly concerned with CAD to ensure that the system was implemented to timetable and to budget. This may have blinded them to some of the fundamental difficulties with the system that perhaps in retrospect seem rather more obvious.

3116    The industrial relations problems within the LAS are well documented. Within operational management there was a clear perception that the CAD system would do much to overcome, or at least reduce, the effect of these problems. A CAD system operating as it was intended in an absolutely objective and impartial way would always ensure the mobilisation of the optimum resource to any incident. This was perceived to overcome many of the working practices seen by management to be outmoded and not in the best interests of providing the best service to London. Such practices included the previous ability of the crews themselves or the stations to decide which resource to mobilise to an incident. CAD would eliminate this practice, or so management thought. Unfortunately such practices could not so easily be eliminated and the CAD system would accommodate them only with difficulty and with a reduced level of efficiency. Crews and stations could, if they wished, still accommodate these practices by failing to mobilise, or sending a different resource, or failing to acknowledge or report status. Such practices would contribute to clogging up the system. Management were misguided or naive in believing that computer systems in themselves could bring about such changes in human practices. Experience in many different environments proves that computer systems cannot influence change in this way. They can only assist in the process and any attempt to force change through the introduction of a system with the characteristics of an operational "straitjacket" would potentially be doomed to failure.

3117    There is little doubt that perceived and actual problems with the system did cause resentment amongst some ambulance crews which would have affected their attitude to the system. These problems included:

a) because the system would allocate the nearest available resource regardless of originating station, crews were having often to operate further and further from their home base. This resulted in them operating in unfamiliar territory with further to run to reach their home station at the end of a shift;

b) the new system took away the flexibility they previously had for the station to decide on which resource to allocate. This inevitably led to problems when a different resource was used to the one that was allocated;

c) the lack of voice contact made the whole process more impersonal and exacerbated the "them and us" situation;

d) the occasional imperfections of Datatrak reduced confidence on the system;

e) the problems with reporting status, however caused, resulted in wrong allocations being made that were less likely to happen in a voice contact/manual allocation world. This often led to the necessity for longer runs than strictly should have been necessary had the correct resource been allocated.

3118    This lack of confidence in the system was not restricted to the ambulance crews. Control management and staff also had less than complete confidence in the system often because of adverse feedback from ambulance crews due to the factors noted above. There were also many factors concerning the computer system technical reliability and system performance that affected their attitude.

**The System Structure**

3119 The complete CAD system had a number of different elements including:

a) CAD Software;

b) CAD Hardware;

c) RIFS Communication Interface;

d) radio system;

e) Datatrak Sub System;

f) GazeKeer and Mapping Software;

g) Mobile Data Terminals.

3120 Various points have already been raised about the quality and speed of the CAD software. The quality issues are significant and are caused by time pressures to deliver, inadequate testing and poor quality control.

3121 All quality problems with software or any other element of the system should have been communicated to the suppliers through the Project Issue Report (PIR) form procedures. This system was designed to enable control to be established over problems awaiting solutions. Each PIR was sequentially numbered to enable the control to be monitored. As already pointed out, these procedures were often circumvented by SO who would on occasions amend software to meet individual user's wishes without going through the PIR route.

3122 However, the PIR system, even with its imperfections, did provide a useful way of monitoring development problems and software quality issues. On the 26 October 1992 the total number of PIR's submitted amounted to 1,513. Of these some 81 remained outstanding on that date.

3123 The PIR's have one of four categories attached to them as follows:

a) *Status 1* System cannot be started, is unusable or cannot handle major operational situation.

b) *Status 2* Severe service degradation; system will not function in the operational environment until this is rectified;

c) *Status 3* Will cause problems in an operational environment resulting in poorer Quality of Service to patient;

d) *Status 4* Minor problems requiring attention; system can be implemented with this fault, but it should be rectified beforehand if possible.

3124 Of the 81 remaining PIR's on 26 October 1992, 2 were category 2, 44 were category 3 and the remainder were category 4.

3125 The outstanding category 2 PIR's related to the ways in which multiple incident reports were displayed and the incorrect decoding of MTD status - both potentially serious problems. Therefore using the LAS's own categorisation, the system was fully deployed on 26 October 1992 with serious faults.

3126 The slow speed of response of the software is also a regularly reported issue. Response times will always be subjective and, under stress, response times will always seem longer than perhaps they are, but in the absence of seeing the system ourselves under a full operational load, there is enough hearsay evidence to support the theory. Possible reasons for slow response times include:

a) inefficient software design;

b) insufficiently powerful hardware;

c) operating environment insufficiently powerful to support the application design.

3127    These possible causes are not inseparable, but they can be considered one by one.

3128    SO admit that many of the programs could benefit from some tuning. To date they have been designed for functionality rather than speed and this area could usefully be revisited. SO are keen to do this. All screen dialogues are written in Visual Basic, a comparatively new development tool designed primarily for fast systems development rather than the development of fast systems! It is possible that these programs could benefit from being rewritten in, say, C++ or even in the latest version of Visual Basic. Some minor efficiencies could be gained also by upgrading the operating environment to Windows 3.1. from the current 3.0. Developing the screen dialogues in Visual Basic was not envisaged at the time the Apricot/Systems Option proposal was produced. This development tool was released subsequent to this. Thus SO were using an, at the time, unproven development tool designed primarily for prototyping and the development of small, non mission critical, systems. The performance speed of Visual Basic applications is not fast. Filling screens with Visual Basic applications takes time measured in several seconds. In order to overcome this CAC staff preloaded all the screens they were likely to use at the start of a shift and used the Windows multi-tasking environment to move between them as required. This placed great demands on the memory available within the workstations, thus reducing performance, and led to a surplus of "clutter" on controllers' screens. It is also probable that the unproven combination of Visual Basic within Windows 3.0 Ied to some of the early systems failures. Our own simulation of certain Visual Basic routines within Windows 3.0 has resulted in some unexplained systems crashes. Running the same routines under Windows 3.1 resulted in no such problems. It is important to note that the underlying processor intensive routines such as resource proposals are written in C and do not rely on Visual Basic. However, the LAS desire to opt for a graphical user interface as opposed to a text based presentation has resulted in a trade off of performance in favour of ease of operator use. In re-examining its options for the future LAS will need to decide whether such a trade off is justified.

3129    The hardware is very powerful. Most of the processing is done within the workstations and so file server performance is not the key issue. All workstations are 486 based (the most powerful chip in standard use) although as they are 25mhz versions they could be upgraded to 50mhz to improve performance.

3130    The workstations, as noted in paragraph 3128, operate the Microsoft Windows environments which allows an attractive and user friendly graphical user interface and simultaneous multi- tasking of applications. This allows users to leave processes running, eg a resource proposal, whilst simultaneously allowing access to other parts of the application by overlaying one window of information on top of another. However useful this might be it is very demanding on processor power and on memory. Speed could possibly be improved by adding additional memory and by better staff training. It is also relevant that the processor power needed to run the resource proposals efficiently increases considerably as the distance increases between the incident and the potentially available resources. This is because of the complex processing needed to calculate time and distance within the system. Thus, when resources become fewer and more distant due to the number of incidents to be covered, the system inevitably slows down.

3131    Overall our examination of the hardware configuration has not revealed any major problems. The equipment is powerful and, generally, resilient. The file servers, the workstations, and the network infrastructure should be able to cope with the peak loads likely to be placed upon it. However, minor and low cost enhancements to the file server and workstation memory would be a useful investment if the equipment is to be used into the future. We have identified no reason why the existing hardware should not continue to be used. Within the total customer base of Apricot networks LAS is not considered to be a large network. Many organisations operate significantly larger networks with greater transactional throughput. Thus, if properly implemented and maintained, there is no reason why the LAS equipment should not be able to cope with the workload.

3132    The two fallback file servers (including the one to be deployed at the Brixton backup centre) should provide adequate resilience. However, this had not been fully set up or tested by 26 October 1992.

3133    The Datatrak system has been proven to be occasionally unreliable throughout the development and implementation stages. We have already referred to certain problems in earlier parts of this report. However, the Datatrak system as currently installed is likely to be as reliable as any AVLS system ever can be in an urban environment such as London.There will always be occasional problems with clean transmission of accurate location information as its accuracy depends on uncorrupted signals being received by and transmitted from moving vehicles in an environment which is hostile to any radio signals. What is important however is that the CAD software should recognise and be able to deal with the fact that occasionally imperfect location information will be supplied.

3134    One factor that differentiates the LAS network from others of an equal or larger size is the lack of full time network management. Throughout the development and implementation of CAD all network housekeeping and management was attended to by SO. Even on the days of "systems failure" on 26 and 27 October 1992 SO personnel had to be called in to handle the network problems that arose. Although it was always LAS's intention to take over this responsibility this had not been achieved by the time of full systems implementation. Thus any network problems that arose had to be referred to SO for resolution. Apricot, in one of their site monitoring visits in early 1992, recommended to LAS that they should have a dedicated network supervisor with the continuing responsibility for identification and rectification of network problems, all housekeeping, and maintenance of performance statistics. This recommendation was not acted upon.

## 4    26 AND 27 OCTOBER AND 4 NOVEMBER 1992

### CAD Conclusions

4001    What is clear from the Inquiry Team's investigations is that neither the Computer Aided Despatch (CAD) system itself, nor its users, were ready for full implementation on 26 October 1992. The CAD software was not complete, not properly tuned, and not fully tested. The resilience of the hardware under a full load had not been tested. The fall back option to the second file server had certainly not been tested. There were outstanding problems with data transmission to and from the mobile data terminals. There was some scepticism over the accuracy record of the Automatic Vehicle Location System (AVLS). Staff, both within Central Ambulance Control (CAC) and ambulance crews, had no confidence in the system and were not all fully trained. The physical changes to the layout of the control room on 26 October 1992 meant that CAC staff were working in unfamiliar positions, without paper backup, and were less able to work with colleagues with whom they had jointly solved problems before. There had been no attempt to foresee the effect of inaccurate or incomplete data available to the system (late status reporting/vehicle locations etc.). These imperfections led to an increase in the number of exception messages that would have to be dealt with and which in turn would lead to more call backs and enquiries. In particular the decision on that day to use only the computer generated resource allocations (which were proven to be less than 100% reliable) was a high risk move.

