

National Workforce Modernisation Programme

Shift Pattern Review Toolkit

Shift Pattern Review Toolkit

Contents:

Section 1- Foreword and Introduction	4
Section 2-Background to the Process and the Model of Review	11
Section 3-Initial Considerations	16
Section 4-Assessment of Demand	26
Section 4a -The Principles of Patrol Planning	44
Section 5-Assessing Management & Staff Needs	74
Section 6-Statutory Requirements & Consultation	78
Section 7-Decision Time and Preparation	89
Section 8-Implementation	100
Section 9-Evaluation and Assessment of Benefits	102
Section 10-Frequently Asked Questions	105
Section 11-Checklists	110

Document Control Sheet

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Section 1- Foreword and Introduction

FOREWORD AND INTRODUCTION

Foreword

This guidance was produced in consultation with the Metropolitan Police Service (MPS). The MPS produced the original guidance and has allowed the NPIA to make minor adjustments in language in order to make it relevant to all forces in England and Wales. Thanks go to the MPS for allowing us to publish this guidance on the National Workforce Modernisation website. Particular thanks go to Tim Bamforth-White MPS HR Services Lead, HR Pay and Benefits the author of the guidance.

Whilst correct at the time of publishing, forces should be aware that changes in legislation and policy may render parts of the toolkit relating to law or policy inaccurate. Any decisions to be taken in respect of legislation or policy should be checked with Force legal departments and policy units to ensure currency.

Introduction to the toolkit

The Shift Pattern Review Toolkit is intended to be guidance for those involved in shift pattern review, evaluation, design and implementation. The toolkit relates to response but can equally be applied to any part of the business. The toolkit will help those responsible to work through the seven phases of reviewing a shift system and point them in the direction of other sources of information and support as required. The toolkit is consistent with the Home Office (Accenture) report and its recommendations and reflects good practice; based on several years experience of resource management, published legislation, the “Police Personnel Allocation Manual” written by Dr William Stenzel, used in the US Senior Command Course and the Merseyside Police “Resource Management Training Course” developed by P.S. Carl Mason.

Whilst it is acknowledged that taken as a whole the toolkit documents are substantial, they are intended to provide comprehensive guidance. With this in mind, the document has been split into individual sections for ease of reference.

The toolkit is intended to be dynamic, incorporating supply demand methodology that can be utilised by each review team to provide a demand profile. This will enable senior stakeholders to determine how well their existing shift pattern matches resources to demand and indicate areas of under or over supply.

Additional sections of the toolkit include practical examples and case studies of shift pattern review.

Whilst the toolkit will provide a logical and methodical approach to shift pattern review, it must be understood that this is only part of the equation. Key stakeholders need to recognise that a shift pattern is the final piece in a resource management strategy. The toolkit links together demand and workload, service objectives and targets, staff and

representative consultation and all legal requirements for managing working time.

Shift pattern review should be a process that takes an identified organisational requirement and turns it into a focussed, effective and efficient solution. The seven-step review process described in detail in the respective sections of the toolkit can be universally applied across the spectrum.

Although the potential benefits of improved rostering are clear from evidence supplied by Accenture for their national study on shift rostering for the Home Office (full report available on the Police Reform website), a change in shift pattern is not a shortcut to improving performance, contrary to the expectations of some.

There are a number of other important dimensions to successful resource management, including: allocating the right numbers of people with the right levels of experience across teams (right people, right place, right time); ensuring supervisors hold staff to account for both their attendance and their performance within a wider performance management framework, and that supervisors themselves are held to account; adopting a robust approach to the management of sickness and overtime.

SEVEN STEPS TO EFFECTIVE SHIFT PATTERN REVIEW

The most common mistakes in reviewing a shift pattern were (and remain) a failure to match accurately resources with demand, ignoring good practice from academic research and non-compliance with statutory requirements.

Many of these mistakes were (and remain) symptoms of beginning the process by choosing a shift pattern and then trying to “fit” local requirements around it. Inevitably, conflict quickly occurs and the process of shift design begins again, wasting time, effort and resources and affecting performance.

To ensure best use of resources, seven key phases of shift pattern review have been identified. They are covered in depth in sections 3-9 of the toolkit but a summary of the phases is set out below;

Section 3 - Initial Considerations – The senior management team should take responsibility of the shift pattern review by sponsoring the work and setting core objectives. Stability of sponsorship is key in a shift review process as a lack of consistent owner and sponsor can create a loss of credibility and direction.

Section 4 - Assessment of demand – This is where you identify the demands (workload) that you are asked to respond to, importantly establishing what the peaks and troughs in that demand are so you can best match your resources to maximise performance and response.

Section 5 - Assessing Management and Staff Needs – this includes establishing sickness and absence rates and trends, work accident rates, training attendance and performance figures. Data analysis may show that there are particular hot spots with your existing shift pattern that need to be addressed.

Section 6 - Statutory Requirements and Consultation – There are a number of statutory regulations that reflect the legal interests of your staff. These include the Working Time and Police Regulations and Health & Safety at Work Act. These requirements will need to be considered in consultation with employees, either directly or via staff or union representatives. Consultation may also extend to external bodies, e.g. your customers, to determine their needs and expectations.

Section 7 - Preparation – Having gathered all the information through the first four steps, you can now piece them together to decide whether your existing shift pattern, or the pattern you have chosen, meets all the needs you have identified.

Section 8 - Implementation – This step is about putting into place your well laid plans. However, it is also an opportunity to monitor progress and make any adjustments that are needed, including contingencies.

Section 9 - Evaluation and assessment of benefits– The final step and perhaps the most important and one that is often overlooked in a virtuous cycle. An evaluation will tell you how well your shift pattern is working and whether it is really meeting the needs of all the groups you consulted. An evaluation will provide evidence on which to base a decision to keep a shift pattern or implement a contingency. The evaluation will also provide evidence of the benefits that can be derived from an optimum shift pattern.

WHY SHOULD WE PLAN SHIFTS?

