

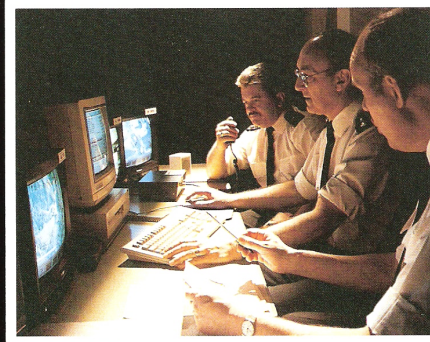
LEARNING TECHNOLOGIES

Controlling the unpredictable - a breakthrough with technology based training

COMMAND AND CONTROL

The Background

Everyone involved in the kind of decision making demanded in potentially explosive situations knows that a clear head and steady nerves are absolutely vital. Whatever the scenario - a blazing fire, an unpredictable mob, a major disaster - the people in command must be able to assess the likely development of a problem instantly and react unwaveringly to defuse the situation. These are skills which may take many years to develop but which need to be enhanced and accelerated by precise, appropriate and cost-effective training.



Hitherto, the training of these commanders has always presented problems. On-the-job shadowing provides a limited amount of experience, spread over too long a period of time to allow successful consolidation. Mock-ups are expensive in staffing, deploying large numbers for days at a time; and paper based exercises simply cannot convey the sense of urgency and immediacy which are inescapable in reality.

New solutions had to be developed with a level of reality so convincing that they would give even the most experienced trainees the sensation of close encounter with the real thing...and yet deliver cost-effective and unambiguous training which could be tailored specifically to precise needs.

The Employment Department has supported three technology based multimedia projects which simulate reality more closely than was previously thought possible. They all deal with areas of potential calamity and can be adapted to train for any unpredictable, large scale event. At present, they focus on fire fighting, crowd control and public order respectively.



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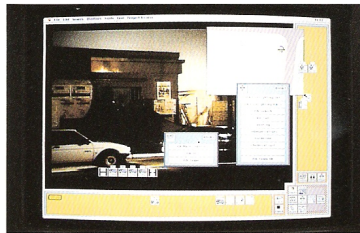
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LEARNING METHODS CASE STUDY

Fire Fighting - Vital Techniques

Fighting and controlling major fires demands effective, efficient command and control techniques. A wrong judgment could be fatal. Yet experience in actually controlling real fires is obviously limited and restricted to a small number of officers. Practice fires are costly in both resources and manpower. The challenge, then, was to train officers so that, when faced with the total command of the fireground, they would have the essential training background to be logistically aware, to control the blaze and to deploy manpower and manage resources most effectively. What the trainers needed was a system which would give fire officers real life problems, in real time, in a controlled environment which would emulate as nearly as possible the feelings and stresses of the command role. This meant a complex scheme with diverse stimuli to constantly tax the mental agility and endurance of those involved and subject them to unremitting decision making.



To this end, **ICCARUS** (Intelligent Command and Control: Acquisition and Review Using Simulation) has been developed by Portsmouth Polytechnic in conjunction with the West Midlands Fire Service, to train senior officers in the management and control of fires. An Apple Macintosh IICi hosts the central processor, supported by a transputer and controlling an array of peripherals - A3 high resolution screen, videodisc player and CD-ROM drive. Visual output is directed to PAL standard TV monitor and audio is mixed and amplified by a stand alone stereo speaker. The user-learner converses with the simulation via a mouse, using an interface which

orientates the user while carrying out the command and control strategy.

Using audio and video simulations and footage from real life incidents, the scenario of a serious fire incident is created, offering the participant a choice of action: monitoring the event from the hub of a busy communications centre, or assessing the situation as it develops at the scene of the fire. Whichever the choice, the use of intelligent computing techniques gives that vital sense of actual involvement, not only by allowing the fire and 'agents' involved to respond according to the actions of the user, but also by creating a series of unpredictable subsidiary events which could develop into major problems unless identified and intercepted.

The technology allows for actions to be taken in multiples of $\frac{1}{6}$ of a second; thus a section of audio can be played, the video can be started and a text message displayed on the screen, all within a second. It is this very flexibility and immediacy which allows the introduction of the unexpected, based on reality, and makes the exercise so challenging. All actions taken by the trainee are logged and included in an interrogative debriefing at the end of the package.

ICCARUS ensures that the Command Unit environment is represented convincingly, allowing for an adequate performance of the command and control logistical role whilst providing the chaos, interruptions and communications overload which might destroy a good performance, so putting commanders under the sort of pressure which would make them lose sight of the need for extensive co-ordination.

An independent evaluation of users' responses to ICCARUS, carried out by Dr Valerie Hey from the Social Science Research Unit at London University's Institute of Education, showed that even the most experienced officers were drawn into the simulation. They were 'literally/metaphorically in the hot seat - reacting to the escalating demands of making and managing complex decisions...The design team have created a training experience of substantial credibility.'