4002    Whilst understanding fully the pressures that the project team were under to achieve a quick and successful implementation it is difficult to understand why the final decision was made, knowing that there were so many potential imperfections in the system.

### Demand on LAS Services 26 and 27 October

4003    LAS management have suggested that 26 and 27 October 1992 were busier than normal and that the increased demand on the service contributed to the system problems and lower service to patients. Diagram 4.1 shows the percentage of incident response times which are less than 15 minutes. The ORCON specified response time from taking the call to arriving at scene is 14 minutes. For 26 and 27 October 1992 the percentage of response times of less than 15 minutes is considerably lower than October's average shown by the horizontal line thus confirming a lower level of service to patients.

4004    Diagram 4.2 shows another indicator of poor service. Average ring times peaked at around 10 minutes on 26 October 1992

4005    There is, however, no evidence to support the claim that 26 and 27 October 1992 were busier days in terms of accidents and other incidents requiring LAS' services. For example:

a) the total number of A&E patients carried on both 26 and 27 October 1992 was less than the daily average for October as shown on Diagram 4.3:

b) the number of telephone calls received by the LAS once adjusted to include only the average amount of calls over and above each original call to initiate an incident was only 6% above the average number of calls for October.

4006    The factor which may have led to the belief that additional demand was placed on the LAS on 26 and 27 October 1992 was the total number of calls, including a high level of "call backs" received by LAS, see Diagram 4.4. "Call backs" are, for example, calls querying the estimated time of arrival of the ambulance previously requested. It should also be noted that even on 26 and 27 October the number of calls is within the range within which it can be predicted that 95% of all calls will fall, ie for 95 out of a 100 days the number of calls received will fall within the upper and lower lines shown on Diagram 4.4.

**Diagram 4.3**
**Total A&E Patients Carried October**



**Diagram 4.4**
**Calls recorded by call logger**
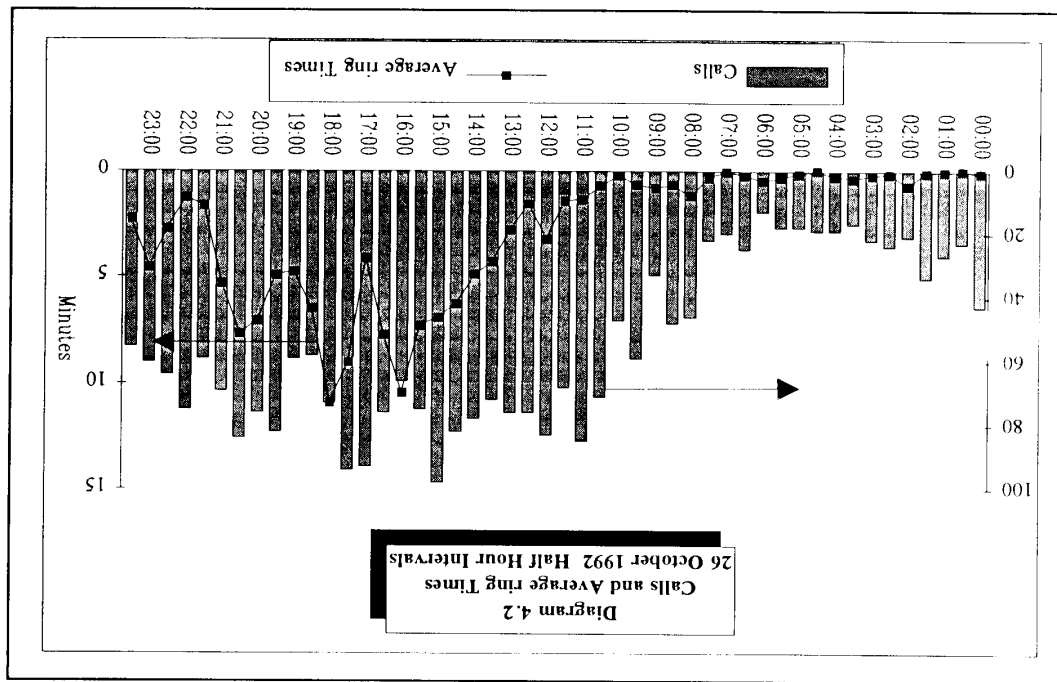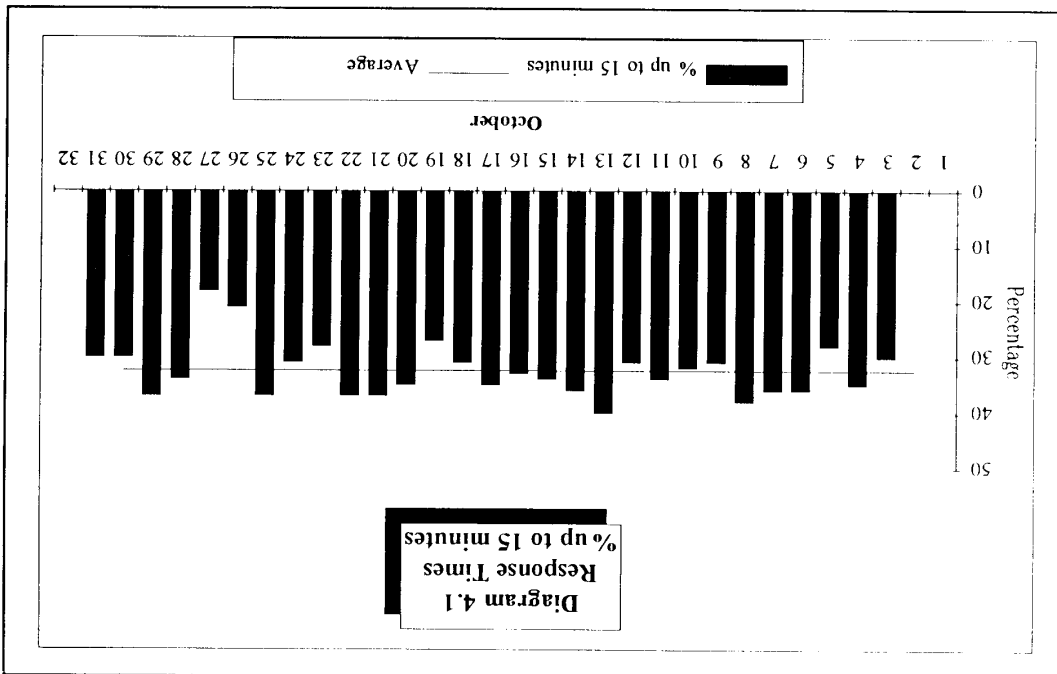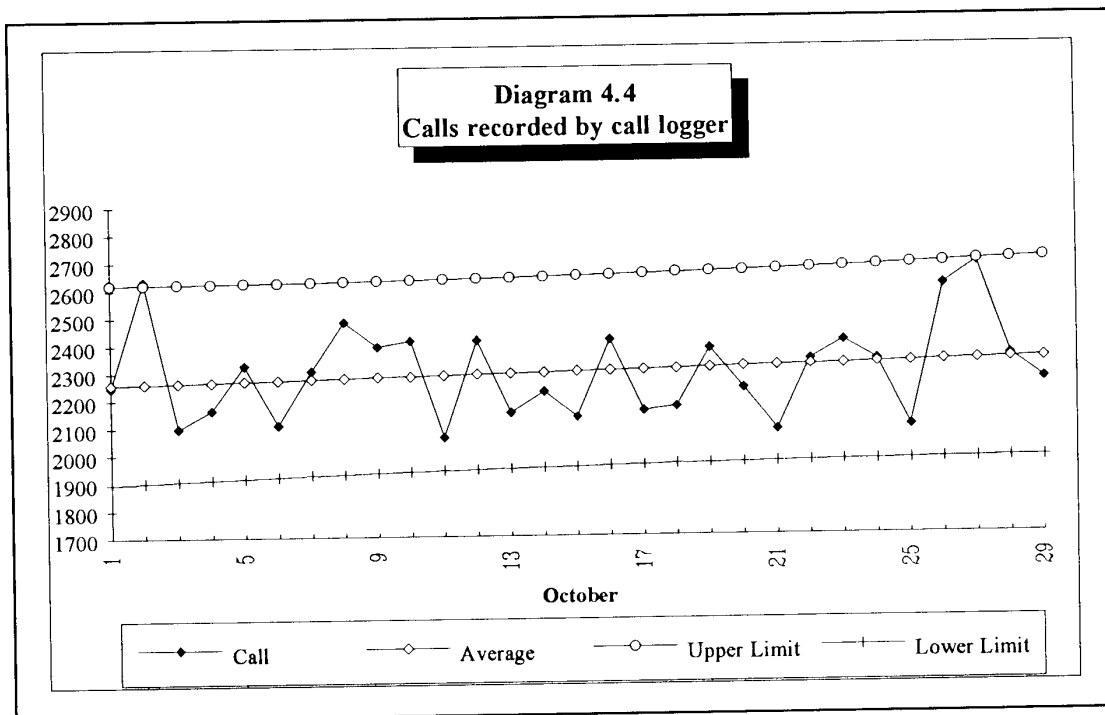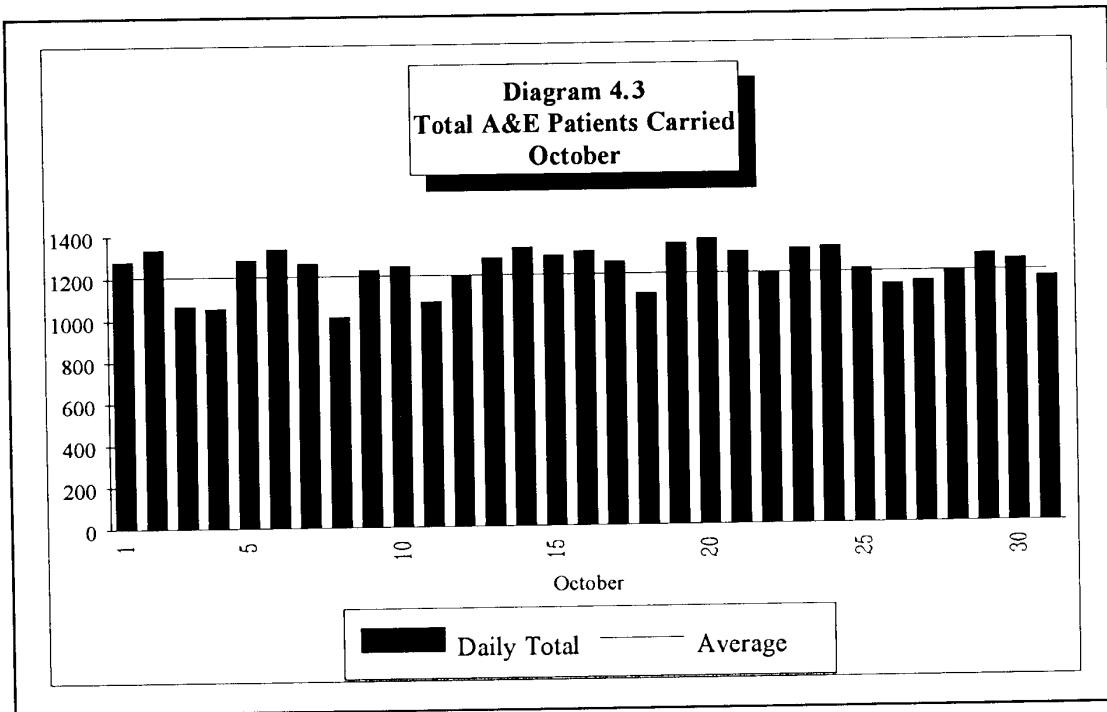
**Key System Problems**

