

Drivers of change in the UK Fire service: an operations management perspective

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The UK Fire and Rescue Service is subject to reform, along with other public sector services, resulting in later retirement age and budget limitations; the fire service is also subject to other societal changes such as shifts in fitness levels and a reduction in call outs. This chapter reviews these changes and considers them from an operations management perspective. A method for how to measure operational effectiveness is proposed and its use in informing changes to operating practice in the fire service is advocated.

Introduction

Reform in the Fire and rescue service in the UK is driven by multiple agendas including seeking continuous improvement, meeting cost reductions and a political desire to reform these established public services (Public Accounts Committee 2011). Examples of these changes to working practices for the emergency services are documented for ambulance (Public Accounts Committee 2011), police (Windsor 2012) and fire services (Connor 2013). In addition to change driven by government, public services also need to respond to demographic and societal change. The average age of firefighters is likely to increase with the proposed implementation of later retirement and this could have implications for the typical levels of health, fitness and experience among firefighters. In addition, changes in geographic population density, road use and home safety affects both the nature and quantity of demand for fire and rescue services. This chapter explores how some of these changes are affecting the fire services. It includes reference to two cases where change is taking place and explores the role that operational effectiveness measurement can have in understanding and managing change.

Literature

The government direction for Fire and Rescue Services in England is set in the *"Fire and rescue national framework for England"* Department for Communities and Local Government (2012) and follows an equivalent document for 2008-2011. It states it *"..sets out high level expectations. It does not prescribe operational matters. These are best determined locally by fire and rescue authorities.."*. The priorities are:

- "1. identify and assess the full range of foreseeable fire and rescue related risks their areas face, make provision for prevention and protection activities and respond to incidents appropriately*
- 2. work in partnership with their communities and a wide range of partners locally and nationally to deliver their service*

3. be accountable to communities for the service they provide”

(Department for Communities and Local Government (2012) p7)

Fire and Rescue Services are required to perform a wide range of services at an organisational level. These include risk registers, large scale incidence response planning and co-operating with other agencies. This chapter reviews the main changes and contemporary pressures on the UK fire service specifically changes to demand and capacity for fire and rescue services, and changes to the profile of firefighters and related HR policies with the fire service. Also reviewed are the operational data gathering activities for fire services.

Fire services are split up in to five family groups within England by the department for Communities and Local Government (CLG) for performance monitoring and are categorised as ‘most similar services’ (Department for Communities and Local Government, 2009). As an example family group 1 is categorised as rural and family group 5 as metropolitan.

Changes to demand and capacity for the fire service

Over the last few decades the role of the fire service has changed. The demand from callouts has reduced and in terms of outcomes there has been a considerable reduction in deaths due to fires with over a 60% reduction in deaths from domestic fires from the 1980’s until present day with 168 in 2012/13 (Knight 2013 and fire statistic monitor 2012/2013). For 2012-13 Fire Services nationally attended 519,900 incidents of all kinds including fires, road traffic collisions (RTC) and false alarms, which has been a 14% reduction on the previous year and a 46% reduction from 2002-3 (Fire Statistic Monitor 2012/2013). The Counties, from the second case study, attended broadly 14,000 emergency calls in 2012-13 which showed a reduction in calls overall on the previous year. However there was an increase in RTC attendance and an increase in the number of special service incidents, which include such things as animal rescue and chemical spills, highlighting how the nature of the role of a firefighter is changing. This reduction in demand is due to a range of prevention activities by the fire service, societal change and various improvements in household safety.

Increasing community engagement activities to reduce the risk of fire appear to have had an effect as indicated by the reducing number of deaths in domestic fires. These types of activities include home safety visits, visits to schools and other community events and inspection of high risk premises. The time spent on fire safety activities in England (excluding London) changed from just over 500,000 hours (2002/03) to a peak in 2006/07 of 1,000,000 hours and then reducing to 700,000 hours in 2012/13. (Fire and Rescue Operational Statistics Bulletin for England: 012-13). Thus the fire service has been fulfilling a societal desire to be more effective and in terms of ‘stakeholder value’ through the reduction of the causes of fire rather than literally just fire-fighting.

