

Simulation - How is it for you?

Simulation can play a major role in training and development for the rail industry, but it must be blended with experience, says Dr Charles Johnson

Professor Uff's report on the Southall rail crash recommends that 'simulators should be introduced for driver training and for the observance of driver behaviour'. The Association of Train Operating Companies (ATOC) is currently working on a driver training strategy for passenger and freight trains, paying particular attention to the use of simulators and also covering driving in abnormal situations. Infrastructure Maintenance Companies are developing similar strategies for train use in possessions. Railtrack, ASLEF and RMT support these initiatives. HSE agrees that this is a sensible way forward.

Is this burst of enthusiasm justified? Perhaps.

Simulation can be very expensive. You must be sure that it will do the job you want, before you invest. The history of simulation is littered with as many failures as successes. Far too often it has been a case of a technology looking for a home or managers looking for a quick fix.

Now seems like a good time to reflect on what simulation can and can't do, and what you can expect to get for your money.

When to use simulations?

The simplest answer to this question is 'when nothing else will do'. Superficially, the test for this is straightforward. Simulations give more accurate assessments of performance than any other assessment method except for good quality observation of real work.

If it is important to get the most accurate assessment you can and work observation will not meet your needs, the costs can probably be justified. However, don't use it when the same results can be achieved by other, cheaper methods or if you need to get at knowledge, or even understanding, where tests, examinations and interviews are all much better.

There are plenty of potential uses for simulation. It can add value at all stages of the employment cycle: recruitment and selection, development and training, rehearsal, initial assessments and assessments of competence. In each case, the question is 'what can simulation deliver that other methods can't?' The criteria for answering this question are: Safety, Rarity, Practice, Opportunity and Observability.

- **Safety** - Can you afford to let trainees loose on real work before they have shown that they are competent? If not, and training demands real hands-on experience, then simulation is likely to be the answer.
- **Rarity** - Many of the most critical and difficult events people have to handle happen rarely, if at all, in the course of



someone's working life. For example, the average train driver is likely to cause one SPAD (Signal Passed At Danger) in 20 years of driving. Most will never experience a SPAD that turns into a serious accident. Simulation is especially useful where it is important to train people to cope with rare but significant events.

There are two sorts of rare events: those which unfold in predictable or unpredictable ways. One example of a predictable event is abnormal driving situations which are permitted within the rules, such as driving with the Automatic Warning System (AWS) isolated. Because they happen infrequently, it is important to over-train in the procedures that should be used and give regular refresher training.

Emergencies are often, but not always, unpredictable. The training and assessment needs are different. People need to be able to anticipate dangers or problems, identify and weigh up options, make rapid decisions and keep a cool head. Simulation can be an excellent way of developing these skills.

Driver training simulators from Corys have been used to train new recruits and retrain existing drivers for the Jubilee Line Extension: London Underground

However, sometimes, in such unpredictable events, blindly following procedures can be very dangerous, so simulations need to avoid the development of unwanted habits. They need constant changing or updating which poses quite a challenge for designers.

- **Practice** - One of the least addressed problems in staff performance is skill degradation. In the case of equipment specific skills, it takes time to get back up to speed after a long period of not using them. Simulation is an obvious way to maintain skill levels.
- **Opportunity** - Starting a new job can be a problem for anyone, particularly when the job involves skills you have had no opportunity to practice or develop. For most engineers and technicians (and many other people such as nurses, mechanics, salespeople etc), making the jump from technical expert to manager or supervisor

is very hard. Simulation is a good way of getting people to use and develop skills which they don't use in their current jobs. This is the main reason for using simulation in recruitment and selection.

- **Observability** – There are lots of occasions where real work behaviour is difficult or impossible to observe and evidence from work outputs is inconclusive. Much maintenance of signalling and telecommunications equipment falls into this category. Simulations focused on decision-making can help to fill this gap.

Choosing your simulation

Once you have decided to use simulation, the next decision concerns how realistic it needs to be.