Aside from the conflicts between organisational and staff needs alluded to in the preceding pages, managers should consider the following matters when attempting to improve duty rosters or working time arrangements:

Health and Safety at Work Act

Corporate & Personal Liability

Should an individual suffer harm or significant loss as a result of an inappropriate rostering decision, then there may be civil or even criminal liability. Certainly, there may be a corporate liability if death or injury occurs.

The "Duty of Care" owed

An implied term in all contracts of employment that the employer takes reasonable steps to maintain the Health and Safety of staff. There is also a statutory requirement that employees maintain a similarly responsible approach to Health and Safety. Working Time is possibly one of the greatest strategic threats to the exercise of the duty of care, as it is often overlooked or affected by local managers who are ignorant of the potential for risk.

The Working Time Regulations

Brought into force in 1998, these Regulations are consequent of a European Directive where the intent was "...To Organise Working Time to Benefit the Worker..." Primarily aimed at addressing those inequities in working time in the other sectors, the legislation nevertheless indicates that its provisions protect any person holding the Office of Constable.

There are now statutory rights to time off, annual leave and special treatment for night and shift workers. There is a legal entitlement to maximum weekly working hours and an attempt to ensure employers address the duty of care by keeping adequate records.

Employment Law Act 2002

This particular legislation places greater responsibility on local managers to ensure that their working practices are fair and equitable. Staff having certain care responsibilities are able to request "flexible" working practices to fit their work around the needs of their care obligations (children and other dependants). Managers must know what the demands are in their area of responsibility in order to meet those demands in a way that accommodates the needs of staff working in a flexible manner, as well as those who work in more rigid, traditional ways.

Audit Commission

The expenditure of public money is now under scrutiny in a far more coherent fashion. The implication seems to be that the Public expect the

opposite of what is actually provided: i.e. Forces often only have a small proportion of staff actually on patrol duties¹.

Good Resource Management and duty roster design go hand in hand with obtaining “Best Value” from staff and provides an argument for improved funding for recruitment where targets are not being met due to staffing difficulties.

HMIC

Amongst other issues, Her Majesty's Inspector of Constabulary has examined the justification behind deployment strategies at a local level². In the past, many Forces were unable to justify why they had the same numbers of staff on patrol 24 hours a day, even though demand was radically different during the evening. Effective shift systems, combined with robust management can assist in deployment strategies to meet a variety of targets

Equity of Workload Amongst Staff

Developing relatively healthy, legal and efficient duty rosters that meet demand shows that employers value staff health, welfare and morale. Often staff will be resistant, but armed with the knowledge that improvements can be achieved overall; managers can support their arguments for change. In doing so they will be able to create a more effective Service, hopefully with staff understanding the need for change and appreciating the efforts to balance organisational needs with their own needs.

Good roster design has never been so relevant to a community led, accountable Police Service driven by best value.

¹ **Audit Commission** "*Streetwise: Effective Police Patrol*" HMSO 1996

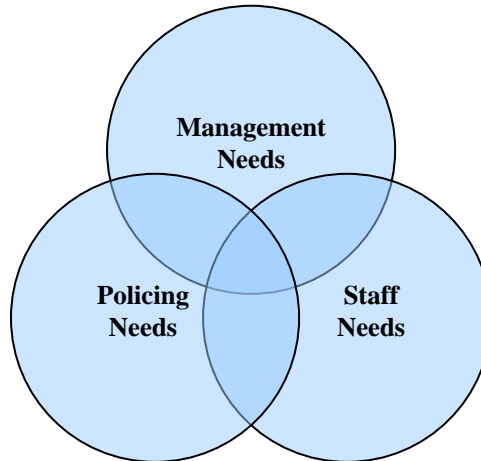
² **HM Inspectorate of Constabulary** "*What Price Policing?*" HMSO April 1998

Section 2-Background to the Process and the Model of Review

BACKGROUND TO THE PROCESS AND THE MODEL OF REVIEW

There are a few general points to keep in mind during your shift work review:

A model of the needs a shift pattern aims to meet



Think about the model above when going through your shift system review. It argues that a good shift pattern is one that balances three groups of needs that include:

- **Policing Needs:** relating to calls for service, policing priorities, local community and other stakeholder needs.
- **Staff Needs:** relating to the needs of your staff such as their safety, their work life balance and legislation relating to time spent at work.
- **Management Needs:** which relate to running your BCU/Department as efficiently as possible. This means balancing costs, such as overtime and sickness, with the need for flexibility to meet policing and staff needs, ensuring the right people are in the right place at the right time, determining the role of individual units, etc.

When thinking about the review of your shift system bear in mind that at times these needs may compete with each other. You have the job of finding the best way of meeting these needs.

*Sample forces for the Accenture study were MPS, Merseyside, Staffordshire, GMP, Nottinghamshire, Lincolnshire and South Wales.

A Cyclical Process

Having a **cyclical process** means that once you have got to the end of the process and have evaluated the shift pattern you have put in place, you will find that you could actually be back at the beginning and wanting to review that pattern due to changes on your BCU/Department or within

the Force. The advice from the Accenture efficiency and effectiveness review programme and anecdotal evidence indicates a shift pattern review **annually** to ensure your BCU/Department shift system is still meeting the needs of your staff, local community and the force shown in the model overleaf.

The seven phases of the shift review process

This toolkit will take you through the phases in a shift system review using a seven-phase model. The phases represent a logical framework for you to work through and give you some guidance in relation to the process.

The **seven phases** in the shift review process are:

- **Initial Considerations**
- **Assessment of demand**
- **Assessing Management and Staff Needs**
- **Statutory Requirements and Consultation**
- **Preparation**
- **Implementation**
- **Evaluation and Assessment of benefits**

As they are **PHASES** this means that they **can overlap**. In some cases it may be advantageous to work on two phases at the same time e.g. assessing demands and consultation, however at other times one should be completed before moving on to the next e.g. preparation and implementation.

As you move through each phase make sure you have your eye on the next and the overall process.