Other changes to the fire and rescue services activities include attending fewer road traffic accidents and other emergencies such as flooding. There were 156,000 of these non-fire incidents in 2008/09 and 134,700 in 2012/13 (Fire Statistics Monitor England: April 2009 to March 2010 and April 2012 to March 2013). The fire service’s prevention role in reducing road traffic accidents takes place in the form of many community and schools activities. Examples can be found on the Chief Fire Officers’ Association web page (CFOA 2014) which identifies activities undertaken for Road Safety Week (9 to 15 June 2014) by 28 Fire and Rescue services across the UK.

In conventional operations management this reduction in demand both for emergency fire and non-fire services would indicate that there was a case for lowering capacity. However, for each individual emergency there is a need to maintain and improve responsiveness. From the property holders' and firefighters' point of view the capacity to attend a fire quickly is critical. Therefore, response times need to be maintained and a geographic coverage of all areas still has to be upheld. This combination of a lower number of incidents to be dealt with and demands to maintain national coverage and response times represents a challenge to fire services.

In this context one way of expressing capacity is the number of firefighters. In 2002/3 there were 31,699 wholetime (full time) firefighters and this has reduced by approximately 11% to 28,166 for 2010/11 (Knight 2013). Over the same period the number of retained firefighters (FTE) has grown by approximately 9% from 10720 to 11702. This may indicate that while overall numbers are similar, the working arrangements of staff are indicative of a drive to develop capacity in a way that reflects changes in demands.

The majority of whole-time firefighters are currently working the shift system laid out in 'The Grey Book' (Fire Brigades Union, 2009) which outlines the conditions of service for firefighters. Although how this is managed can be agreed locally with each authority, in the most part this consists of 2 day shifts, 2 night shifts and 4 days off (224), requiring 4 watches (or crews), to allow for full cover of the station. Alternate working systems are starting to appear within the UK FRS as a way of reducing costs by reducing the number of wholetime personnel required to offer the same level of cover, such as day crewing plus and day crewed/retained.

Fitness, age and wellbeing

Firefighters joining the service prior to 2006 are currently able to retire at age 50 and after 30 years of service. For those joining post 2006 the retirement age increased to age 60 and at the time of writing proposals are in place to change the pension rights and retirement age to 60 for all operational staff (Department of Communities and Local Government, (2012^B), Firefighters' Pension Scheme (England) Order 2006 and Williams, Wilkinson, Richmond and Rayson (2012)). The number of wholetime firefighters has been reducing in recent years and recruitment has been low (Department of Communities and Local Government, 2013). These two factors have combined to make the average age of a firefighter increase over time (Bath Chronicle 2014) as firefighters are retiring later and fewer, younger firefighters are recruited. It is well known that fitness reduces as we age (Health Survey for England, 2009, Allied Dunbar National Fitness Survey, 1992) and so an increasing mean age of firefighters would be likely to adversely affect overall fitness of the service. Fitness particularly affects firefighters as a role because of the physical requirements of the job.

Fitness and health have moved up the fire service agenda in recent years with a key document from the Firefit Steering group released in 2009 outlining best practice and key recommendations for fitness policy for the UK Fire and Rescue service (Firefit Steering Group, 2009). This suggests a minimum recommended aerobic fitness requirement for operational firefighters based on a review of the scientific literature on the physical demands of firefighting. Recent work has attempted to quantify the physical demands of various firefighting tasks within a UK cohort in order to rationalize any fitness requirement for the role (Siddall, Standage, Stokes and Bilzon, 2014). Findings of this work suggest that tasks related to firefighting can require an oxygen consumption of up to $47\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ and up to 92% of heart rate reserve, with running out hose and climbing stairs with