4007     As detailed earlier there were a number of basic flaws in the CAD system and its supporting infrastructure. In summary, the system and its concept has several major problems:

a) a need for near perfect input information in an imperfect world;

b) poor interface between crews, MDTs and the system;

c) unreliability, slowness and operator interface.

*Need for near perfect information*

4008     The system relied on near perfect information of vehicle location and crew/vehicle status. Without accurate knowledge of vehicle locations and status the system could not allocate the optimum resource to an incident. Although some poor allocations may be attributable to errors in the allocation routine, it is believed that the majority of allocation errors were due to the system not knowing the correct vehicle location or status of vehicles that may have proved more appropriate.

*Poor interface between crews, MDTs and the system*

4009     Given that the system required almost perfect information on vehicle location and status, each of the component parts of the chain from crews to despatch system must operate well. This was not the case. From our investigations, possible reasons for the despatch system not knowing the correct vehicle location or status of vehicles that may have proved more appropriate:

a) a failure of the system to catch all of the data;

b) a genuine failure of crews to press the correct status button owing to the nature and pressure of certain incidents;

c) poor coverage of the radio system, i.e. black spots;

d) crews failing to press status buttons as they became frustrated with re-transmission problems;

e) a radio communications bottle neck, e.g. when crews commence duty and try to log on via their vehicle's MDT or during other busy periods;

f) missing or swapped callsigns;

g) faults in the "hand shaking" routines between MDTs and the despatch system, eg MDTs showing Green and OK, but system screens showing them in a different status;

h) crews intentionally not pressing the correct status buttons or pressing them in an incorrect order. i) crews taking a different vehicle to that which they have logged on to, or a different vehicle/crew responding to that allocated by the system;

j) incorrect or missing vehicle locations;

k) too few call takers.

4010     The above reasons are often interconnected.

*Unreliability, Slowness and Operator Interface*

4011    It is reported that the system "fell over" a few times before 26 October 1992. More common was the frequent "locking up" of screens. Staff had been instructed to re-boot their screens if they locked up. The system also slowed up when under load and whilst it was doing its "house keeping" at 02:00 hours each morning.

4012    General imperfections include:

a) failure to identify all duplicated calls;

b) lack of prioritisation of exception messages;

c) exception messages and awaiting attention queues scrolling off the top of the allocators'/exception rectifiers' screens;

d) software resource allocation errors;

e) general robustness of the system (workstation and MDT "lockups");

f) slow response times for certain screen based activities.

**System Configuration Changes**

4013    In the months before 26 and 27 October the system was used in a semi manual fashion. Calls were taken via the system and paper copies printed as back up to screen based information. An allocator was assigned to each of the three Divisions and worked with a radio operator and despatcher. By this method of working, together with the paper back up, CAC staff were able to update manually vehicle status and override suggested resource allocations where necessary to overcome the problems listed above.

4014    No changes with bearing on the system failure had been made to the system in the weeks before 26 and 27 October 1992. The computer system was functioning in the same way before and during 26 and 27 October 1992.

4015    The changes relevant to the failure on 26 and 27 October 1992 relate to the decision to "go live" and to use the system as it was originally envisaged, i.e. with no paper records and activation boxes. The key changes were:

a) re-configuring the control room;

b) installing more CAD terminals and Radio Interface System (RIFS) screens;

c) not using the manual paper and activation box system as back up;

d) separating resource allocators from radio operators and exception rectifiers;

e) going "pan London" rather than operating in three Divisions;

f) using only the system proposed resource allocations;

g) allowing some call takers to allocate resources if the nearest resource was less than 11 minutes away;

h) separate allocators for ASls, AS2s and AS3s (999 calls, doctors' urgent calls and PTS calls respectively).

**Causes and Effects of Breakdown on 26 and 27 October 1992**

4016    On 26 and 27 October 1992 the computer system itself did not fail in a technical sense. Response times did on occasions become unacceptable, but overall the system did what it had been designed to do. However, much of the design had fatal flaws that would, and did, cumulatively lead to all of the symptoms of systems failure.

4017    In order to work effectively the system needed near perfect information all of the time. Without this the system could not be expected to propose the optimum resource to be allocated to an incident. There were many imperfections in this information which individually may not be serious, but which cumulatively were to lead to system "failure".

4018    The changes to CAC operation on 26 and 27 October 1992 made it extremely difficult for staff to intervene and correct the system. Consequently, the system rapidly knew the correct location and status of fewer and fewer vehicles. The knock on effects were:

a) poor, duplicated and delayed allocations;

b) a build up of exception messages and the awaiting attention list;

c) a slow up of the system as the messages and lists built up;

d) an increased number of call backs and hence delays in telephone answering.

# Diagram 4.5
## 26/27 October Cause/Effect Diagram

System misses data transmission

Crews forget to press right button in correct sequence

Radio blackspots

Crews become impatient with re-transmission

Radio bottlenecks

Missing or swapped callsigns

"Hand shaking" problems

Crews don't press buttons intentionally

Crews take different vehicle or different vehicle responds to incident

Incorrect or missing vehicle locations

Too few call takers

Increased voice comm's

Voice comm's delays

Failed data mobilisations

Crew frustration

Incorrect or no vehicle location or status received by system

Allocators unable to spot and correct errors

System has incorrect location and status information

Resources reserved, but not mobilised

System allocation faults

Incorrect allocation
a) multiple vehicle
b) not closest vehicle

System has fewer resources to allocate

Takes longer to allocate

Two line summary awaiting attention list builds up and scrolls through automatically

System places covered jobs back on awaiting attention list

Staff unable to clear exception messages

System generates exception messages

Uncleared exception messages generate more exception messages

System slows Re-booting becomes more frequent

Exception messages deleted to speed system

Uncovered incidents

DELAYS TO PATIENTS

Call backs

More and longer calls

Delays to phone answering

4019    Each effect quickly reinforced the others leading to severe lengthening of response times. A more detailed explanation follows.

4020    A cause and effect diagram is shown, Diagram 4.5, for the operation of the system on 26 and 27 October 1992. As the number of incidents increases there are several naturally reinforcing loops which escalate the problems. A description of the course of events and interaction follows.

4021    When the system was fully implemented at 07:00 hours 26 October 1992 the system was lightly loaded. Staff and system could cope with the various problems (left hand side of the diagram) which caused the despatch system to have imperfect information on the fleet and its status. As the number of incidents increased, incorrect vehicle location or status information received by the system increased. With the new room configuration and method of operation, allocators were less able to spot and correct errors.

4022    The amount of incorrect location and status information in the system increased with four direct effects:

a) the system made incorrect allocations: multiple vehicles sent to same incident, or not the closest vehicle sent;

b) the system had fewer resources to allocate, increasing the problems of effect a);

c) as previously allocated incidents fed through the system and suffered from the problems on the left hand side of the diagram which resulted in the system not having the resource's correct status, the system placed covered calls that had not gone through the amber, red, green status cycle, back on the attention waiting list;

d) failures because of the problems on the left hand side of the diagram caused the system to generate exception messages.

4023    Starting with effect 4022 d), the number of exception messages increased rapidly to such an extent that staff were unable to clear the queue. As the exception message queue grew the system slowed. The situation was made worse as unrectified exception messages generated more exception messages. With the increasing number of "awaiting attention" and exception messages it became increasingly easy to fail to attend to messages that had scrolled off the top of the screen. Failing to attend to these messages arguably would have been less likely in a "paper-based" environment.

4024    Effects 4022 b) and c). With fewer resources to allocate the system would recommend what it saw as the closest vehicle. This was often an incorrect allocation as a closer vehicle was actually available. It took longer to allocate resources for three reasons:

a) the allocator had to spend more time finding and confirming suitable resources;

b) incidents were held until a suitable resource became available;

c) resource proposal software took longer to process as resources became more distant.

4025    There was a re-enforcing effect in that as allocators tried to contact a resource, that resource was unavailable for allocation to another incident. Once an allocator "clicked onto" a resource its status turned to dark green thus preventing it from being allocated elsewhere. It is reported that one allocator was allocating resources, but not mobilising them. Any delay in allocation or mobilisation was a delay to a patient.

4026    It also took longer to allocate resources as more two line summaries fed through the system. Standard two line summaries of incidents awaiting resource allocation included those that had previously been covered, but were not seen by the system as complete. As this queue built up it caused the system to slow.

4027    At one stage two line summaries were scrolling onto the screen so fast that in trying to stop summaries moving off the screen, allocators were further slowed in their tasks.