Framework for evaluating rostering arrangements

To enable a well-rounded assessment of the different shift patterns worked across the country, the Accenture study adopted a balanced scorecard approach. The scorecard brings together four areas against which shift patterns can be assessed to understand their strengths, weaknesses and the potential benefits a change in shift pattern can deliver.

<p>Supply demand match</p> <p>A measure of how closely the demand profile is 'matched' by the shift pattern</p>	<p>Officer welfare</p> <p>Legislation, health and safety good practice, HSE's Fatigue Index</p>
<p>Manageability</p> <p>Complexity of pattern, overlaps, split reliefs, resilience, overtime and sickness</p>	<p>External factors</p> <p>Case-handling continuity, CJS considerations, police visibility, public satisfaction and confidence</p>

Figure 1.1 The balanced scorecard

The need to assess the ability of a shift pattern to match supply with demand and to meet officer needs is widely recognised; but Accenture recommend this be balanced by the two additional sets of criteria.

Considering each quadrant in turn:

Supply-demand match is the basic assertion that a shift pattern should deliver a supply of resources that matches the pattern of demand effectively. A close match implies an efficient use of resource and ensures that potential quality of service and officer safety concerns during periods of under-supply are minimised. For response teams especially, a good supply–demand match can potentially lead to improved speed and quality of response, improved crime investigation, reduced anti-social behaviour and improved customer satisfaction.

Officer welfare is an essential consideration. In this area, a number of police regulations and the European Working Time Regulations need to be complied with. There are also considerations such as child support and anti-social hours that need to be taken into account, as well as health and safety good practice. A shift pattern which scores well in terms of officer welfare can potentially improve officer safety, increase morale, provide healthier, less fatigued officers and reduce sickness levels.

Manageability refers to the ease with which a shift pattern can be applied and managed. This includes not only the underlying complexity of the pattern but all the consequential factors such as split reliefs, shift overlaps etc. It also considers officer satisfaction (which does not always align with officer welfare) and examines the potential impact of a shift pattern on sickness and overtime.

External factors - given the nature of police work it is important to assess a shift pattern's impact on stakeholders beyond the response teams. This covers issues of case handling continuity, availability for court and impact on other CJS (Criminal Justice) agencies, as well as the impact on the public, both in terms of officer visibility and continuity of care for victims and witnesses. Improving in this area can potentially impact upon forces' ability to provide public reassurance, develop better relationships with other CJS agencies and, in the long run, see more offenders brought to justice.

Section 4 will provide greater detail on this assessment framework, including the definitions of demand used. It is important to emphasise that, although largely applied to response teams in this study, this same scorecard could be used to assess other shift patterns, with some minor tweaks to the definitions within each quadrant.

Approach to this study

This study draws on both quantitative and qualitative analysis. The quantitative analysis has been driven from two key data sources:

Demand data. The volume of “calls for response” from the public measures response team demand by hour of the day and day of the week.

Policing stakeholders agreed that “calls for service,” offers the best indicator of total response team demand, with peaks in any additional demand (e.g. targeted patrols) likely to coincide with peaks in calls for service. In this toolkit though, we take this one stage further by trying to quantify other demands on response teams, as a time factor, to more accurately determine how many officers are required for patrol.

The Accenture study shows how patterns of calls for service correlate very strongly with patterns of officer deployment. This data has been collated for each of the sample force BCUs and extended to include Dorset, Bedfordshire, Surrey and Northamptonshire. In terms of **supply data**, current shift patterns, consisting of start times, shift lengths and rest day patterns were collated for all sample force BCUs. The study drew on a range of **stakeholder interviews** with representatives from the sample forces, from forces where they had recently undertaken a shift pattern review, from overseas police forces, and from other UK sectors such as the NHS, HM Prison Service and national retailers, as well as with recognised experts in the field.

In addition to a thorough review of existing government and academic studies, both quantitative and qualitative data was generated by a **national survey**, sent to all non-sample forces in England and Wales. The data derived from the survey provided an understanding of the current situation regarding response team shift patterns, PCSOs and flexible working. Through the survey Accenture were also able to extend the sample of supply data. This allowed the study to derive a more informed set of recommendations than data from the sample forces alone would have permitted.

Section 3-Initial Considerations

INITIAL CONSIDERATIONS – SMT & PROJECT MANAGER/S

Sponsorship and Ownership

The SMT as a whole should take sponsorship of both the review and any subsequent implementation. The SMT should also be involved in setting the objectives and agree resources and a timetable for completion and implementation. Ultimately, the performance of the BCU/Department is their responsibility.

Stability of sponsorship is crucial in a shift review process, a lack of a consistent owner and sponsor can result in a loss of credibility and direction, potential hijacking of the process by other groups and a significant increase in time and resources in the review. It is strongly recommended that SMT's appoint a **working group to oversee the review**, comprising the key stakeholder. This working group will monitor the progress of the **review team** that will actually carry out the work of the review on a day-to day basis.

It is important, however, to ensure that ownership of any changes in shift pattern rests with **the staff (police officers and police staff) affected by the process**. Chances of successfully implementing any new shift system are greatly improved if the people it directly affects are committed to the change and have bought into the change process itself.

Unfortunately there have been examples of shift patterns being rejected by staff merely because they did not feel included in the change process, even when the proposed shifts offered improved demand match and offered greater benefits. Similarly, a review of shifts in Scottish forces on behalf of ACPO found that officers were resistant to change because they assumed that the changes would benefit their managers rather than themselves. Convincing them otherwise can therefore be a challenge if they are not bought into the process from the start.

Section 6 of this toolkit looks at ways in which you can encourage officers and staff to “buy-in” to a shift change process. It offers advice on consultation and some ideas on how to include staff in the process. **You may want to look at this now and include the people it is going to affect most into your process from the start.**

Project Management

If you are unfamiliar with project management techniques or the skills you will need to manage your shift review project you might want to consult with your Force Projects team. They can provide project management guidelines and good practice information.

