Risk Management

Changing the face of emergency response in Merseyside

Jo Jones looks at how Merseyside Fire and Rescue Service have used process simulation to facilitate better risk management

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THE 2004 FIRE AND RESCUE SERVICES Act and the resulting Fire and Rescue National Framework have led to major change within the British Fire and Rescue Service. With each organisation now working to an Integrated Risk Management Plan, fire rescue services are looking at their operations closely to identify how they can better manage risk and increase value for money to the local community they serve. Here, we examine how – with the help of process simulation – Merseyside Fire and Rescue Service (MFRS) is achieving these goals, whilst changing the face of emergency response in Merseyside.

Expert Help

Merseyside Fire and Rescue Service has a reputation for quality and innovation. The service works to its own stringent set of response targets, which are more challenging than the national standards, and has won recognition for its work. Indeed, in 2005, the service received the highest rating in the Audit Commission's first Comprehensive Performance Assessment (CPA) of British fire services. One of the areas in which MFRS excelled was performance management.

The organisation is confident that a key factor in success in this area is a partnership with Process Evolution, a specialist process improvement company that uses business process simulation to deliver performance and efficiency gains across the Emergency Services sector. Always looking to improve their services further, Merseyside came across Process Evolution in 2004. The service quickly recognised how simulation could help them and embarked on a project which would lead to significant changes for the service.

Tony McGuirk, Chief Fire Officer of MFRS, recognised the potential of this approach from the start: "Information and how we use it is at the heart of improved emergency response. In our sector it is critical that we get the right people and resources to the right place at the right time in the most efficient way possible. We recognised immediately that, by accessing and interpreting the wealth of information already available within our organisation, simulation would enable us to do just that."

What is Process Simulation?

Process simulation is a technique used by organisations worldwide to achieve a step change in performance. A computer model is created that accurately mimics the behaviour of an organisation's real life processes, incorporating all of the complexities that characterise real life, such as randomness or variability of incident rates. Changes can then be made to this real life model to evaluate their effectiveness, crucially prior to implementation, and, therefore, without the risk that change normally entails.

In the case of MFRS, a model was created that simulated five years of historical data of incidents for the whole service, detailing when and where each incident took place, who responded to it, how long each response took and overall performance rates.

This base model gave the service a huge insight into how it worked. The wealth of reports generated by the simulation revealed where workload was heaviest, what type of incidents were occurring, when incidents occurred and, importantly, any patterns in incident occurrence.

Radically Changing the Response Model

Several important discoveries came out of this initial work. Firstly, the model revealed vital information about small fires resulting from antisocial behaviour. Although the service had a feel for where such incidents were happening, like many services, they had not been able to quantify in which areas they were most prevalent. Yet the analysis showed not only that such fires were occurring in three main areas but also that they occurred primarily between the hours of 1600 and 2200.

Crucially, it also revealed the extent of the impact of small fires incidents on MFRS operations, with small fires call outs constituting the largest incident type across all stations. It was obvious to the service that sending out a rescue pump (a primary engine crewed by five members of staff) to such incidents was a waste of valuable resources. Now with evidence of the huge workload

created by small fires MFRS decided to take the radical approach of designing and patenting a new unit, the Small Fires Unit (SFU), a much smaller appliance, which would be crewed by three firefighters only, and would respond only to small nuisance fires. Further experimentation with the model showed that the majority of incidents of this nature could be dealt with using just four SFUs, thus releasing key resources for major incident response. And of course, using the simulation model, the service has been able to identify where the SFUs should be located in order to respond to these incidents, and at what times.

The model also revealed vital information about false alarms, highlighting patterns of occurrence, in terms of likely times and repeat calls to a small number of sites. For the first time, the service had clear evidence that the majority of incidents were occurring in the city centre within office working hours. This gave Merseyside the confidence to be able to trial a motorbike response service to such incidents, again releasing valuable resources to deal with high risk property fires.

Matching Staffing Levels to Demand

But despite these gains, MFRS did not stop there. Having made these initial changes, the organisation wanted to examine whether the core response model truly met the needs of Merseyside. The service was operating 26 stations with 42 whole time appliances, twenty four hours a day. However, given fluctuations in workload through the day and the proposals already discussed, were they really all needed all of the time?