4028    In summary, effects 4022 b) and c) contributed to incorrect allocations, a slowing of the system and uncovered incidents all leading to delays to patients. The number of uncovered incidents was probably increased when at one stage the exception report queue was cleared in an effort to increase the speed of the system.

4029    Effect 4022 a), incorrect allocations, led directly to patient delays and crew frustration. Crew frustration was further increased by delays in arriving at the scene and the reaction from the public.

4030    Crew frustration may have been responsible for:

a) increasing the instances when crews didn't press the status buttons in the correct sequence;

b) the allocated crew taking a different vehicle, or a different crew and vehicle responding to the incident.

4031    In the month preceding 26 and 27 October 1992 crew frustration also led to an increase in radio traffic which, owing to the potential for radio bottlenecks, increased the number of failed data mobilisations and voice communication delays. In turn, and completing the loop, failed data mobilisations and voice communications delays lead to further increased voice communications and crew frustration. On 26 October instruction was for minimum voice communication. Statistics show that the number of successful data mobilisations increased. However, with no voice communications, wrong or multiple allocations were not corrected thus negating the beneficial effect of increase data mobilisations.

4032    Turning to telephone communications between the public and CAC, delays to patients and uncovered incidents greatly increased the number of call backs, thus increasing the total number of calls handled. An increased call volume, together with a slow system and too few call takers caused significant delays in telephone answering, thereby further increasing delays to patients.

**Failure of the Computer System. 4 November 1992**

4033    Following the CAD problems of 26 and 27 October 1992, CAC had reverted to a semi manual method of operation, identical to that which had operated with a variable degree of success before 26 October.

4034    This method of working comprised:

a) calls being taken on the CAD system (including use of gazetteer);

b) incident details being printed out in CAC;

c) optimum vehicle resource identified through contact with nearest station to incident;

d) mobilisation of the resource via CAD, direct to the station printer or to the MDT.

4035    In general CAC staff were comfortable with operating this system as they found the computer based call taking and the gazetteer for the most part reliable. There were known inadequacies with the gazetteer and occasional "lock-up" problems with workstations, but overall the benefits outweighed the disadvantages. The vehicle crews were also more comfortable as the stations still had local flexibility in deciding which resource to allocate to an incident. The radio voice channels were available to help clear up any mobilisation misunderstandings. Largely as a result of the problems of the previous week, additional call taking staff had been allocated to each shift thus reducing significantly the average call waiting time.

4036    This system operated with reasonable success from the afternoon of 27 October 1992 up to the early hours of 4 November.

4037    However, shortly after 2am on 4 November the system slowed significantly and, shortly after this, locked up altogether. Attempts were made to re-boot (switch off and restart workstations) in the manner that CAC staff had previously been

instructed by Systems Options to do in these circumstances. This re-booting failed to overcome the problem with the result that calls in the system could not be printed out and mobilisations via CAD from incident summaries could not take place. CAC management and staff, having assured themselves that all calls had been accounted for by listening to the voice tapes, and having taken advice from senior management, reverted fully to a manual, paper-based system with voice or telephone mobilisation. As these problems occurred in the early hours when the system was not stretched the operational disruption was minimised.

4038    SO were called in immediately to investigate the reasons for the failure. In particular LAS required an explanation as to why the specified fallback to the standby system had not worked.

4039    The Inquiry Team has concluded that the system crash was caused by a minor programming error. In carrying out some work on the system some three weeks previously the SO programmer had inadvertently left in the system a piece of program code that caused a small amount of memory within the file server to be used up and not released every time a vehicle mobilisation was generated by the system. Over a three week period these activities had gradually used up all available memory thus causing the system to crash. This programming error should not have occurred and was caused by carelessness and lack of quality assurance of program code changes. Given the nature of the fault it is unlikely that it would have been detected through conventional programmer or user testing.

4040    The failure of the fallback procedures arises as a consequence of what was believed at the time to be only a temporary addition of printers. The concept of the system was that it would operate on a totally paperless basis. Printers were only added, as a short term expedient, in order to implement at least a partial system at the originally planned implementation date of 8 January 1992.

4041    The fallback to the second server was never implemented by SO as an integral part of this level of CAD implementation. It was always specified, and indeed implemented, as part of the complete paperless system and thus arguably would have activated had the system actually crashed on 26 and 27 October 1992. However, there is no record of this having been tested and there can be no doubt that the effects of server failure on the printer-based system had not been tested. This was a serious oversight on the part of both LAS IT staff and SO and reflects, at least in part, the dangers of LAS not having their own network manager.

## 5    THE WAY FORWARD FOR CAD

5001    The development of a strategy for the future of computer aided despatch within the London Ambulance Service must involve a full process of consultation between management, staff, trade union representatives and the Service's information technology advisers. It may also be appropriate to establish a wider advisory group involving experts in CAD from other ambulance services, the police and fire brigade. Consequently the recommendations from the Inquiry Team should be regarded as suggestions and options for the future rather than as definitive recommendations on the way forward. What is certain is that the next CAD system must be made to fit the Service's current or future organisational structure and agreed operational procedures. This was not the case with the current CAD.

5002    In the team's investigations there was unanimous support for technology to be used to enhance the delivery of ambulance services to people in London. Computer aided despatch is the most clearly identified way in which this may be achieved. All parties were unanimous that the current paper based system is inefficient and, although re-introduced in November 1992 as a short term expedient, should be replaced with an automated system as soon as possible.

5003    However, learning from the lessons of 1992, it is essential that computer aided despatch is introduced only in a properly controlled way whereby there can be minimum risk to the delivery of an optimum service to the public.

5004    We recommend that any future CAD system must conform to the following imperatives:

a) it must be fully reliable and resilient with fully tested levels of back-up;

b) it must have total ownership by management and staff, both within CAC and the ambulance crews;

c) it must be developed and introduced in a timescale which, whilst recognising the need for earliest introduction, must allow fully for consultation, quality assurance, testing, and training;

d) management and staff must have total, demonstrable, confidence in the reliability of the system;

e) the new system must contribute to improving the level and quality of the provision of ambulance services in the capital;

f) any new system should be introduced in a stepwise approach, with, where possible, the steps giving maximum benefit being introduced first;

g) any investment in the current system should be protected and carried forward to the new system only if it results in no compromises to the above objectives.

5005    The extent to which the existing investment may continue to be used will need to be considered. In examining each element of the current investment the following picture emerges.

*Hardware*

5006    The computer hardware is industry standard "IBM compatible" workstations and file servers. At a minimum the existing work stations could be used for any future system and, it is probable that the file servers could also be used - regardless of whether or not the current software is replaced or extended. However, additional memory and faster processor chips may have to be added to the workstations and the file servers in order to enhance performance. Other fine tuning may also be required.

*Datatrak A VLS Equipment*

5007    The Datatrak AVLS is arguably as accurate as any such system ever can be in a city such as London. Thus it is probable that this investment can be retained. However, work will need to be done on improving the accuracy and reliability of the system, possibly involving a change to the method used to calculate location information. This will require LAS to work in close partnership with Datatrak.

*Solo Electronic Systems MDTs*

5008    There has been criticism of the design of these units, particularly their readability in certain lighting conditions. This must be addressed before recommendations may be made on their appropriateness for the future. In particular consideration should be given to moving to a minimum four line display, improving the clarity of the display, and adding printing facilities. Ambulance crews must be fully consulted in this process.

*Systems Options Software*

5009    The biggest question mark must be over the application software. There are many known bugs in the system and the performance of the software has attracted much criticism. Before recommendations can be made on the future for this software LAS management, together with their professional IT advisers, must determine the extent to which it meets their revised needs for the system and a full quality assurance review must be undertaken to ensure its full underlying quality as a basis for future development. In a mission critical system such as CAD there are doubts as to the suitability of the Windows environment and the use of Visual Basic for the screen dialogues. There is every probability that, in order to achieve performance improvements, many aspects of the system will require a major rewrite.

5010    In setting out a proposed framework for the future it is recognised that to achieve a comprehensive computer aided despatch system for the service will take up to four years. This time scale may seem long, but it may be regarded as modest compared to the slow, but sound progress being made in similar situations by other ambulance services and other emergency services. Achievement of the above objectives cannot be achieved quickly. Much has to be done in the improvement of industrial relations and the clarification of operational procedures and working practices before any

new system can hope to succeed. This will take time. The development, quality assurance, and testing of all aspects of a highly complex system will also take time. The technical communications infrastructure, vital to the system's success, must be examined. These and many other issues will prevent early implementation of a comprehensive system.

5011    The strategy for the future must be to develop a framework whereby the end objective for CAD is totally clear and which allows that objective to be reached in a controlled way through the successful implementation of a number of interim phases. Each of these phases will enable confidence to be gained, by management, by staff, and by the people they serve, before moving on through subsequent phases to the final solution. It is clear that one of the reasons for the failure of CAD in 1992 was the impossible timetable and the originally planned total CAD implementation in just one phase. This approach must be avoided for the future.

5012    What then should be the ultimate objective for CAD within LAS?

5013    In principle there is very little wrong with the overall concepts embodied in the existing CAD system. This system was intended to achieve the following:

a) more efficient call taking through direct computer input, the use of a computer based gazetteer, and a triage system designed to identify the priority cases;

b) continual update of the availability of ambulance resources through an automated vehicle location system and regular status updates by crews through mobile data terminals;

c) proposal of the most suitable resource to send to an incident using the above features and without any human interaction (in the majority of cases);

d) mobilisation of the most appropriate vehicle through direct data transmission either to the station or direct to the ambulance MDT;

e) management and allocation of ambulance resources on a pan-London basis;

f) the regular collection of management information on such matters as resource usage and response times as a direct by product of the usage of the system.

5014    As has been catalogued in detail elsewhere the current CAD system, for a great many reasons, did not achieve what it set out to achieve. However, the principles are sound and are being pursued by other ambulance services in the UK. There is no reason why, with the continued advances in technology, and with appropriate ownership by all concerned, such a system could not in the future be made to work effectively and efficiently in London. The only element of the systems concepts outlined above in which we have doubts for the longer term is the pan-London operation. Although this should not be ignored for the future we do not believe that the benefits of moving away from a divisional operating basis are fully proven. However, as pointed out above, the achievement of a comprehensive CAD system must be part of a long term plan.