firefighting equipment being the most demanding activities. This is equivalent to level 10.2 on the multi-stage shuttle run test (bleep test). Alongside this, it has been shown that risk profiles of firefighters for lifestyle diseases such as coronary heart disease, stroke, obesity and diabetes are in line with the general population (Munir, Clemes, Houdmont, and Randall, 2012, Smith, Fehling, Frisch, Haller, Winke, Dailey, 2012, Plat, Frings-dresen, and Sluiter, 2012, Poston, Haddock, Jankhe, Jitnarin, Tuley and Kales, 2011). Therefore, as the average age of firefighters increases there is a risk that age-associated health problems will have a growing negative impact on firefighters' operational effectiveness. As a consequence, health promotion and wellbeing policies are becoming more common in many fire and rescue services. The majority of research on health and wellbeing within a firefighter population has been conducted outside of the UK, mainly in the US, but at the time of writing a major national study is being undertaken to assess lifestyle factors in UK firefighters (Turner, 2013). Preliminary results suggest similar findings to the previously mentioned studies showing trends in line with the general population for cardiovascular disease risk (Siddall, Standage, Stokes and Bilzon, 2014). The evidence of similar risk profile for firefighters is surprising considering the physical nature of the role and the requirement for applicants to achieve a high standard of fitness and health.

There is little data that directly relates firefighter fitness to its effect on operations, but one might expect fitter fighters to be more effective. However, little hard evidence exists to confirm this and to assess the relative sensitivity of firefighters' fitness to operational effectiveness. This was one of the purposes of the study conducted in the 'Shires' case study explored later in the chapter.

Operational Data for Fire and Rescue Services.

Fire and Rescue Services publish annual reports on their performance (see individual fire service websites such Derbyshire Fire and Rescue 2012/13 and Greater Manchester Fire and Rescue 2012/13) and these typically cover areas such as; number of primary fires, average response time – first appliance, home fire safety visits, commercial fire safety inspections and energy consumption by region. Much of this data is collected from response data that is collected by incident and details information such as incident types and time to attendance. There is some variation in how fire services define measures, for example for response times Essex measure the appliance leaving the station in under 2 min from the call coming through (this is also called turn out times by some services) whereas Leicestershire measure the appliance arriving at an incident in under 10 minutes and London is 12 minutes.

The reports published by different services do not follow a standard format, for example London Fire Brigade (2013) base data around their 6 key aims; prevention, protection, response, resources, people and principles, and covers key indicators such as those mentioned above. Essex Fire and Rescue Service's (2012) report tends to cover similar types of data but is less organised around aims and objectives. In these reports some fire services often compare their performance with performance for their 'family group'. Data in these reports are used by the Department of Communities and Local Government to compare performance of similar fire services within the family groups in key areas such as primary fires, road traffic incidents and fire safety. However, there appears to be limited measures that cover shorter term operational effectiveness that is likely to be important for highlighting changes to operating procedures. These reports are 'outward facing',

written for public consumption, so it is likely that fire services are self-censoring and are less critical than they would be with internal data.

Two Fire and Rescue Service Cases

The following two cases explore the use of operational data for two different fire services. The initial purpose of conducting the investigations into each of these fire services was not to examine the use of operational data but to use it as a yard stick for examining wider changes that affected operational practices in the service. As such the investigation into the use of operational data in these cases was not the primary function of the research, however, as part of the research in each case the use of operational data emerged as common theme, and hence its presentation here. To provide each case with a wider context the initial purpose of the case research is presented. This additionally demonstrates the importance of effective operational measures in monitoring change in public services, particularly in an environment where maintaining the service levels to the public is an overriding requirement.