Project management may seem like a very formal way of completing your review but it is a means of ensuring you don't miss anything out and a chance to develop some generic skills in project management if you don't already have them. The following sections take you through some of the

main activities you will need to complete as part of your review. They are very closely linked to good practice project management but cannot substitute you gaining the project management knowledge and thinking about what you need to do for your BCU/Departmental review.

Setting up a working party

Part of managing your project will be making sure that the right people are working on or involved in your review. The **review team** and/or **working party** may have already been chosen by your SMT however if this is not the case you will need to decide who needs to be involved and what their role will be.

You will need input or support from people with the following qualities:

- Someone with the authority to make decisions happen in practice.
- Someone who is willing to act as a lead officer on the review team.
- Someone who has the time to spend completing the review including assessing demands, consulting widely and evaluating the outcomes.
- Those who represent federated ranks and staff unions at a local level.
- Someone who has knowledge of your duties management processes and systems.
- Other key stakeholders in the process as relevant to your own review.

At various times in the review you will have to draw on these qualities for example you may need an SMT member to announce the review and its outcomes demonstrating management commitment. In addition they may also act as your review team's liaison in the SMT meetings.

- Use the space below to draw up a list of individuals you want to involve and what role they are likely to take. Use this as a starting point for agreeing roles with people:

Setting your time lines

When planning your review bear in mind that the time scales in which you choose to complete your review are important. Set them too short and you will end up missing important activities out, too long and people will lose interest and you will lose support for your review. It is likely that in terms of operational and management needs your BCU/Department will already collect the information you need in some form. It will however take time to make the arrangements for and carry out the consultation with all the relevant people. You may want to get this underway as soon as possible to help prevent your review dragging on for all concerned. Section 6 takes you through the consultation phase of review.

Identifying Key-Stakeholders

You may find it useful to list all the groups of people or individuals who will be affected by or who will have an effect on the success of your shift pattern review or any subsequent change in shift system. These are your key-stakeholders. They are likely to include a wide range of people including your customers, your staff and others members of the Force including staff union representatives and staff associations. Think as broadly as you can and then highlight those that are likely to be most influential in the process, this group will be your key-stakeholders. Some may overlap with the members of your working party although generally speaking stakeholders stretch much wider than those involved in directly working on the shift system review. Section 6 of this toolkit may give you some hints to get you started.

- Use the space provided below to list your key-stakeholders:

Defining why you want to complete a review

This may sound obvious but you will find it advantageous to clearly identify why you are thinking of undertaking a shift system review. This is so you can be honest in communicating this to your key stakeholders. You will need to identify whether you believe you can make significant improvements in meeting demand, performance measures, community needs or officers needs. You may also need to review your shift system in the event of changes in policing priorities or because of changes in

legislation. Remember you may be asking your staff to make some big changes in their lives, and reasonably enough, they will want to know why they are being asked to do this.

- Use the space below to jot down the initial reasons for thinking of reviewing your shift system:

Defining Shift Review Objectives & Success Criteria

You need to define what your review objectives are or in other words what you are aiming for. Remember to try and set SMART (specific, measurable, achievable, relevant and timely) objectives, as these will give you a better chance of success in the long run.

Setting objectives will also help you to clarify why you are undertaking the review, realise if what you are planning to do is achievable, helps others understand what they can expect from your review and should help you answer the question at the end “was the review successful?”

Your objectives should relate to what you are trying to achieve for example:

- To identify the requirements of key stakeholders of the shift system.
- Improve the work-life balance of our staff by identifying and implementing a shift system that better meets their needs.
- Improve your ability to meet policing demands by identifying and implementing a shift system that better meets the needs of local people.
- To improve the cost-efficiency of the shift pattern.

Your options are extensive but think about what would be an improvement or a success for your force. You may have a number of objectives for your review but keep the number manageable to give yourself a better chance of carrying out an effective review, not only in the short-term, but also as part of any longer term objectives and strategies.

- Alternatively, use the space below to list your key objectives for your shift system review.

You may also want to set yourself some success criteria or targets. This means measures that you have to meet to know that you have been successful. Be realistic, you may want to come back to this section after completing your assessment of demand (see toolkit section 4). Success criteria could look something like:

- See an improvement in response times of at least 2% by a given date.
- The staff survey shows a statistically significant improvement in their shift pattern satisfaction ratings overall within one year of the new shift system introduction.
- See a decrease of 5% in staff sickness and absence rates by a given date.

These in turn you would expect to form part of an annual review process to ensure whether the shift pattern continues to meet the demands and objectives for your force.

- Use the space below to identify your success criteria

Change Management Strategy

Basically this strategy is a way of saying what will be the best approach for you to go about making any change in your own BCU/Department. You will need to consider a number of factors that will help you to make any changes you may wish to make as a result of your review for example:

- People – how are you going to get them to support your planned changes?
- Technology – is the technology right to support what you are planning to change?
- Resources – do you have the right level in terms of human resources and equipment to really make this change work?
- Senior Management Team – is your SMT supportive of your planned changes?
- Environment/Change Fatigue – is it the right time to make the changes you are planning. Think about the timing of other changes which may be going on.

It may help you to note the main factors that are likely to impact on your review, remember to think as broadly as you can from a local level to an international level, and from all ranks and types of staff and from the most basic pieces of equipment to the most technically advanced.

Once you have thought about these issues you need to think about the main steps you can take to reduce any barriers to change.

➤ Use the space below to list all the major factors that are likely to impact on your review and what you will do to overcome them:

Factors impacting on the review	Actions to reduce or manage the impact

It is likely that some of the activities you have thought about will involve some aspect of research or communication which will include both listening and talking to people. The next section of this toolkit looks at ways in which these activities could be undertaken.

Note: This activity would also form part of your project documentation preparation that includes documenting project constraints, assumptions and risks.

Communication Strategy

Even if you don't end up making any changes as a result of your review you will still need to tell people about the fact you are undertaking a review and why. It is important to carefully consider the best methods of doing this. How you communicate your intentions and decisions can have a huge impact on the success of your work.

