The London Ambulance fiasco

- The London Ambulance Service (LAS) Computer Aided Despatch (CAD) system failed dramatically on October 26th 1992 shortly after it was introduced:
  - The system could not cope with the load placed on it by normal use;
  - The response to emergency calls was several hours;
  - Ambulance communications failed and ambulances were lost from the system.
- A series of errors were made in the procurement, design, implementation, and introduction of the system.

London Ambulance Service

- Managed by South West Thames Regional Health Authority.
- Largest ambulance service in the world (LAS inquiry report)
  - Covers geographical area of over 600 square miles
  - Resident population of 6.8 million people (greater during daytime, especially central London);
  - Carries over 5,000 patients every day;
  - 2,000-2,500 calls received daily, of which 1,300-1,600 are emergency calls.

Computer-aided despatch systems

- Provide one or more of the following:
  - Call taking;
  - Resource identification;
  - Resource mobilisation;
  - Ambulance resource management.
- Consist of:
  - CAD software & hardware;
  - Gazetteer and mapping software;
  - Communications interface (RIFS).
  - Radio system;
  - Mobile data terminals (MDTs);
  - Automatic vehicle location system (AVLS).

The manual system to be replaced

- Call taking
  - Recorded on form; location identified in map book; forms sent to central collection point on conveyor belt;
- Resource identification
  - Form collected; passed onto resource allocator depending on region; duplicates identified. Resource allocator decides on which resource to be mobilised; recorded on form and passed to dispatcher;
- Resource mobilisation
  - Dispatcher telephones relevant ambulance station, or passes mobilisation instructions to radio operator if ambulance already on road;
- Whole process meant to take < 3 minutes.

Concept/design of the CAD system

- Existing systems dismissed as inadequate and impossible to modify to meet LAS's needs
  - Intended functionality "greater than available from any existing system".
- Desired system:
  - To consist of Computer Aided Dispatch; Computer map display; Automatic Vehicle Location System (AVLS);
  - Must integrate with existing MDTs and RIFS (Radio Interface System).
- Success dependent upon:
  - Near 100% accuracy and reliability of technology;
  - Absolute cooperation from all parties including CAC staff and ambulance crews.

Problems: Procurement (i)

- Contract had to be put out to open tender
  - Regulations emphasis is on best price;
  - 35 companies expressed interest in providing all or part of the system
    - Most raised concerns over the proposed timetable of less than 1 year until full implementation.
- Previous Arthur Andersen report largely ignored
  - Recommended budget of £1.5M and 19 month timetable for packaged solution. Both estimates to be significantly increased if packaged solution not available;
  - Report never shown to new Director of Support Services.
- Only 1 out of 17 proposals met all of the project team's requirements, including budget of £1.5M.

Problems: Procurement (ii)

- Successful consortium
  - Apricot, Systems Options (SO), Datatrak; bid at £937k was £700k cheaper than the nearest bid;
  - SO's quote for the CAD development was only £35k
    - Their previous development experience for the emergency services was only for administrative systems.
  - Ambiguity over lead contractor.
- 2 key members of evaluation team:
  - Systems manager: Career ambulance man, not an IT professional, already told that he was to make way for a properly qualified systems manager;
  - Analyst: Contractor with 5 years experience working with LAS.

Problems: Project management

- Lead contractor responsible
  - Meant to be SO, but they quickly became snowed under, so LAS became more responsible by default;
  - No relevant experience at LAS or SO.
- Concerns raised at project meeting not followed-up.
- SO regularly late in delivering software
  - Often also of suspect quality, with software changes put through 'on the fly'.
- Formal, independent QA did not exist at any stage throughout the CAD system development.
- Meanwhile, various technical components of the system are failing regularly, and deadlines missed.

Problems: Human resources & training (i)

- Generally positive attitude to the introduction of new technology.
- Ambiguity over consultation of ambulance crews for development of original requirements.
- Circumstantial evidence of resistance by crews to Datatrak equipment, and deliberate misleading of the system.
- Large gap between when crews and CAC staff were trained and implementation of the system.
- Inability of the CAC and ambulance staff to appreciate each others' role
  - Exacerbated by separate training sessions.

Problems: Human resources & training (ii)

- Poor industrial relations.
- Management 'fear of failure'.
- CAD system seen as solution to management's desire to reduce 'outdated' working practices.
- System allocated nearest resource, regardless of originating station.
- System removed flexibility in resource allocation.
- Lack of voice contact exacerbated "them and us".
- Technical problems reduced confidence in the system for ambulance crews and CAC staff.

System problems

- Need for near perfect information
  - Without accurate knowledge of vehicle locations and status, the system could not allocate optimum resources.
- Poor interface between crews, MDTs & the system
  - There were numerous possible reasons for incorrect information being passed back to the system.
- Unreliability, slowness and operator interface
  - Numerous technical problems with the system, including:
    - Failure to identify all duplicated calls;
    - Lack of prioritisation of exception messages;
    - Exception messages and awaiting attention queues scroll off top of screen.

Configuration changes

- Implementation of the system on 26 October involved a number of significant changes to CAC operation, in particular:
  - Re-configuring the control room;
  - Installing more CAD terminals and RIFS screens;
  - No paper backup system;
  - Physically separating resource allocators from radio operators and exception rectifiers;
  - Going 'pan London' rather than operating in 3 divisions;
  - Using only the system proposed resource allocations;
  - Allowing some call takers to allocate resources;
  - Separate allocators for different call sources.

So, what happened?

- Changes to CAC operation made it extremely difficult for staff to intervene and correct the system.
- As a consequence, the system rapidly knew the correct location and status of fewer and fewer vehicles, leading to:
  - Poor, duplicated and delayed allocations;
  - A build up of exception messages and the awaiting attention list;
  - A slow up of the system as the messages and lists built up;
  - An increased number of call backs and hence delays in telephone answering.

Why did it fail?

- Technically, the system did not fail on October 26th
  - Response times did become unacceptable, but overall the system did what it had been designed to do!
  - Failed 3 weeks later due to a program error - this was a memory leak where allocated memory was not completely released.
- It depends who you ask!
  - Management;
  - Union;
  - System manager;
  - Government.

Lessons learned

- Inquiry report makes detailed recommendations for future development of the LAS CAD system, including:
  - Focus on repairing reputation of CAD within the service;
  - Increasing sense of 'ownership' for all stakeholders;
  - They still believe that a technological solution is required;
  - Development process must allow fully for consultation, quality assurance, testing, training;
  - Management and staff must have total, demonstrable, confidence in the reliability of the system;
  - Any new system should be introduced in a stepwise approach.