The Shire's Fire and Rescue Service – age and operational effectiveness

The Shire's Fire and Rescue Service (FRS) has a mix of rural and some larger non-metropolitan cities in its area and they were keen to put an emphasis on maintaining and improving fitness. They were also aware that the mean age of their firefighters was increasing and, conscious of the relationship between age and fitness, were interested in monitoring health and fitness levels (Munir, Clemes et al. 2012). The Shire's mean age between 2008 and 2011 had increased from 38.5 to 40 years (data from Shire's HR records). A review of the Shire's health and fitness data revealed an increase in obesity in their firefighters with the number of firefighters in the obese category having risen from 10.9% to 12.9% between 2008 and 2011. A change to on-station activities in 2005 had also removed allotted time to fitness training. *"In 2005 time allocated within the daily work routine for fulltime firefighters fitness training was removed, however, two hours a week (tour) is still provided on the night shifts. Firefighters, who wish to exercise during the day shifts, complete their training within their allocated lunch hour. Part time firefighters have no regular time for exercise allocated. They have a requirement to be fit for role, but have to exercise in their own time. PT equipment is provided on their stations to facilitate this."* Shire FRS Health & Fitness Adviser.

The important question for the Shire's service was: did these changes to age and fitness have an effect at an operational level? To answer this question the Shire FRS wanted to use its existing operational data with the firestation as the unit of measurement. This was considered because change to working practices was likely to be taking place at the station level. There are also different types of fire stations such as full time and part time stations and the performance of these can be compared along with differences in fitness facilities and regimes and contrasting demographic profiles for firefighters from urban to rural.

In addition to the specific issues of fitness and demographic changes the Shire also wanted to examine their performance measures to enable performance improvement at a local level *"giving greater emphasis to the operational readiness and competence of stations and watches"* Shire FRS Area Manager.

To address these issues the following research questions were posed:

1. Using existing operational effectiveness measures is the effectiveness of fire stations influenced by fitness levels of their firefighters?
2. Do the existing and proposed measures of operational effectiveness for fire stations allow managers within the Shire FRS to make informed decisions about management of fire stations?

Methodology

The research used existing data from two principle sources, health and fitness data for individual firefighters and existing operational performance data. Health and fitness data from 785 firefighters was sorted by firestation and those with more than thirty firefighters providing valid data were used. This resulted in nine firestations being analysed (the smallest had 31 firefighters, the largest had 66). Using a series on one way ANOVA analysis, fitness measures were compared between firestations. There were several fitness measures available to us; BMI, waist size, VO₂ max and % fat.

Fire stations at each end of the fitness scales i.e. the most fit and least fit, then had their operational effectiveness data interrogated to examine if there was any evidence of differences in operational performance. These data were limited to turnout times.

This analysis served two purposes: firstly to initially explore if different levels of fitness affect operational effectiveness (RQ1); and secondly to explore if the existing performance measurement system was able to operate at this level of decision making (RQ2).

Results and conclusions

Of the nine firestations (FS 1 and FS 2) two showed significant differences in fitness between their firefighters for VO₂ max and waist size, the rest of the firestations were clustered with similar results, with a third firestation (FS 3) that had marginal significance also for VO₂ max and waist. There were also differences for % fat and BMI but these were not statistically significant. The causes of these differences are as yet unknown but could be due to different fitness regimes and age.

In terms of operational performance, the data that was provided related to turnout times and there were no significant differences either between FS 1, 2 or 3 or any of the other six firestations. At first this might indicate that differences in fitness make no difference. However turnout times do not cover the range of activities performed by firestations thus a more in depth analysis of effectiveness is required. Moreover, the urgency associated with firefighters' work may buffer the impact of fitness on the time taken to attend a fire (i.e. it may be more effortful for those with lower fitness levels to achieve a good response time but they are highly motivated to do so because of the importance of the task). It may have also been that local geography influenced responsiveness. Thus future work includes obtaining better measures for operational effectiveness that includes less urgent and / or more discretionary activities at firestation level to allow changes such as health and fitness levels to be tracked over time.