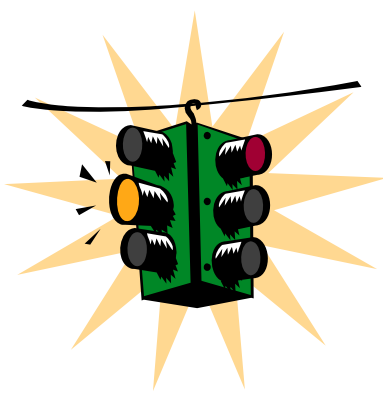
Key points to remember include:

- **Put yourself in their shoes.** Think about if you were on the receiving end, how would you like to hear about the review of shift pattern change? You may need to change the style of your communication based on who your audience is and their knowledge or experience.
- **Use face-to-face contact** when possible because people always like to 'hear it from the horse's mouth'.
- **Make sure your message is clear and honest.** If more than one person is doing the communicating make sure they are all saying the same thing. There is nothing more detrimental to a change process than mixed messages as people don't know where they stand or who to believe.
- **Write down your communication strategy** so it is clear to yourself and others what to expect.
- **Most importantly consult with the communications professionals in your force**

It is likely that you will want to use a combination of communication methods to ensure that everybody receives your message and has a chance to ask questions. You need to ensure that you open the channels of communication now so that you have already built a positive and useful relationship with your key-stakeholders prior to your review even taking place. In particular make sure all your staff know. After all it is them who the review is likely to have the greatest impact on.

Use the space below to list all the information that people will want to know against all the people who will need that information. This will form the basis of your communication strategy:

Information Required	Who needs it	How it will be communicated	When

	<p>You now need to take the decision to start work on your shift system review.</p>
<p>RED</p> <p>AMBER</p> <p>GREEN</p>	<p>If you have looked at the checklist and have not completed the tasks or feel that you have not been satisfied with the preparation so far go back and re-think. It will save you a lot of anxiety later on in the process.</p> <p>Use your judgement if you have not quite completed all the tasks outlined. In your own situation is it going to significantly affect the outcome of your shift review? Are you sure?</p> <p>If you have ticked off all the tasks in the checklist on the previous page and feel comfortable and prepared enough to proceed move on to the next phase.</p>

Section 4-Assessment of Demand

ASSESSMENT OF DEMAND

Through this phase of the process, one of the most important, you are aiming to identify and analyse all the policing demands that your BCU/Department is asked to respond to. Some of the activities covered in this phase overlap with those covered in the assessment of management needs (toolkit section 5) and consultation phase (toolkit section 6). You may wish to work through the three phases separately or consider completing them together. Make sure you are at least aware of what you will need to do in the next phases to ensure you use your time most effectively.

As the toolkit currently stands, only one basic method and one more advanced method of performing demand and supply are described. It may be that your own previous experience means that you have a tried and tested alternative or that your force already uses a database to make these assessments.

Accenture Review

Much of the initial analysis concerning supply-demand (response teams) has been conducted by Accenture and before you commence, it is recommended that you review the Accenture study (2004), notably sections 2, 3, 4 and relevant appendices (D and E). The process of analysis used by Accenture however is relatively complex. The following sections of this document will take you through a slightly simplified version of shift pattern analysis.

Documenting your Analysis

You need to ensure that the analysis you carry out as a result of working through this phase of your review is well documented and all data stored safely. You will need this information during the evaluation phase and your analysis will feed into the Shift Review Report that is discussed in the decision time and preparation section of this toolkit (section 7).

Operational Demand

As policing provides a service much of our work is responding to the need for assistance from various groups of the community around the clock. This need or operational demand falls into a pattern of peaks; where greater numbers of people require assistance or the type of assistance they require is time consuming, and dips; when fewer people require assistance or the type of assistance they require is less time consuming. **It goes without saying that in order to meet this demand effectively we have to deploy more officers during peaks and fewer during dips.** Thought would also need to be given on how you would cope with the requirements of your force Mobilisation Plan.

Demand analysis by Accenture for the Home Office studied over 70 command units (BCU's) nationwide. **The analysis established that whilst the volume of demand varied, the *pattern* of demand**

throughout the day and week was remarkably similar, regardless of geography. They asked the question, given the similarity in the pattern of demand, why is there such a variation of shift patterns?

Which units to review

Which units you include in your shift pattern review depends on which part of the business you are reviewing; for example response, investigation, proactive units or squads, case progression units, custody, etc. These various units across your force may have differing times of peak demand, but those intrinsically linked will obviously be very similar.

For the force to function efficiently overall, the deployment of staff in differing units must work together. Deciding which teams or units you wish to include in your review is important. Do not assume that just because certain teams have always worked certain hours they are automatically matching their current demand.

The best people to ask should be those in each unit, as long as they remain objective, as they should know the units' workload and workflow. Your SMT should tell you which units should be included in the review. (See consultation phase toolkit section 6). Ensure that they consider all the aspects described in the model of shift system aims (toolkit section 2.1) including staff needs, policing demand and management needs.

- Use the space overleaf to identify all the units or teams that you want to include in your review or will ask for a business case from that shows they are already optimally meeting demand for their services:

Name of Unit or team	Business Requested / Received	Case /

Force & Local Policing Priorities

Policing priorities for the force are set each year. Your BCU will also set local policing priorities. In order to meet these priorities you will need to consider the peak times in which the types of crime/activity that have been prioritised are taking place or reported. If there is a pattern you will also need to take these peaks into consideration when reviewing your demand to ensure whilst meeting overall demand for your policing service, you are also meeting those demands that have been prioritised across the organisation and locally.

Definition of demand

Demand can be defined as: a request that requires a response or action by a member of staff. For example the most widely available indicator of response team demand is the number of “calls for response” from the public. This is necessarily a rough estimate, since the ideal measure would be the number of calls for response to which a deployment was necessary, plus those that would have had a deployment had resources been available. Accenture compared the demand profiles for calls for response and actual deployments for two forces, and the two were highly correlated (0.97). It is also the case that response team officers may be called upon to undertake other duties (e.g. targeted patrols in hotspot areas), but the timing of such activities will often coincide with peaks in calls for response so require even more staff.