5015    Any CAD system will be made up of four main elements:
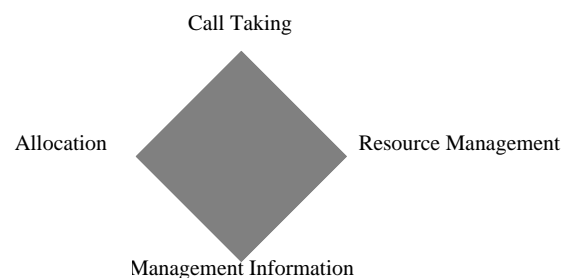
5016    In identifying the way forward it is helpful to establish which elements of a potential final CAD implementation might sensibly be left till last. These elements might include:

a) resource allocation and mobilisation by call takers rather than specialist allocators. This was always going to be a high risk strategy. It can only be achieved safely if every individual element of the total integrated system is virtually 100% reliable. As it is probable that this will be achievable only at the end of the full project this element must similarly be deferred. The risks arising from inappropriate resource allocations are likely to be greater than the potential time savings that might be achievable through call takers also mobilising;

b) pan-London working within CAC. Much confidence in the system has to be gained before management and staff will be able to place reliance on the resource management aspects of the system. In an area as large as London, and with the number of vehicles in use, it is unlikely that human operators would be able to exercise control on anything other than a divisional basis;

c) fully automated resource management. A significantly greater degree of intelligence" will need to be built into an automated system if it is to get the best out of the finite resources available to the service. Until that intelligence is available and programmed into the system (together with virtually 100% accurate location and status information) any degree of automation of resource management must be designed to assist rather than replace the human operators.

5017    Having recognised the overall concept of the final objective and those elements that will not be achievable until the end of the total process, we now concentrate on the suggested phases of development and implementation.

*Phase I (Interim)*

5018    There are certain elements of the currently abandoned system that could, subject to full quality assurance and testing, be re-implemented within a very few months. These elements relate to the call taking and incident location functions.

5019    Although potential problems of speed and outstanding bugs need to be addressed, CAC management and staff would, in general, be keen to see the computer based call taking and gazetteer re-introduced. The gazetteer and the public telephone location system have known imperfections (which can be remedied), but these features overall were considered to be useful. Thus it is suggested that LAS management consider a full re-appraisal of the existing call taking/gazetteer functionality, carry out a stringent quality assurance review of the existing software and, if the quality of the software is found to be appropriate, carry out full testing with a view to re-implementing a call taking system rapidly. As discussed earlier we continue to have doubts as to the suitability of the Windows environment and Visual Basic for the screen dialogues. This needs to be addressed as a matter of urgency. The adoption of a text-based user interface and a traditional programming language such as C may be more appropriate in terms of meeting the speed requirements of the system. This can be proved only with appropriate benchmarking.

5020    The triage system should not be used as part of this interim phase.

5021    It will be necessary also, as part of this phase, for the printing of incident information for use by resource allocators. In order to achieve this safely it will be necessary to acquire more robust and faster printers, integrate them fully as part of the network, and institute safeguards, to ensure that all calls are printed and acted upon.

5022    The continued use of printers may seem a slightly primitive method of working, but it has the advantage of easy integration with existing resource allocation and mobilisation practices, and provides confidence to CAC staff that a paperless environment initially would not have.

5023    Using existing hardware and existing software (if it passes quality tests) this interim solution could be implemented within 2 - 3 months. Even if the screen dialogues need to be rewritten this time scale should not need to be increased significantly.

5024    Appropriate resilience measures will need to be built in to ensure that calls are not lost due to equipment or power failure and that the system has appropriate backup to cover any such contingency.

5025    We recommend re-training of CAC staff be carried out on the system to ensure that they are familiar with its features and that they are operating the system in a totally consistent way. This element should not be under-estimated. It is a major task that will require planning and commitment. It should be integrated fully with the general training of CAC .t

5026    Identification of potential duplicate calls and handling of call backs would in this phase need to be handled in the same way as currently. The system could be used even in this phase to recognise potential duplicates (based on time and location) for allocator attention

5027    We recommend a suitably qualified and experienced project manager be appointed immediately to co ordinate and control the implementation of the proposed first stage of CAD. He or she will need to work closely with SO in the first instance in the quality assurance exercise on the current call-taking software. The future role of SO can be decided only after this review has taken place. Bearing in mind the SO knowledge of the Service and the current system it will almost certainly be most efficient to continue to use them for phase 1. However, their involvement in future stages, although not ruled out, must be less certain

*Phase 2*

5028    Phase 2 will be more ambitious and will have an emphasis on resource management. It should be designed to eliminate paper as far as possible and to make available to the resource allocators timely and reliable information on vehicle and crew status and location. This would enable resources then to be allocated by human operators using their own judgement. but based on reliable information from the system. Mobilisations would then be passed to the vehicles initially by voice, then to station terminals or MDTs.

5029    Phase 2 will be very much a part of the final solution whereas phase 1 was designed to be a short term expedient to allow some rapid progress and gains to be made.

5030    In designing phase 2 it will be necessary to re-examine the existing structure of phase 1 to determine whether or not it needs to be redeveloped. It is probable that to enhance speed the screen dialogues may need to be rewritten in a programming language such as C. The opportunity should also be taken of upgrading to the latest release of Windows - indeed the use of Windows should in itself be re-appraised in order to ensure that the performance trade-offs of its use continue to be acceptable.

5031    However, the main emphasis of phase 2 will be to enable reliable and up to date location and status information to be available to the resource allocators.

5032    This will involve major software redevelopment which, if substantial, may render the existing software redundant. This cannot be gauged at this stage.

5033    As highlighted elsewhere in the report a prerequisite of this will be a communications structure that is resilient and that has the capacity to handle the loads likely to be placed upon it, particularly in terms of status notification. The co-operation of all crews will also be necessary to ensure proper and timely communication of status. We recommend that a specialist review be undertaken of communications in the light of the final objectives of CAD and that any recommendations arising are actioned as part of the proposed second phase of CAD.

5034    As a further interim measure it would be possible for the radio operators to update status manually, on an equivalent to the current RIFS Trap screen, from verbal communication with crews.

5035    Thorough testing should proceed in parallel of the Datatrak location information in order to ensure its total reliability.

5036    In this phase and subsequent phases allocators would require two screens, one showing incident information (in place of the paper from phase 1) and the other showing resources. The resource screen (which could also be back projected onto

a large screen) would show map information overlaid with vehicle and status information. This resource screen would replace the current activation box once the reliability of the system was proven. Allocations would be made from this screen and passed, initially to the radio operator for mobilisation - on open channel in case a nearer resource is becoming available and could respond more quickly.

*Phase 3*

5037    Phase 3 follows only after total acceptance and experience of phase 2. It will involve the passing of mobilisation information to vehicles' MDTs rather than by voice. This should be achieved only after there is total confidence in the communications system and in the information upon which the allocation judgements are made. During this phase resource proposals may also be trialled, but only as suggestions to human allocators. Only when there is total confidence in these resource proposals should call takers be allowed to mobilise, and only then if the resource proposal is within sensible parameters (eg within 10 minutes of incident).

5038    At all phases appropriate regard must be given to systems resilience and contingency planning. There must be adequate fallback commensurate with the need to maintain a constant high level of service.

5039    This is a complex multi-supplier, systems integration project and as such requires strong project management. This is likely to be achievable only if LAS engages a project manager with significant relevant experience to take on this role. This must be seen as a matter of some priority.

5040    We recommend the establishment of a Project Subcommittee of the LAS Board. The project manager must report to this Subcommittee, chaired by an LAS Board Director, and with appropriate representation from all sides of the Service. This Project Subcommittee would have overall responsibility for the project. Bearing in mind the criticality of the system it may also be appropriate to establish a separate advisory group with knowledgeable and experienced outsiders (eg the Metropolitan Police) able to contribute their own experience and ideas to the Project Subcommittee.

5041    Bearing in mind the strategic importance of information technology and communications to the Service. We recommend that LAS recruit an lT Director, who will have direct access to the LAS Board. He or she will have overall responsibility for all IT and communications planning and implementation within the Service. An individual operating at this level will help the Service to move away from the historical piecemeal approach to IT planning.

## 6    MANAGEMENT AND OPERATION OF THE LAS

### The Scope of LAS Operations

6001    The geographical area of LAS operations is set out in section two, and covers the whole of the capital city. London is the largest city in the UK, the seat of Government, a major tourist centre and a pivotal point for the travelling public, both national and international.

6002    There was no suggestion that solutions to the problems facing LAS could simply be copied from elsewhere in the United Kingdom, or even in the world. A number of particular points were raised to support the view that LAS is a special case, including:

a) the size of the population covered;

b) the ethnic profile of the population;

c) the density of traffic;

d) the likelihood of a major incident which would affect a large number of people;

e) terrorist activity;

f) the social environment of the capital;

g) the presence of Parliament and particular emphasis in the public eye.

6003    Although these points are not exclusive to the capital, in no other area of the United Kingdom do they come together so comprehensively.

6004    The question of whether the LAS should restrict its operations to a more central core of London, rather than the outer boroughs as well, was raised. This is a question that has been raised before. The conclusion then was that the LAS should continue to operate across the whole of London. From the evidence before it (and especially the argument that broad coterminosity with the Police and Fire Services is essential), the Inquiry Team does not consider there is a case for revisiting this question. The recommendations in this report are based on the assumption that there will be no changes to the geographical scope of LAS activities.

**Managing the LAS**

6005    It would be easy, but misleading, to see the management problems of the LAS only in the context of the past two years. The 1980s was a decade where there is clear evidence of a failure by management to modernise the service in line with other services, or to advance the organisation to meet the changing requirements of society in general and the NHS in particular. This was reflected in a lack of investment in the workforce (such as paramedic training and career advancement), the fleet and the estate; like or no commitment to management training; and a consequent decline in both performance and staff confidence. This is not to say that there were not committed managers in the LAS doing their best - but the style was outmoded and static, and the attitude introspective.