Each station has one rescue pump, crewed by five officers. Two-pump stations have an additional support pump, crewed by four. However, MFRS had already identified that about one fifth of their stations could be defined as having low level of activity and risk (LLARs), potentially not needing a full-time crew. Yet busy and quiet stations alike were being crewed by the same appliances, with all staff on the same shift patterns.

MFRS began to question whether the same number of staff and appliances were needed for LLARs. When the project began, they thought that permanent crews could be removed from the LLARs and replaced with the second pumps from two pump stations when required. The service wanted to simulate this scenario, evaluating the impact on performance, identifying the best combinations and testing this approach against new response standards. However, the simulation showed that it would be far more efficient to look at changing crew patterns across MFRS.

The model revealed a very predictive demand profile across the whole of the service with regular peaks and troughs, and the highly visual nature of the reports helped them to quickly identify inefficiencies which impacted the service (for instance, shift changes were happening in peak rather than quiet periods, leading to very high overtime costs). Added to this, experimentation with different scenarios identified that, with a different support structure and new shift patterns, staff levels could be halved without impacting service levels, saving the service £330,000 a year per station!

The analysis was then widened further to see whether changing shift patterns across the whole of the service would lead to further efficiency gains. One important discovery of the simulation was the steep drop in the number of incidents reported between 2200 and 1000 – yet under the current system resource levels remained constant during these hours. Further experimentation revealed that four pumps could be taken out of service during these hours with no impact on service. However, to ensure that Merseyside would still be able to respond to a major incident should it occur, staff for these four pumps could be kept on standby (a concept known as strategic reserve), with the ability to mobilise within 15 minutes. Again the model was vital to establishing the viability of this approach, showing that call-ins would rarely be required, and that when they were, the service would still be able to meet its response targets.

CFO Tony McGuirk: "We really didn't anticipate how little having a second support pump contributed to our level of service but the simulation provided clear evidence that this was the case. This would never have happened if we hadn't taken a fresh approach and asked experts in process to review the way our organisation worked."

Saving £1 Million in the First Year

MFRS is now working to implement the shift changes across the service. Three stations have already implemented the new shift systems, saving the service £1 million per annum, with changes anticipated in a further three stations. Two stations are now providing pumps on resilience reserve. And, as a result of the simulation, the authority has also been able to improve efficiency in its mobilisation centre.

Interestingly, the new approach offers benefits on many levels. By changing the response model so that it more closely fits demand, MFRS has created several new working patterns for its staff. As a result, the service's firefighters now have greater flexibility over the way they work. They may elect to remain on the traditional shift pattern or volunteer for one of the new ones, choosing whichever provides them with the best work/life balance. The new system also gives them the opportunity to earn more money through the availability of additional overtime. Both new opportunities have been well received by staff.

The importance of Process Evolution's evidence-based approach in communication of the benefit of these changes cannot be overstated. Initially there was concern from staff and wider stakeholders that changing the mix of resources within the service would negatively impact the service provided by MFRS, ultimately putting lives at risk. However, the simulation model provided the evidence that, rather than endangering the people of Merseyside, the proposals would enable the service to work smarter, releasing more resources to deal with the key risk area of property fires response.

Achieving a Step Change in Efficiency

The service are delighted with the results of this project, which has indeed given a step change in efficiency. Although the initial simulation projects are now complete, the model now plays a key role in the service's development strategy, ensuring an evidence-based approach to all key decision-making.

In the words of Tony McGuirk: "This project has given us a much clearer understanding of our processes. The many improvements identified have not all been huge but together they are significant and will help us to maintain our high levels of service whilst reducing costs. In the abstract, we could save many more millions with this approach. In reality, we have just started out, but we're certainly on a journey of continuous improvement to the service we provide to Merseyside."

Looking to the future, MFRS is now hoping to integrate the simulation model with the government's FSEC tool and to be able to analyse exactly how Home Fire Risk Assessments reduce risk.

With tools such as these, the organisation really is changing the face of emergency response in Merseyside.

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