Other units may have other measures of demand based on what function they perform. The key is to identify the most relevant measures of demand to the units that you have decided to include in your review.

Seasonal Variation

You would expect that as population activity changes over the year so would the demand for police assistance. There were several BCUs in the Accenture study that were affected by seasonal changes in demand such as two BCUs in Dorset (Bournemouth and Weymouth) and East Lincolnshire. Consultation with these forces led to the conclusion that although there were increased levels of demand at specific times, e.g. summer months in seaside towns, the timing of peaks and dips in demand does not change. This indicates that any alterations to the resourcing on these BCU should be to increase the numbers of police officers during high seasons. You will need to consider your BCU/Department's seasonal variation in demand as part of your analysis.

Basic Analysis: Is your shift pattern meeting demand?

In evaluating a shift systems capacity to achieve an effective and optimal deployment of staff we need to consider:

- The match between policing demands and officer/staff supply.

- How the change over of staff or officers at the end of a shift affects the BCU's ability to meet demand during these handover periods.

You can complete this exercise comparing the match between supply and demand for nearly all units, not just those on response teams.

The process for measuring the match between staff supply and operational demand has the following steps that the rest of this section takes you through:

Step 1: Collect your data and organise into a database

Step 2: Analyse monthly trends

Step 3: Analyse weekly, daily and hourly trends

Step 4: Compare demand and staff supply profiles

Collecting your data

To work through your analysis successfully you need to collect a large amount of information. This needs to be done in a systematic way. You are likely to need to work with a number of people in your BCU/Department who will have access to the information you need. You will need to make sure they are able to get you the information you want within the timescales of your review and in a usable format.

You need to think about when your shift pattern was introduced. If it was in the last two years you need to think carefully about the data you are collecting. It is really useful to be able to compare your current shift system with the previous one. However in your analysis, make sure you take account of when your shift pattern changed. Do not make the mistake of using data in your analysis that actually relates to a pattern other than the one you are currently reviewing.

There are two types of data you should collect as a minimum:

- Monthly data for 24 months e.g. the total number of calls received in the control room every month
- Hourly data for a period of four weeks e.g. the number of calls received in each hour of each day for four weeks.

You need to collect monthly data to be able to analyse the longer-term effect of your shift pattern. You need to collect hourly data so you can analyse changes in your ability to demand with accuracy. Four weeks is collected to ensure that the data is approximately representative of demand.

Table 4.1 below provides you with a basic list of information you will need to collect. Use this as a guide but also be aware that you may need to collect other information that is specific to the operational nature of your BCU/Department.

TABLE 4.1: Data Required	Monthly	Hourly
Staff Numbers: for the BCU/Department	Monthly	Hourly
Total Staff Number	Yes	
Number of Police Officers	Yes	
Number of Police Probationers	Yes	
Number of Police Staff	Yes	
Staff Numbers: for the units included in the review	Monthly	Hourly
Total Number of Teams (This could be minimum number of staff for unit operation)		Yes
Total Staff Number	Yes	Yes
Number of Police Officers	Yes	Maybe*
Number of Police Probationers	Yes	
Number of Police Staff	Yes	Maybe*
Sickness and Absence	Monthly	Hourly
Number of Days lost to sickness	Yes	
Number of Days lost to mental health sickness (e.g. stress)	Yes	
Number of individuals taking any period of sick leave	Yes	
Number of days lost to absence	Yes	
Accidents and Injuries	Monthly	Hourly
Number of accidents and injuries	Yes	Maybe*
Number of Police Collisions	Yes	
Number of Police Collisions at fault	Yes	Maybe*
Training Attendance	Monthly	Hourly
Number of training days	Yes	
Number of training days attended	Yes	
Overtime	Monthly	Hourly
Number of overtime hours worked	Yes	
Cost of Overtime: Total	Yes	
Cost of Overtime: BOCU liability	Yes	
Crime reports	Monthly	Hourly
Number of reports made	Yes	Maybe*
Quality of reports	Yes	
Number of crime recording system reports made	Yes	Maybe*
Quality of crime recording system reports	Yes	
Crime	Monthly	Hourly
Number of Arrests made	Yes	Maybe*
Number of Crimes Reported	Yes	
Number of target crimes reported	Yes	
Demand	Monthly	Hourly
Number of calls for assistance received*	Yes	Yes
Number of calls for assistance met within target timeframes*	Yes	Yes
* You may want to separate call grades or use a more appropriate measure of demand for the unit you are assessing		

* You may want to collect this information at the level of an hour if these measures are particularly of interest to you or relevant to the unit you are assessing.

Measuring Demand

There is a wealth of activity analysis available to measure demand. The initial focus of your analysis must be your BCU/Department's ability to meet demand.

Step 1: Measuring seasonal demand variation

- a) Take the measure of demand you have decided is most relevant to your BCU/Department and **calculate the total demand for each calendar month over the previous two years** (24 months). Two years is collected because it allows you to assess seasonal variation based on more than just one year.
- b) **Plot a graph with Demand on the y axis (vertical axis on the left) and month of year along the x axis (horizontal axis).** Plot the previous year figures as points on the graph and join up using one line. Do the same for the preceding year but plot as a separate line on the graph.
- c) **Analyse the graph by looking at its overall shape.** If the lines are nearly straight across this means your BCU/Department has little or no seasonal variation in demand. If the lines have peaks this is where demand is greatest and should be considered as high season. If you have peaks you will also have dips where demand is lower, these periods can be considered as low season.
- d) **Look at whether there is any difference between the two lines plotted on the graph.** If they are close together you can be relatively confident you have identified what your BCU/Department's seasonal variation looks like. If they are far apart you have a big difference in demand between these two years you may need to go back further in history and add more years to your graph to identify your true seasonal demand profile. It may be that the difference in demand between the two years can be explained in terms of a significant change e.g. your BCU/Department covering additional geographical area. Use your local knowledge to get to the bottom of your season demand profile.