Exploration of operational effectiveness at the Shires

Following the inconclusive results from the fitness and operational effectiveness analysis it was decided to further explore how operational effectiveness could be measured using current data collected by the Shires and to this end a number of interviews were conducted with:

- a. A station manager – an operational manager of a station who runs four watches
- b. Two group managers concerned with policy and response
- c. Manager of HR information systems
- d. Manager of HR Business Partners who look at performance issues, capability, discipline

The interviews were semi structured and reviewed the method for assessing operational effectiveness in the fitness study i.e. in the response data and the unit of measure assessment - the firestation. The interviews went on to explore further ways of measuring effectiveness including how the current performance measurement system was used and ways to quantify other aspects such as preventative activities, for instance public engagement and assessing operational readiness and competence of fire crews. Interviewees were also given an opportunity to suggest any additional measures for effectiveness they would want to be included and how this data should be handled.

Results from interviews provided some fairly clear conclusions:

1. The appropriate unit of measurement is the watch not the firestation. This is because the watches are managed by watch managers who have different approaches and the operation of different watches at a single station can vary. So calculating effectiveness across watches to give an overall station measure will tend to mask variation and give a good measure.
2. Watches and stations in the Shires adhere to the targets set for response times set fairly consistently and so do not show up much variation of effectiveness.

Suggestions about what could be done to more adequately measure effectiveness were numerous and covered a wide range of areas. Reviewing these suggestions put the researchers in mind of the Overall Equipment Effectiveness (OEE) measurement used primarily in lean context to assess the effectiveness of individual pieces of equipment. OEE was first proposed by Nakajima (1984) and then Rich (1999) and was promoted initially in the automotive sector and then adopted widely through endorsement by the Department of Trade and Industry (DTI, 2000). It consists of three areas; quality, availability and performance with the idea of assessing the important aspects of a particular piece of equipment. This idea can be translated into service application as quality, availability and performance are concepts that are highly relevant to service delivery. There is precedence for using OEE in non-manufacturing applications, for example Simons, Mason and Gardner (2004) apply it to road freight transport. So an initial framework using OEE's three elements allowed the suggestions from the interviews at the Shires to be categorised as shown in Table 1.

Table 1: Summary of suggested operational effectiveness measures structured into OEE categories.

Conventional OEE	Possible measures	Comments
Performance	Turnout times Attendance times	Probably do not vary much Too incident specific and dependent on geography?
Availability	Sickness (neg) Stand down times (neg)	Is availability too narrow a measure for the fire service?
Quality	Commendations Training competency Breathing Apparatus tests Vehicle accidents (neg)	All pretty indirect and either look at preparedness or HR issues

	Critical equipment fails (neg) Discipline cases (neg) Personal injuries (neg) Equipment maintenance	Maintenance is mainly performed by the firefighters and interviewees indicated that this measure seems to indicate a well-run station
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The comments shown in the final column indicate some shortcomings in measures such as those associated with performance and for equipment maintenance the wider implications of this measure. The (neg.) notation indicates that as this measure increases it negatively impacts operational effectiveness.

Consideration of these suggestions, the comments and the role of the fire service as stated in Fire and Rescue national framework for England (2012) of *“identify and assess the full range of foreseeable fire and rescue related risks their areas face, make provision for prevention and protection activities and respond to incidents appropriately”* would indicate that an assessment of ‘Responsiveness’, ‘Availability’ and ‘Preparedness’ is appropriate. Hence the structure of performance measures from Table 1 has been altered to Table 2 to better fit this framework, with some of the quality related measures appearing in preparedness.