Crowd Control - A Training Challenge

Anyone who has experienced thousands of people together at one particular time knows that crowd control at major spectator events is not easy. Controlling around 40,000 people at a football match, for instance, requires a high level of decision making and communication skills. It means being able to react instantly to an ever-changing situation, to anticipate, to forestall and to dissipate potentially explosive situations.

Control commanders need to be trained to extremely high standards to achieve the level of expertise which is increasingly essential at large events throughout Europe. Training has posed a problem: shadowing is successful but restrictive in opportunities and in the numbers trained at one time, and therefore costly; mock exercises are difficult and expensive to mount; paper-based training is unrealistic, allows too much time for the trainee to react and lacks that essential pressurised atmosphere which pervades the real thing.



A major breakthrough has been pioneered by the National Computing Centre and the Scottish Police College, supported by funding from the Employment Department. They have developed an Interactive Video training system which combines video, computer and audio stimuli to produce a replica of extraordinary realism.

This unique network system is multimedia and multi-user, incorporating video based scenarios under the control of a facilitator who can introduce the unexpected at any time. Four teams of four participants have four different sources of information. Each workstation represents a main area of responsibility to be found at a football match: match commander; officer in charge inside the ground; officer in charge outside the ground; and divisional control - the police station in whose area the stadium is located.

The facilitator workstation, which is also within the network, selects and presents events to the teams, which henceforth see only their own, partial, view of the total situation. Various 'cues', such as a video, text, or a system generated audio message, represent potentially serious incidents. Each group must consider the action they propose to take. They base their decisions on what they see on screen and on what they hear during the continual audio bombardment, and then transmit their message over the personal radio system incorporated within the network. So the groups interact with one another, just as at a real match, and there is the continual sense of the unforeseeable constantly happening. Decisions and their consequent actions are recorded for eventual review at the debrief which follows.

The system, called **VISTRAIN**, comprises a set of four interactive video workstations based on Commodore Amiga 2000 computers and Sony Laservision videodisc players. These workstations are linked in a star network using Amiox boards and linked to the facilitator's Amiga 3000 workstation. A sixth computer, a Commodore bridgeboard, is connected to the audio network and digitally records and stores the personal radio messages - invaluable for replay during the debrief stage.

For any high level training in crowd control, **VISTRAIN** has to be the breakthrough that has been hoped for for a long time.

Public Order - The Problem of Policing

With similarities to crowd control at a spectator event, the policing of a large number of people in an unconfined street situation poses its own problems. For the police, marches and demonstrations can be large and complex events, involving considerable resources and planning time. If they go wrong, they can result in damage to property and injuries on all sides. A large march, for instance, means negotiating with the organisers, planning the event itself and orchestrating the logistics involved, not forgetting the deployment of the police, consideration for the marchers and those en route, and, above all, the assurance that order and tranquillity be maintained.

Consequently, training of commanders must be of a high quality and keep pace with the ever-changing demands. It is technology based training which offers the flexibility necessary to meet the challenge.

Leeds University and the Metropolitan Police, supported by the Employment Department, have developed computer based exercises to help participants think more clearly about strategical and tactical decision making. They saw the need to move on to a larger scale simulation exercise which would introduce realism and credibility. It had to be flexible and adaptable so that it could be customised to local training needs. Hence their **Policing of Public Order** package.

The first component of the package is a digitised map on which the proposed route and significant buildings can be marked. This provides the static world. The dynamic actions are contributed by the crowd groups which appear on screen. Each has a repertoire of behaviour, as have the police, positioned at strategic points along the way and

distinguished according to whether they are on normal policing duties or in reserve as horse units or with special equipment such as shields. The 'agent groups' (the police or marchers) can sense what is happening around them, make decisions and respond. Some of these actions lead to inconsistencies that are resolved by the inbuilt 'referee' which looks at the ratio of police and their equipment to crowd volume and delivers its decisions.

At any time, the trainee can ask for updated reports on which they can base their strategic and tactical decisions, utilising their police strength in the most effective way. Constantly, the situation changes and the user reacts, always under pressure. This is a system which can be used on any PC that takes commercially available software. Its concept is simple. It is one that has been needed for a long time and which will adapt to suit any of a variety of needs - exactly.

Developmental Flexibility

All three of these command and control simulations demand such complexity in their functions that the software has to be very carefully thought out. This involves painstaking research to ensure that the training is tailored so that it fits the needs of the user precisely - only then can it be most efficient and successful. The applications of this sort of flexible, cost-effective training, made specifically to individual requirements, are virtually limitless. Any large scale management of a potentially explosive situation requires specific, high level training, which cannot afford to fail.

For high quality, cost-effective training in the controllability of the unpredictable, these developments in technology based training offer an exciting option.