You need to identify a month to analyse in more detail that will be the basis of the hourly, daily and weekly analysis. The month you choose should be an average month in terms of demand. If you choose a month that is in high or low season your analysis will be less representative of your demand generally e.g. July is likely to be unrepresentative as it is the summer holiday period.

If you have large seasonal variation it would be wise to pick three months in the same year, one high season, one low season and one average to be absolutely sure your analysis is representative of your demand profile. Bear in mind you will have to undertake three separate analyses and compare differences in patterns at the end. To do this using the Toolkit Database you will need to introduce copies of the step2 worksheet, one for each month you have chosen to analyse.

Step 2: Measuring hourly demand variation

- a) Take the measure of demand you have decided is most relevant to your BCU/Department and **calculate the total demand for each hour of each day over the first four full weeks of the month you have chosen.**
- b) You now need to **calculate the average demand week.** This is done by adding the demand from 00.00 to 01.00 on Mondays from week one, week two, week three and week four. The number calculated is then divided by four to get the average demand for 00.00 to 01.00 on Monday. Repeat this process for each hour in the week. This is where you will start to understand that a database set up in the right way can really help.
- c) **Plot a graph with Demand on the y axis (vertical axis on the left) and the days of the week (Monday through to Sunday) by hour (00.00 through to 23.00 for each day) along the x axis (horizontal axis).** Plot the average demand week figures you have just calculated and join the points up with a line. This graph gives you a relatively accurate estimate of your hourly demand profile.

Although this graph will be interesting what you really need to know is what times of day over the week are you able to meet demand and at what times are you not. Your ability to meet demand reflects your shift pattern. At times where you are not meeting demand you may want to increase the supply of staff available. At times when you are easily able to meet demand you may want to reduce the number of staff available.

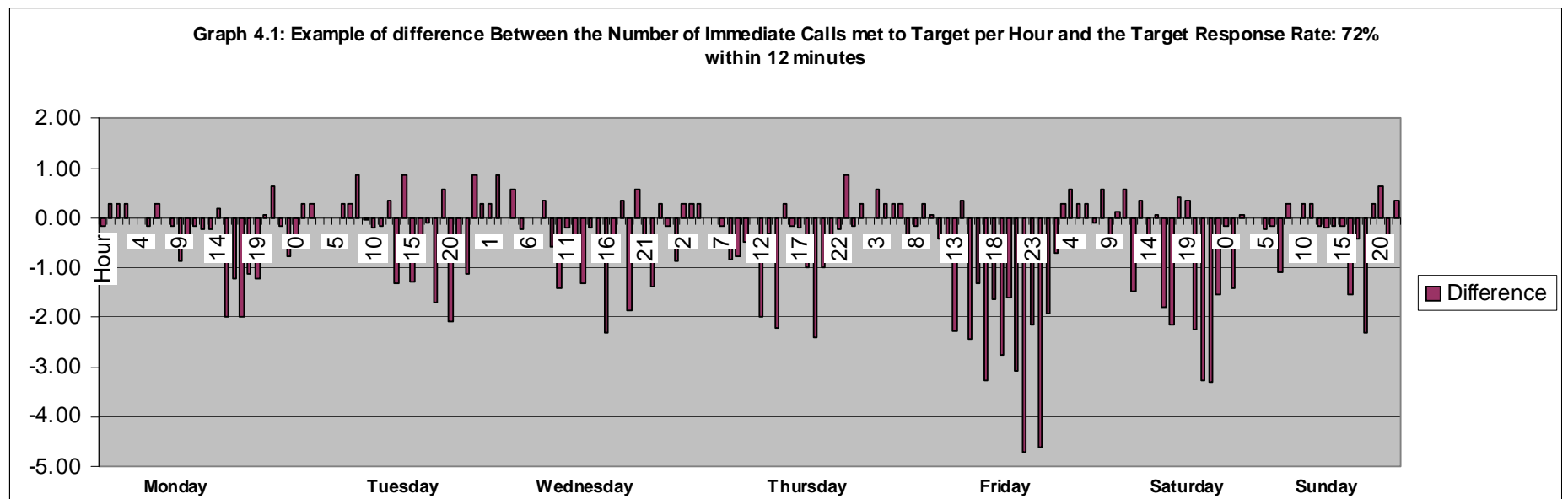
The following step will take you through identifying at what times you are more than able to or are failing to meet your key demand measure.

Step 3: Identifying times of under and over performance against demand

- a) **Decide what is the key measure for meeting demand.** For example in relation to immediate calls officers are required to respond within a given time. You have met a call for response if the time it takes to respond is less than that set time you have successfully met the demand. If it takes longer you have not.
- b) You may decide that all immediate calls need to be met within 12 minutes so your criteria is 100% of calls met inside of 12 minutes.

- c) Calculate your success criterion for each hour.** If you have decided that you need to meet all demand (100%) then your success criterion is equal to demand. If however you have decided that your criterion is less than 100%, for example 72% of immediate calls within the set time(12 minutes), you need to calculate for each hour what success looks like based on the demand in that hour. For the first analysis use the average demand week numbers calculated as part of step 2 as your measure of demand.
- d) Calculate your Average Success Week.** Start with the actual demand met (e.g. number of calls met to target based) within the hour 00.00 to 01.00 on Monday of each of the four weeks. Add these figures together and divide by four to get your Average success week. Repeat this process for each hour of the week.
- e) Calculate your average success at meeting demand.** You now need to compare your average success week with your success criterion to look for areas of under and over performance. To do this you need to subtract the success criterion from your average success week to come up with a negative or positive figure. For example between 00.00 and 01.00 you might have on average met 2 calls to target, subtract the success criterion of 3.6 for this hour and you get minus 1.6. This means that on average 1.6 calls are not being met to target between 00.00 and 01.00 on a Monday. Complete this process for each hour in your average week. Some of your figures are likely to be positive this means you are more than meeting your target at these times. If you get a zero this means that on average you are matching your demand and your ability to meet it perfectly at this time.
- f) Plot a bar graph of Average Success at Meeting Demand.** Plot a bar graph with Demand on the y axis (vertical axis on the left). You will need to have both positive and negative numbers on the y axis so put the zero line across the middle of your page and label above and below it. The days of the week (Monday through to Sunday) by hour (00.00 through to 23.00 for each day) go along the x axis (horizontal axis) or zero line.