6006    It is undoubtedly the case that by 1990, at the end of a very damaging national industrial dispute over pay, the LAS stood in need of major modification and change. Overall levels of performance were poor, morale was low, top level staff were retiring, the implementation of new technology had stalled and the National Health Service was being reorganised in a root and branch way with the introduction of self-governing Trusts and the development of purchaser/provider responsibilities. In the particular case of ambulance services this would necessitate a radical change in the management of PTS. For the LAS, this means having to tender for services with some 80 hospitals and community units.

6007    During 1990/91, following the establishment of the LAS Board by South West Thames RHA, a new top level of management was recruited including a Chief Executive, Director of Operations, Director of Human Resources and Director of Finance. This management team believed that, faced with the issues outlined above, they had to adopt a radical and fast- moving agenda of change. The overall aim was to improve substantially the ambulance service to patients within London. The immediate key issues to tackle were considered to be a top-heavy management structure; the introduction of " more democratic and more responsive staff consultative arrangements"; and the full implementation of a new CAD system.

6008    Few would argue with that agenda - but the process adopted and the speed at which it was done were to cause an alarming level of demoralisation among managers and staff, and opposition from staff representatives. We recommend that LAS management gives serious thought to how to demonstrate its commitment to, and appreciation of, its most valuable asset, namely, its staff - for example, an annual awards ceremony to recognise staff who have faced challenging situations and have conducted themselves in a way which has credited the LAS in the eyes of the general public.

*Management Restructuring*

6009    There was a major restructuring exercise between January and April 1991, the effect of which was to reduce the number of senior and middle management posts in the LAS by 53 out of a total of 268. This was regarded as essential to get LAS in shape for the new purchaser/provider responsibilities of 1991/92.

6010    Evidence suggests that there was no consultation with staff over the proposed structure and job design, and the selection process was mismanaged. The whole exercise caused a good deal of anxiety and stress among managers, rather than

establishing a revitalised and forward-looking climate. One outcome was that many staff who had worked 15 or 20 years in the LAS left the service; and others were placed in managerial positions which they did not feel suited to.

6011    The span of control of some Executive Directors was too great and as a consequence they became involved in issues which should more properly have been dealt with by second-line management, and by local managers in discussion with staff. This meant that energies were taken away from the key areas of strategic direction and policy consideration. A structure is needed which allows for devolution of management responsibility to the lowest effective level. This should counter the frustration presently felt by all parties at the slow decision- making process and the way in which local issues impinge on senior management time.

6012    While realising the demoralising impact of the 1991 management restructuring, we recommend that consideration is given urgently to a further restructuring of management:

a) to lessen the span of control of some Executive Directors;

b) to implement an experienced and effective level of management, with delegated responsibility and authority for decision-making, to deal with day to day operational issues on a divisional basis within London.

6013    Restructuring should involve full consultation on procedures for advertising posts; comprehensive job descriptions and person specifications for all management posts; and an understanding that if top level managers are to be recruited from within LAS or from outside, then an appropriate salary commensurate with responsibilities needs to be paid.

### *Management Training*

6014    It is clear from evidence taken that LAS management had received little or no effective management training over the years. New management structures will need to be accompanied by a cohesive, progressive and properly resourced management training programme for all tiers of management.

### *Management Uniforms*

6015    Ambulance services throughout the United Kingdom are essentially and necessarily uniformed organisations, a point made more than once in evidence received by the Team. The public expects to see smart and efficient ambulance personnel.

6016    On an operational and professional basis, the wearing of a uniform is essential, especially within the A&E tier. This includes management positions both within operations and the control section of the LAS. It is particularly important that staff attending a major incident are in uniform, so they can quickly pass through police lines. Otherwise, as the Team heard had happened, an officer might be refused access to an incident, leading to potentially serious consequences for the co-ordination of ambulance activity.

6017    We recommend the reinstatement of recognised uniforms to all levels of operational and control management, including, in appropriate circumstances, senior executive staff. Uniforms should clearly demonstrate rank to enable the officer to be operationally effective. We believe this would restore a measure of pride, ownership and team spirit to the LAS. There is also a clear expectation among those who gave evidence on behalf of the public that the Chief Executive of the LAS should be seen in uniform in the same way as the Chief Fire Officer and Commissioner of the Metropolitan Police.

### *Staff Consultative Arrangements*

6018    Poor communications between staff and staff associations and senior LAS managers have created an atmosphere of mistrust. This might appear surprising given the statements made by management that they wanted to be democratic, but the perceived sidestepping of staff representatives caused much friction. An example of this is the length of time (almost the whole of 1991) it took to consider a new consultative machinery. Both management and staff representatives' view was that the other side was being deliberately obstructive.

6019    This resulted in staff uncertainty in responding to the new management team, eventually leading to an even greater breakdown between staff and managers, and between the different levels of management. This also affected the extent to which staff became involved at an early stage in the CAD project. The end result also was that the Executive Directors, and particularly the Chief Executive and Director of Operations, became isolated from the feelings of managers below them and staff in general.

*Deadlines*

6020    It is clear from evidence received that many managers and staff saw deadlines set by the top level of management as being rigid, inflexible and, more importantly, not to be challenged, at the risk of losing one's job or being moved sideways to another post. The most obvious examples are embedded in the implementation timetable for the CAD system, but it affected a whole range of management initiatives.

6021    Deadlines are useful and often necessary. It is quite understandable that, faced with the need for major changes, the LAS management of the past two years was keen to implement its agenda as quickly as possible. Indeed, faced with concerted pressure from its managing RHA, MPs, the public, health service consumers and the media over improving performance times, it is by no means certain that the Service would have been allowed to adopt a more measured approach to introducing changes, particularly with CAD. There is some evidence that the management team were looking at a 5 year timescale for turning around the organisation, but this was never formally recorded in LAS plans.

6022    The lack of consultation and agreement over realistic deadlines with managers and staff involved in the process, and the pressure imposed by going public on deadlines and then finding difficulty in meeting them, clearly needs to be avoided in the coming years. It is not possible to turn around LAS performance overnight - CAD will take up to 4 years to develop and implement fully; working relationships will need to be built up gradually. The Inquiry Team would warn of the danger of setting unrealistic timetables without consultation and commitment of those involved; and the public and its representatives must be prepared to allow the LAS breathing space to put its house in order.

*The Tomlinson Report*

6023    The Inquiry Team, at the time of writing, is unaware of the final outcome of the Tomlinson proposals. But it is safe to say that should any proposals to close A&E Departments in London be implemented, then this could have significant implications for the LAS, its levels of performance in getting patients to hospital and the resources needed to meet required standards. The Inquiry Team recognises that LAS management is aware of these implications, and is studying them.

*Trust Status*

6024    The view was put to the Inquiry Team at various times that part of the LAS agenda was to move towards self-governing Trust status. The Inquiry Team took no view on this question. However, whether or not an application is made to become a self-governing Trust, current changes in the NHS necessitate the improved management information and strengthened local management highlighted in this report.

**Management / Union Relationships**

6025    There are five recognised trade unions with members in LAS - NUPE, COHSE, NALGO, GMB and TGWU. Together they represent 92% of all staff. The first three have resolved to amalgamate on 1 July 1993 into a new Union, UNISON, which will thereafter hold 83 % of the 92 % of trade union members in LAS. In addition, a small number of staff belong to APAP.

6026    For the past two years the picture shows a management that believed the trade unions have resisted all forms of change, used the LAS as a vehicle to attack the wider NHS reforms, deliberately obstructed management efforts to put their case to all staff, and sustained restrictive practices. The trade unions have believed that management has sought to marginalise them, questioned their elected status, eroded their standing with members, and sought to restrict facility

time and consultation with members.

6027    In short, a major confrontation developed, with the trade unions taking their grievances to law, ballots for industrial action and much political activity. This resulted in an unproductive drain on management time, and severely exacerbated the demotivation and demoralisation of staff at all levels

6028    Despite this unpromising picture of conflict and unproductive confrontation, there is clearly a deep and lasting commitment to the LAS and its work from both management and staff. The need for strong and effective leadership from management at all levels is not questioned, nor is the fundamental desire of staff to be proud of their jobs. This commitment must be turned to advantage by the development of a constructive and virile relationship between management, trade unions and staff in the interest of providing the best possible service to the public.

6029    To develop an effective partnership between executive management and trade union representatives in the Whitley spirit, we recommend:

        a) single table bargaining by means of a small central joint staff committee, served by joint secretaries, and with the full commitment of full time officials and elected representatives. The trade union membership would be nominated by, and accountable to, the recognised trade unions. This committee will select to agree upon matters of staff related policy developed in appropriate joint subcommittees introduced to plan the development and speedy implementation of such policies as equal opportunities, occupational health, health and safety matters and a range of essential training initiatives;

        b) a second tier of divisional joint committees at which management and elected lay convenors will determine solutions to those issues (to be agreed) which have been delegated to them. The objective would be to resolve all issues of divisional responsibility at the lowest possible level.

6030    This consultative machinery must be quickly established to pursue the objectives of the Service efficiently, and with maximum regard to the efficient use of management and elected staff representatives' time.

6031    As in so many areas of LAS work, this will require training for management and trade union representatives. LAS will wish to consider how best they might introduce this machinery and train staff to use it properly.

**Resource Management**

6032    Although some submissions to the Inquiry Team called for immediate increases in resources, the attitude within the management team of the LAS was that they were not in a position to ask for additional manpower or other resources until such time that they had a very clear case that Present resources were inadequate to provide the service required by purchasers.

6033    Management was depending very largely on the successful implementation of CAD, and the resulting management information, to obtain a reliable and complete analysis of resource requirements. The general feeling was that it was more a case of too many resources being available at times of relatively low demand, and too few resources at times of high demand. The new information would have determined this one way or another, and would have established a case for new rostering arrangements, or a bid for more resources (or both).

6034    CAD having failed, the LAS has no efficient and effective means or procedures available to it to determine the resources needed to provide the required level of A&E services within London.

6035    We recommend that the LAS urgently consider how best to obtain the necessary management information, in the absence of information arising from the CAD system.

*Revenue*

6036      In the absence of sound management information, any historically based budget, such as LAS', must inevitably be regarded as suspect. Nevertheless, all NHS Authorities have a statutory responsibility to operate within their cash limits.