Table 2: Operational effectiveness measure restructured

Conventional OEE	Possible measures	Operational effectiveness for Fire and Rescue Service
Performance	Turnout times Attendance times	Responsiveness
Availability	Sickness (neg) Stand down times (neg)	Availability
Quality	Equipment maintenance Training competency Critical equipment fails (neg) Breathing Apparatus tests Commendations Vehicle accidents (neg) Discipline cases (neg) Personal injuries (neg)	Preparedness

So a further conclusion that:

3. A measure of effectiveness should include some aspect of responsiveness, availability and preparedness.

Conclusions from study

From the study there is no indication that there are differences in operational effectiveness of stations but only if effectiveness is measured in response times at the station level. Data used for effectiveness needs to encompass a wider range of firefighter activities and that a watch (shift) level operational unit of analysis is more likely to be appropriate. To this end the Shire’s fire service

decided to develop its own way of assessing effectiveness that involved watch visits by senior managers, assessing condition of station, Q&A on Incident Command System policy, incident response feedback issues, operational drills, breathing apparatus checks and command point and equipment Q&A and this method of assessment is on-going at the Shires.

To allow future analysis fitness against operational effectiveness a better assessment of effectiveness data over considerable time periods and data across a large number of stations will need to be gathered.

The Counties – changing demand for Fire and Rescue Services

The Counties FRS provides services to a largely rural area with a few medium sized cities and faces similar challenges in service delivery to the Shires, they are in the same 'family group'. Funding from central government for fire and rescue services has been cut in recent years and the Counties FRS was facing a deficit in their budget of £1m in year 1 and up to £7m in year 3. Fire and rescue services have a statutory requirement to present balanced books and therefore the Counties FRS was faced with looking for options to reduce the budget deficit. As part of public sector reform The Counties decided to change some fire stations over to Day Crewing Plus (DCP). DCP is a method of operating that still provides full time fire and rescue cover whilst requiring lower levels of manning. Traditional fire service systems are known as a '224' shift system whereby four crews (shifts) rotate over 12 hours shifts to provide 24 hour cover to a system. In contrast DCP operates by firefighters 'living-in' the firestation and working a number of 24 hour shifts, (usually between 1 to 5 days). During the 24 hours the firefighters are expected to sleep but are on-call in the case of emergency. If their rest time is interrupted by a call out, the rest time is extended to allow firefighters to catch-up with sleep. This change both to working conditions and corresponding home life clearly has potential implications – both positive and negative – for firefighter well-being (both physiological and psychological). There are also implications for the fire service and local community as they would want to ensure that the effectiveness of the service is maintained with the system of working hours. Within this context the Counties fire service commissioned research to investigate the effect of DCP on operational performance, and health and wellbeing of the firefighters on DCP with the following research questions.

RQ1: What are the implications of the change in shift pattern for the individuals working the new system?

RQ2: What impact has the change of shift pattern had on the performance of the stations highlighted for change, in terms of operational effectiveness?

Methodology

The method to investigate the health, wellbeing and operational performance of the firefighters was a longitudinal mixed methods study with data collection over three stages with the stations intended for DCP; pre-changeover, 6 months post-changeover, and 12 months post-changeover. Questionnaires assessing wellbeing, work demands, job satisfaction and job performance were triangulated with operational performance data and semi-structured interviews for a full and rich account of implementing DCP. 42 participants (out of 56 who are now working on the new system) over four fire stations have been interviewed at stage 1 and 22 participants interviewed over two

stations at stage 2 with on-going interviews for stage 2 and future for stage 3. Inductive thematic analysis was used to analyse interviews as an iterative process. The operational performance data was derived from existing data that the Counties fire service already collected. Themes and issues emerging from either of the three collection methods were then triangulated against the other two data collection methods to see if the theme or issue was supported across the three types of data.

Assessing operational effectiveness has built upon the assessment framework from the Shire's. The use of operational unit became a moot point for DCP because there are no separate watches just a single team on a station who deliver DCP so the unit of analysis is the station. Thus the following aspects shown in Table 3 were assessed. There are slight differences between the suggestions from Table 2 to that assessed in table 3 because the data collection was focused down to a fewer number of possible measure that were assessed by the staff (involved in performance measurement at the Counties) as the most useful.