Simulation is not all about train cabs or pistons and 3D video. It ranges from the paper and pencil exercises beloved of managerial assessment centres to the ultra-realistic flight simulators used by many of the world's air forces. All sorts of options exist in-between (see box). Many of these have not been fully explored yet. For example, the benefits of standalone computer simulation are not widely realised, let alone the possibilities of on-line multimedia services.

The key question is what you are trying to show. For example, you might want to assess whether someone is:

- As ready as they will ever be to handle unusual events;
- Ready to try the real thing; or
- Suitable for training or further development.

For the first two of these, the nature of the demands is critical. Where decision making and communication is important, tabletop and group exercises may suffice. Where the job requires remote decision making, such as control room staff in London Underground, the real world can be accurately mimicked

Types of simulation

- **Case Studies and written exercises** – any paper based simulation where individuals work on their own
- **Non-work projects and assignments** – specially created tasks drawing on work-related issues and used specifically for development and assessment
- **Group and tabletop exercises** – any exercise which requires communication or other form of interaction between individuals
- **Presentations and role-play exercises** – any exercise where individuals are faced with a situation to which they must respond by assuming a particular role. It almost always involves interaction with assessors or other participants with the assessors observing
- **Analogous exercises** – any exercise where individuals are asked to undertake a task which uses the same skills as a real task but in a quite different activity
- **Model or kit-based simulations** – any exercise involving a practical activity which uses equipment which mimics real equipment or the real work environment
- **Work samples** – any exercise using real equipment or other aspects of the real work environment in a carefully controlled and, usually, off-line activity

using a PC and a telephone. Similarly, the quality of safety briefings can be assessed using presentation and role-play exercises. Only jobs where there are significant perceptual and physical demands justify extensive, realistic, kit-based simulation. Even then the simulation should focus on essentials. For example, there is little value in teaching train drivers knowledge of complete routes using simulators but there is value in using them to teach and test drivers on critical junctions and signals.

Assessing someone's suitability for further training is a key selection issue. A high degree of realism is rarely required. The interest lies in whether people will cope with the sorts of intellectual, perceptual and physical demands they are likely to meet in a new role. Analogous exercises using stripped-down tasks are often good enough although they may need

An appropriate balance has to be found between simulation and the real work environment: training by Virgin Trains' Millennium Drivers organisation.


to be supplemented with tabletop, group or role-play exercises where interpersonal or communications skills are important.

Written simulations and tabletop exercises are relatively cheap options. Those involving role-play can be more expensive if they make significant use of expensive assessor time. All three of these options have recurring costs that can be avoided in computer or kit-based simulations. However, the latter can have significant up-front development costs.

Assessing competence

It is unwise to claim that someone is fully competent on the basis of a simulation alone. Although people can get very caught up in the action and suspend their disbelief for significant periods, they always know that a simulation is not real. They are not going to die or cause a major disaster, the business isn't going to collapse, the pressures and the emotions are not the same. Simulations rarely detect the kinds of bad habits that tend to develop in real work setting over time. They can give part but never the entire picture. So, for example, simulations may be a cost effective way of delivering initial training to train drivers and preparing them to deal with emergencies, but they are unlikely to tell you how they will perform day in, day out.

Experience

Simulations make it possible to provide training and assessment opportunities which are difficult or impossible to deliver in other ways, but it is not a universal solution. The fact is, that there are some situations where no amount of exposure to simulation can substitute for real experience. There are others where simulation is invaluable because the real event may never happen. There are yet others where the simulated experience may be as good as the real thing for training purposes but not for assessment. The value of simulation needs to be judged on a case by case basis. But overall it can be a powerful tool for accelerating and enhancing the ability of the rail industry to overcome to the selection, training and development challenges it faces. 

Dr Charles Johnson is a Director of Competence Assurance Solutions Ltd, an Associate Fellow of the British Psychological Society and is Chair Elect of the British Psychological Society's Steering Committee on Test Standards. He can be contacted by e-mail at charles@casolutions.co.uk