6037      The LAS had a revenue overspend of £2.5 million in 1991/92, and is heading for a further overspend, though of lesser proportions, in 1992/93 (£0.7 million).

6038      The Team has not, within its terms of reference, pursued in detail the question of revenue funding. That must remain a matter for the LAS to determine with the South West Thames RHA and other purchasers of LAS services. However, it is clear that LAS needs to move to a position as quickly as possible where it is able to make sound decisions for the future, based on good information about the most efficient use of resources.

6039      The introduction in the NHS of contracting for services necessitates a change in relationships. The LAS and South West Thames RHA have to secure service agreements on the level, quality and scope of ambulance A&E services that purchasing RHAs will purchase and fund. Purchasing RHAs must decide for themselves the level of service provision required by them for their communities from the LAS. When service agreements have been concluded, the LAS will need to agree with South West Thames RHA a sound business plan for 1993/94 and develop a strategic plan beyond that, recognising the statements already made in the report about the realistic timescale involved for the LAS to achieve the desired level of performance.

*Vehicles*

6040      The LAS has a planned capital replacement programme for vehicles which, if allowed to run without interruption, would provide the LAS with vehicles being replaced when they are five years old. This programme depends on the purchase of an agreed number of new vehicles in each financial year.

6041      The Team was concerned that the capital monies allocated to this area were not ring-fenced. For example, in 1992/93 a proposed purchase of 69 front line vehicles has been reduced to 32, and a proposed replacement of 104 PTS vehicles has been reduced to 50. Capital monies have been vired to revenue in order to compensate for a revenue overspend.

6042      The Team believes that the capital vehicle replacement programme as planned is adequate for service needs, provided it is fully funded. We recommend that the capital monies necessary to fulfil the planned vehicle replacement programme are ring-fenced; and that additional (non-recurring) revenue monies be identified to implement adequate preventative maintenance procedures until such time that the average age of the fleet is reduced, and the backlog of maintenance requirements met.

6043      The recent purchase of vehicles and the specification used has created a certain amount of tension between management and operation ambulance personnel. This particularly centred on whether the vehicles should have a fixed bulkhead. or a door between front and rear.

6044      The Team does not feel able to be prescriptive on this question, but believes the vehicles were introduced in good faith and with a desire to allow ambulance personnel to care for patients in the best possible environment. Although there was no formal consultation with staff representatives, a number of staff comments were taken on board. The Team is pleased to note that currently a total quality group consisting of ambulance staff, the Fleet Manager and professional mechanics are working together to accommodate staff views and to rewrite the vehicle specification.

6045      To enhance the professionalism of the service as a whole, and to ensure that qualified ambulance staff are always in a position to respond to 999 calls, we recommend that consideration be given to the employment of vehicle cleaners at stations.

6046      The Team received evidence on the reduction of workshop facilities within the LAS and the use of the Automobile Association (AA) to carry out recovery and roadside maintenance. It was explained to the team that this allowed the

retention of skilled maintenance staff in the workshops, and the AA is able to provide valuable statistics on roadside breakdowns. Mindful of its terms of reference, the Team did not pursue these issues in depth. However, from the evidence before it, it saw no reason to challenge any of the decisions made on these issues.

### Rapid Response Units

6047    The Rapid Response Units (RRUs) were implemented with the intention of being able to provide the public with a fully trained paramedic on scene more rapidly than the regular emergency vehicle. There are undoubtedly cases where the RRU has assisted in saving lives. However, issues arise over the need for double manning of these vehicles and consideration should be given to having these more mobile and more strategically placed.

6048    It is clear that staff from the existing A&E services have been transferred to RRU duties. Extra funding was not available for RRUs in 1991/92. Funding for 1992/1993 has been made available on a one-year only basis. This has led to a shortfall in standard emergency vehicle cover. (A similar problem exists due to the paramedic staffing of the helicopter service.) Management has been offering overtime payments, funded by the resulting vacancy lines on A&E rotas. Take-up of this overtime is not always adequate for a full level of cover to be available on the road, given the reluctance of staff to work weekends and late night overtime at plain time rates.

### The Estate

6049    It is undoubtedly the case that the LAS estate has been neglected. LAS needs to consider both revenue and capital requirements to improve the estate. This consideration might include the actual location of stations.

## Personnel Management

6050    There are a number of priority tasks facing personnel management in the LAS, as specified below

### The Reform of the IR Consultative Policy

6051    The Director of Human Resources in LAS has a major role to play in determining and assisting to build a good industrial relations climate with the trade unions and staff representatives. This Director should take the lead in implementing speedily the proposed consultative machinery set out in paragraph 6029.

### Manpower, Succession and Career Planning

6052    The Team found little evidence of a considered and realistic manpower planning strategy in LAS. There is also a clear lack not only of succession planning - most obvious in the unwillingness of top management to delegate - but also basic career planning. This will be a weakness within the organisation in terms of its development strategies over the next 5 years. Manpower costs equate to 70% of the LAS revenue budget, and it is not good enough that manpower planning is based purely on historical figures.

6053    We recommend that the LAS undertakes in the near future a full study of e manpower needs of the LAS.

### Examination of Terms and Conditions Issues

6054    There are issues of grading and national terms and conditions of employment (such as overtime rates) which affect control room staff, A&E staff and managers. In our view these require prompt solution to improve materially the operational effectiveness of the LAS.

### Training

6055    At present there is professional/technical/paramedic ambulance training managed by a deputy to the Director of Operations. This programme has, from a standing start, developed well, particularly in respect of the impressive increase in paramedic numbers over the past two years. However, even this will need to be enhanced if LAS is to

achieve the Ministerial policy for paramedic training of at least one fully trained paramedic on every front line emergency ambulance by 1995.

6056    Training in CAC - involving induction training for new entrants, supervisor training, and refresher training - appears to be seriously under resourced in comparison with other emergency and ambulance services.

6057    Training is not just about pressing the right buttons. It also involves ensuring that call takers ask the right questions, for example to pinpoint the exact location and nature of an incident, to ensure that the information passed to crews is accurate and relevant. They should also be able to provide effective advice and reassurance to members of the public.

6058    The Inquiry Team heard evidence that a significant proportion of 999 incidents attended by an ambulance were not of an emergency nature (which puts the A&E service under unnecessary pressure). While it is perhaps not possible to expect, for example, an anxious relative to make the distinction between an emergency and non-emergency incident, vehicle crews clearly expect CAC call-takers to be able to prioritise emergency calls. That is a matter of training and experience.

6059    It is also important that both operational and CAC staff fully understand each others' roles. This can only be achieved through CAC staff working with ambulance crews and vice versa, as a planned element of individual career development and training. London Ambulance Service

6060    The timetable for implementation of the CAD system did not allow for an adequate and comprehensive programme of training, and this had a significant effect on the level of performance of control room staff throughout 1992, and particularly when faced by the pressures imposed by the events of 26 and 27 October 1992. It is essential that any further progress with CAD is accompanied by a comprehensive and integrated training plan.

6061    Management training is a Cinderella activity in the LAS, though the need for it has been acknowledged in the past two years. It has commanded few resources, and is inadequate to cover the training needs of managers and staff. The Team sees it as an essential concomitant of the new management structure advocated in paragraph 6012.

6062    In sum, we recommend that the LAS treats as a priority the introduction of a properly resourced training strategy for crews, CAC staff and management, developed as an integral part of personnel management.

*Occupational Health*

6063    There is no doubt that ambulance personnel working on the road at the sharp end of LAS activity are subject to greater stress than most professions. There is also at times a good deal of pressure within CAC and at all levels of management within the Service. Any level of increased stress is likely to have a consequent effect on sickness levels within the service, and therefore the resources available for patient care.

6064    The Inquiry Team had access to a number of reports which looked at questions of stress within the LAS and the NHS as a whole - the ACAS Report of a Survey into Occupational Stress Factors in the LAS of January 1989; the Price Waterhouse Staff Attitude Survey of January 1992; and Mr Tristan Ravenscroft's preliminary report into the levels of Post Traumatic Stress Disorder among LAS A&E personnel of January 1993. The Inquiry Team would not wish to be prescriptive about the precise nature of stress counselling offered to staff. However, it is important that such counselling is available promptly to all staff and is undertaken by appropriately qualified professionals. There is an important role for managers to identify the symptoms of stress among their staff and act accordingly.

*Equal Opportunities*

6065    There is no recognised or agreed policy for equal opportunities within the LAS. While there is no suggestion that this is a deliberate omission, it is important that LAS brings itself into line with good working practices. LAS management should consider what steps can be taken to alter the profile of the workforce so that it more accurately reflects the community which it serves.

**LAS Accountability**

6066    A constant theme running through much evidence submitted to the Inquiry Team was that of a perceived lack of accountability for LAS actions. This issue brings into question the relationship between the Chief Executive, the LAS Board and the South West Thames RHA

*Management Accountability*

6067    On 22 March 1989, the Department of Health issued a circular which effectively called for Regional Health Authorities to shed services which were not considered part of the RHA's core function. The LAS was considered such a service, and after consultation with the other three RHAs, the South West Thames RHA decided to create an "arms length" Board, appointed by and accountable to the RHA, which would be responsible for the day to day management of the LAS. The Board first met on 12 June 1990.

6068    The LAS Board is not a statutory body and is therefore not in a position truly to fulfil the normal obligations of a NHS management Board, such as might manage a self-governing Trust. South West Thames RHA retain the statutory obligation of accountability.

6069    The RHA appointed a Chief Executive of the LAS who took up post in August 1990, in a normal contractual relationship with the RHA as his employer. The Chief Executive was accountable to the LAS Board and its Chair, and through them to the Regional General Manager (RGM). The Chief Executive had executive responsibility for the management of the LAS in terms of its strategic development and its daily operation.

6070    We have already commented on aspects of procurement and implementation of CAD. However with specific reference to management accountability, we would comment that the budget for the CAD project and the original deadline of 8 January 1992 for implementation were set by the Chief Executive without discussion with the LAS Board. Neither did the Board know that potential suppliers had challenged the deadline and, for some at least, it may have been a reason why they did not tender.