Table 3: Assessment of operational effectiveness for The Counties

	Possible measures
Responsiveness	Turnout times Attendance times
Availability	Appliance availability Sickness (neg)
Team/Personnel measures	Critical equipment failures Individual Training Equipment maintenance Commendations Vehicle accidents (neg) Discipline cases (neg) Personal injuries (neg)

The operational data at the stage of writing was collected from one fire station over a period of three months, not all of the data requested in Table 3 was available at fire station level.

Results and findings

Thematic analysis of the interviews allowed the richness of firefighters' expectations and early experiences of DCP to be fully explored. Interview questions focused on the impact of DCP on working conditions, work practices and on firefighters' work-life balance. Those yet to transfer were asked about their expectations of DCP while those already on DCP were asked to reflect upon their early experiences. They were also asked for their views about the implementation of change including the transition from the Watch system. Embedded in these questions were further probe questions designed to explore the links between DCP, individual health and well-being and operational effectiveness.

Those working in the DCP system indicated that the longer, unbroken periods of time at the station afforded them significant opportunities to shape how they organised and managed several work activities that contributed directly to operational effectiveness (for example the completion of their 'references'; individually-assigned tasks such as organising community fire safety events). A common theme was that work activities could be sequenced and prioritised more flexibly and carried out under less time pressure that was often the case in the 224 system with its 12-hour shifts. These job

crafting activities were also reflected in the relatively high levels of job control reported in the questionnaire measure. There was also an enhanced sense of co-dependency as the new system meant that firefighters did not 'hand-over' tasks to another watch at the end of their shift: many reported an increased sense of ownership over tasks and that they felt they had more opportunities and motivation to see tasks through to a conclusion within a batch of DCP working hours. Those interviewed also reported that working relationships were different within DCP as a result of firefighters spending longer unbroken periods of time together and with the changes to the team that occurred as firefighters finished their batch of hours and others took their place. Together these features of enhanced control, autonomy, influence over decisions and - at times - increased support from colleagues had fostered a strong teamworking environment. Several managerial tasks were dealt with through effective collaboration between all the firefighters working at the station (e.g. managing work hours to ensure that there was sufficient cover at the station over every 24-hour period). Most indicated that overall workload was unchanged but that it felt more varied as extended periods within the station environment brought them into contact with a wider range of work activities. The majority view was that work time felt less pressurised as not all tasks needed to be completed within the 12-hour period attached to the 224 watch system.

Managers indicated that their role had changed with DCP with them needing to oversee a more diverse and larger group of firefighters drawn from several different watches. They indicated that this presented them with opportunities to shape the way that DCP was implemented in their station to ensure that it worked as well as it could. For example, they needed to be more aware of how long individual staff had been at the station since starting a batch of DCP so that their workload could be managed effectively. Managers felt that they had more flexibility over the setting of deadlines for work and the prioritisation of tasks as the end of a 12-hour shift no longer dictated the end-point for several tasks they allocated to firefighters. They also reported some additional demands associated with helping firefighters to adapt to the new ways of working and supporting them through the change process. Most reported that these activities could impact on organisational effectiveness, usually in a positive way, but that established measures might not be sensitive to the impact of these everyday managerial interventions. In some instances, different managers at the same station used their increased control to develop ways of working that differed from those implemented by another manager at the same station. However, in some stations managers chose to work closely together to develop consistent ways of working to ensure that DCP operated in the same way regardless of which manager happened to be on duty at any given time. Interestingly, awareness of a range of performance measures was generally limited to station managers with most firefighters focusing on day-to-day verbal feedback from their manager or colleagues to gain an insight into their own, and their crew's effectiveness. This suggested that published effectiveness data were not directly influencing firefighters' day-to-day work behaviour.