6071    From this illustration and others the Inquiry Team concluded that, while lines of accountability looked secure on paper, in practice the LAS Board was not given sufficient information to exercise the responsibilities delegated to it by South West Thames RHA for the day to day management of the LAS. Neither was it apparent that they actively sought such information. This may have been the result of being a newly established and non- statutory Board.

6072    The RGM believed it important not to interfere, having got the Board established "at arms length", but may have underestimated the impact of the loss of the expertise and checks previously engaged at Regional level in supporting and monitoring the LAS.

6073    Looking to the future, we recommend:

a) the precise role, function and responsibilities of the Chair and non-Executive Directors on the LAS Board are agreed in writing between those members of the Board and the South West Thames RHA. It is important that all non-Executive Directors have the time, commitment and experience to undertake the functions specified;

b) the Chief Executive should remain accountable to the LAS Board, and its Chair, and through them to the RGM. The issues on which Board discussion and approval are required should be clarified as should the topics on which the Board should receive regular reports.

c) Executive Directors should remain accountable to the Board, and personally accountable to the Chief Executive;

d) personal objectives of the Chief Executive, Executive Directors and senior managers should derive from the corporate objectives agreed between the LAS Board and South West Thames RHA. Regular reviews would thus be undertaken as part of the two- way corporate review and Individual Performance Review (IPR) programme and difficulties in meeting agreed targets and objectives identified at an early stage. This will enable clarification of any additional support required or renegotiation of the timescale or even the target or objective.

*Public Accountability*

6074    The LAS is accountable to South West Thames RHA for its performance, and the RHA similarly accountable to the NHS Management Executive and the Secretary of State.

6075    However, on a more local level, concern was expressed to the Inquiry Team on numerous occasions that there appears to be a complete absence of any regular formal or informal method of communication between the management team as representatives of LAS and interested parties such as Community Health Councils, Family Health Service Authorities, District Health Authorities, Local Government and Members of Parliament.

6076    We recognise that there is an exceptionally large number of organisations in London with a legitimate interest in LAS affairs. A recommendation that LAS management pursue more open and regular communications with outside bodies is made in paragraph 6085. As far as possible, this contact should be devolved to local community level, with formal feedback to senior management on key issues. Local management should have an awareness of service policies in order to ensure a consistent message is shared with local communities. This will require central co-ordination and monitoring.

## Public Confidence

*Public Confidence*

6077    The press release announcing the setting up of this Inquiry referred to the fragility of public confidence in the LAS. This has been a constant theme both in evidence submitted to the Inquiry Team and in the treatment of the issues in the media (where regrettably, though perhaps understandably, incidents involving mishaps in the Service are more newsworthy than incidents where all goes smoothly).

6078    The Team considers it of the utmost importance that continuing action is taken to restore public confidence in the LAS - for while there are undoubted problems to be faced in terms of performance standards and working relationships, there is also a great deal of commitment amongst management and staff to ensure that LAS provides the quality of service that patients have a right to expect.

6079    It was a constant complaint that the recorded message used on the 999 telephone lines, to reassure callers that they were in a queue to be answered, was totally inappropriate. The Inquiry Team concurs with this concern and is pleased to note that more call takers are now employed. We recognise, however, that there may be rare occasions when it will be more reassuring to the caller or to the British Telecom operator to hear such a message indicating that the correct connection has been made, rather than to have a continuous ringing tone. We would not therefore completely discount the use of a recorded message.

*ORCON/Patient's Charter Standards*

6080    Ultimately, the LAS is judged by the quality of service which it provides to the public. The single most effective way of restoring public confidence would be for an actual and visible improvement in performance to take place and be seen to have taken place.

6081    As anyone who has read so far will appreciate, this is not going to be possible overnight. It depends to a great extent on development and implementation of a computer system which will take years rather than months, and on the gradual building up of trust and genuine participation between management and staff, to ensure that LAS resources are most effectively managed.

6082    We recommend that LAS makes available to interested parties such as Community Health Councils, purchasers of the service and London MPs its performance levels in respect of:

a) 999 telephone answering times;

b) activation percentage within three minutes;

c) response percentage within 8 minutes;

d) response percentage within 14 minutes.

*Public Relations*

6083    The Inquiry Team heard many complaints from representatives of the public and LAS consumers (MPs, Community Health Councils, Local Medical Committees) that the PR exercises undertaken by LAS during 1991 and 1992 were superficial and did not allow for genuine dialogue. There was particular criticism that management's concentration on high- profile services such as RRUs, motorcycles and helicopter (EIEMS) disguised the shortcomings of basic service provision. Whilst accepting that management were attempting to be open in explaining their policies to both staff and the public, this exercise clearly failed to convince.

6084    Public Relations are important, not least when the LAS is faced by a barrage of complaints about service performance and strong criticism from the media. It should not be forgotten that LAS daily responds successfully to a great many calls, including very serious incidents, and has extreme pressures placed on it and its staff. A greater awareness of the LAS' achievements would serve to increase public confidence, and this should be high on the agenda of the LAS management.

6085    However PR is no substitute for genuine participative dialogue with interested parties. We recommend that LAS management adopt, within reason, an open approach to regular meetings with the media, outside bodies and representatives of the public, with the genuine intention of addressing issues raised. We realise that management time is precious, but we consider this approach essential if public and professional confidence is to be restored.

*Complaints Procedures*

6086    LAS currently receives on average 100 written complaints a week (0.003% of the average 35,000 A&E and PTS patient journeys each week). LAS aims to reply fully to complaints within 25 working days, bearing in mind the need to research each incident carefully. Currently there is a backlog of over 900 complaints.

6087    It is clear from evidence received by the Inquiry Team that many replies to complaints in the past have been considered abrupt and even misleading by those who had written in. The point was also made that although the LAS received many complaints on a particular issue, LAS did not appear to recognise trends, and therefore failed to address the underlying root of the problem.

6088    A review of 12 Health Service Commissioner cases relating to LAS over the past three years covered nine PTS cases and three A&E cases. Of these three, one related to inadequate arrangements during the national dispute, one to clinical aspects of care and one to delay in answering 999 calls and the telephone queuing system. Seven included poor handling of the initial complaint by LAS. The Commissioner's findings on these cases were that LAS needed to improve this aspect of its service.

6089    The LAS should have an open and easily accessible complaints procedure. Clearly the public should be able to expect a prompt, sympathetic and accurate response to complaints. To this end, we recommend that the LAS devote adequate resources to answering complaints in terms of permanent staff trained in the complaints procedures, backed by the necessary administrative support. An increase in resources should allow staff time to identify trends in complaints, and promote subsequent management action.

*Allegations of Deaths*

6090    Only the coroners' courts are able to determine whether a death may have been caused by a delay in an ambulance reaching the patient. There was a good deal of publicity that the breakdown of the CAD system on 26 and 27 October 1992 may have led to 20 deaths. Indeed, NUPE issued a document stating that "Introducing an untested computer to deal with 999 calls...has directly led to patients dying".

6091    The fact is that of the 26 cases considered by coroners' courts since November 1991, we are advised that not a single one has concluded that the LAS can be blamed for the death of a patient. We recommend that all media outlets which ran stories concerning alleged patient deaths following the CAD breakdown should make it clear that in no case has a coroners' court concluded that the late arrival of an ambulance caused a patient's death. Management should also make this position clear to all LAS staff, through a written communication.

6092    Even one death caused by a delay, were it to happen, would of course be one too many. And it is clear, simply from looking at performance standards, that LAS has failed on numerous occasions over the past years to respond as quickly as it should (though it should be remembered that not a single ambulance service in the country can say it has a perfect record in this respect). The additional distress caused by delays in answering calls, despatching ambulances and the arrival of ambulances on scene is high, and is further reason for LAS to ensure that performance levels are made a key priority.


**ANNEX A**

**EVIDENCE RECEIVED**

The following groups or organisations were invited to provide evidence to the Inquiry Team, or independently submitted evidence. A number met the Inquiry Team.

- members of LAS HQ management, past and present
- members of staff in CAC and vehicle crews
- representatives of companies involved in CAD system and NHS Supplies
- London Local Medical Committees, and Secretariat
- London A&E Department consultants
- Westminster Hospitals Development Fund
- Greater London Association of Community Health Councils, and individual CHCs
- Association of London Authorities and London Boroughs Association
- The four Thames Regional Health Authorities
- National Union of Public Employees (NUPE), Confederation of Health Service Employees (COHSE), National Association of Local Government Officers (NALGO), GMB, Transport and General Workers' Union (TGWU), Association of Professional Ambulance Personnel (APAP)
- staff representatives
- Bedfordshire and Hertfordshire, Royal Berkshire, Essex, Buckinghamshire and Kent
- Ambulance Services
- Metropolitan Police
- London Fire and Civil Defence Authority
- the Department of Health
- London MPs
- members of the public
- independent computer/IT consultancies

As part of the Team's familiarisation process, meetings were held with other ambulance services including West Midlands, Surrey, Hampshire and Gloucestershire.

**ANNEX B**

Glossary of abbreviations

A&E      Accident and Emergency
ACD      Automatic Call Distributor
AS1,2,3  Ambulance Service (nationally recognised control forms)
AVLS     Automatic Vehicle Location System
CA       Control Assistant
CAC      Central Ambulance Control
CAD      Computer Aided Despatch
CTS      Communication and Technical Services Ltd
HEMS     Helicopter Emergency Medical Service
IAL      International Aeradio Ltd
IT       Information Technology
LAS      London Ambulance Service
MDT      Mobile Data Terminal
ORCON    Operational Research Consultancy (nationally recognised standards of performance for ambulance services)
PIR      Project Issue Report
PR       Public Relations
PRINCE   Project In Controlled Environrnent
PSTN     Public Switched Telephone Network
PTS      Patient Transport Service
QA       Quality Assurance
RGM      Regional General Manager
RHA      Regional Health Authority
RIFS     Radio Interface System
RRU      Rapid Response Unit
SO       Systems Options Ltd
SOLO     Solo Electronic Systems Ltd
SDS      Systems Design Specification
SRS      Systems Requirement Specification
WBT      Work Based Trainer