It was notable that different stations managed the transition to DCP in different ways. In some a very collaborative approach was taken with station managers collating and discussing suggestions from firefighters prior to the implementation of DCP. In other stations, managers collaborated with each other but there was less consultation before implementation with feedback being actively sought on new ways of working once they had been trialled. Discussions involving all stations staff that were seen to influence the implementation of DCP were viewed very favourably and cited as an important factor in successful transition.

There were some early indications of individual differences in firefighters' responses to DCP. Some indicated that working for longer un-broken periods of time suited their personal circumstances (as it was also accompanied by longer unbroken periods away from work). Others were still taking time to adapt to the longer periods of time away from home and the way that it influenced how they managed their commitments and relationships outside of work. There were also differences in the perceptions of DCP between those firefighters who had chosen to move for personal reasons such as pension boosting in the last few years of service, who had broadly positive perceptions, and those who felt they had to move in order to stay at a station they felt connected with, who were more negative in their perceptions.

An interesting point was made about the possibility of career stagnation because of DCP for two possible reasons; firstly due to the reduction of the number of personnel, fewer crew and watch manager posts are needed preventing those who are qualified from obtaining a promotion, and secondly, those firefighters who are working DCP are earning more with their enhancement than the standard salary for the next rank up reducing the incentive for those firefighters to attempt promotion.

The operational data collected from one fire station over a period of three months indicated that preventative measures included in preparedness marginally improved under DCP. The availability data was more complex to interpret because the change to DCP had affected manning for the part-time appliance and hence its availability. Responsiveness over the short term did indicate that it may be useful a measure of effectiveness for transfer to DCP, although analysis of the interviews did indicate that there was not a high awareness of this among the firefighters.

Conclusions from Counties Study

The triangulation of wellbeing interviews and questionnaires with operational effectiveness data provides a valuable insight into changes to work practices in the public sector. In some cases the interview material supported operation data, for example around the area of references and preparedness data. Interview material about the use of performance measures indicated that they were not well used or known at an operational level, and they could be informative in managing the change to DCP.

The findings from the study are on-going and will be used to inform any possible further DCP implementation at the Shires

Conclusions for measuring operation effectiveness in the UK Fire services.

This chapter highlights a tension in the public sector; in order to provide value for public service stakeholders prevention activities reduce demand, in this case prevention of fires and lowering the need for rescue. The reduction of demand creates an opportunity for lowering capacity and hence costs, but this causes two problems; first in terms of geographical coverage for the individual who still needs FRS and secondly a reduction in staffing levels which can be met either by redundancy, shorter hours or recruitment freezes. A principle method of staff reduction used by the fire services has been recruitment freezes (Local Government Group, 2011) and this in turn then increases average age levels in the Fire Service. Increasing age levels combined with a reduction in general

population fitness – a trend the fire service follows – tends to reduce overall fitness in the fire service, a service which is physically demanding. These drivers of change in the fire service lead us to propose three propositions:

Proposition 1: A systematic and robust method of evaluating operational effectiveness would be helpful in assessing the current and future changes likely in the fire service. This would allow fire service to conduct the type of reform that is demanded of them, whilst still ensuring an effective service is available; a crucial tool in operational decision making.

Proposition 2: The use of responsiveness, availability and preparedness measures seems to encompass appropriate aspects of effectiveness relevant at an operational level for firestations and these should be at watch level for 224 firestations.

Proposition 3: The triangulation of wellbeing interviews and questionnaires with operational effectiveness data provides a valuable insight into changes to work practices in the public sector, particularly for the type of substantial change to DCP. The future findings from this research will be informative both to the Counties FRS in their own DCP deployment and other fire services undergoing similar change.

Future work includes completing the Counties study of DCP and fully realising the Operational Effectiveness measurement. To achieve this it would be useful to compare the more managerially hands-on approach to measurement in progress at the Shires as a cross validation of approach to operational effectiveness for the Counties.

In the longer term managing aging and societal change in the fire service represents a substantial challenge. Operations management has a role in this by providing insight to the operational effects and monitoring changes at an operational level.

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