Now mark each of the points that you just calculated on your graph being careful to note whether it is a negative or positive number. Turn each point into a bar that links it vertically to the zero line. The longer the bars are the greater the extent of under or over performance. For example a -1 bar means on average at that time of day and week you are failing to meet your target by one demand unit (e.g. call for service). If the bar were -5 this means you are failing to meet demand by on average 5 units of demand at that time (e.g. 5 calls for service) which highlights a time of poor performance. Graph 4.1 below provides an example:



g) Analyse the graph visually. Any bars below the zero line are areas where you are not meeting demand. Bars above the line indicate times when you are more than meeting demand. The closer the bars are to zero the more perfectly you are matching demand.

You have now completed a basic model of analysis that gives you an overall feel of how well you are meeting demand.

- **You may want to repeat steps 1, 2 & 3 above looking at other four week periods e.g. a high and a low season month to get a feel for whether your ability to meet demand at these times changes.**
- **You may also want to repeat steps 1, 2 & 3 above for other measures of demand or possibly other success criteria.**
- **Continue repeating steps 1, 2 & 3 until you feel you have a full picture of how well you are meeting demand.**

We advise that if you have identified areas where you are not meeting demand you continue through into the next phase of analysis to look into the problem in greater detail. Please be aware that the next section is relatively complex in terms of the calculation you will be required to perform and the benefits of completing this analysis should be weighed up against the amount of time it is likely to take you.

The output of the next stage is a score from 0 to 1 that tells you how well your pattern matches demand. You can use the score to compare your current pattern to others used elsewhere in other units and forces. The next steps will also help you to understand the relationship between meeting demand and staff supply at a higher level of detail.

Advanced analysis: Calculating your shift pattern Supply Demand Match Score

The analysis process worked through in this section was created by Accenture to allow them to compare shift patterns on their ability to meet demand at a national level. The analysis is quite complex and will require you to think very carefully to understand what the output actually means to you and your BCU/Department.

The process for calculating and measuring the match between your staff supply and operational demand had the following steps that this part of section 4 of the Shift Review Toolkit takes you through:

- Step 4: Measure Seasonal Staff Supply Variation**
- Step 5: Calculate your normalised staff supply profile**
- Step 6: Calculate your normalised demand profile**
- Step 7: Plot normalised demand and staff supply over time**
- Step 8: Quantify areas of demand and supply mismatch**
- Step 9: Calculate your shift patterns Supply Demand Match (SDM) Score**

Staff Supply: maximum strength resource and abstraction

At any one given time, a BCU/Department has a specific number of staff allocated to work for it. This could be considered as **maximum resource strength**. However there will always be staff on leave, off sick both long term and short term, providing support elsewhere, on secondment, on leave before retirement, in training, etc (the list is almost endless although table 4.1 gives you a good starting point). This means from our maximum strength resource there are **abstractions** that reduce the number of available staff.

You will need to consider the supply (of staff) and demand (for your service) information in relation to both your maximum strength resource and calculations where abstraction has been taken into account.

To do this you will need to calculate the average number of staff you lose to the various types of abstraction. This will help you to be more realistic about your staff supply. Obviously staff abstraction has its own pattern of peaks and dips, for example more people may choose to take annual leave during school holidays. It would be wise to calculate your average abstraction rates for each month of the year using at the very least the previous two years data. This will give you a picture of what your average abstraction has been most recently. Although not exact this will also provide you with an approximation as to the number of staff you are likely to have available in the coming year.

The process to do this is very similar to Step 1 in Section 1.4 that guides you through calculating seasonal demand variation.

Step 4: Measuring seasonal staff supply variation

- a) **Calculate the total number of staff that were available for each calendar month over the previous two years** (24 months). For response teams this would be the total number of officers. You may want to separate police officers and staff dependent on the focus of your analysis.
- b) **Calculate the total number of possible days staff could have attended work in each calendar month.** For example office-based staff have Saturday and Sundays off therefore can only work 5 out of every seven days in each month. In relation to staff you will need to think about where in the shift pattern they started the month, as this will influence the number of days they would have worked. Adding up each member of staff's total number of possible days worked will give you **total staff workdays for each calendar month**.
- c) **Calculate the total number of days lost in abstraction in each calendar month.** You may want to break this down into categories such as annual leave, sickness (and possibly the reasons why, for example the number of days lost to for mental health reasons can

often be an indicator of extreme staff stress levels), training and so on.

- d) Subtract the total number of days lost to abstraction calculated in point c from the total number of staff work days calculated in point b for each calendar month. This gives you **total staff days worked per calendar month**.
- e) **Plot a graph with Supply on the y axis (vertical axis on the left) and month of year (January through to December) along the x axis (horizontal axis)**. Plot total staff days worked per calendar month for the previous year as points on the graph and join up using one line. Do the same for the preceding year but plot as a separate line on the graph.
- f) **Analyse the graph by looking at its overall shape**. If the lines are nearly straight across this means your BCU/Department has little or no seasonal variation in staff supply or abstraction. If the lines have peaks this is where supply is greatest and should be considered as a low abstraction season. If you have peaks you will also have dips where supply of staff is lower and abstraction greater, these periods can be considered as high abstraction seasons and are most likely to fall around traditional holiday periods.
- g) **Look at whether there is any difference between the two lines plotted on the graph**. If they are close together you can be relatively confident you have identified what your BCU/Department's seasonal variation in staff supply is. If they are far apart you have a big difference in staff supply between these two years so you may need to go back further in history and add more years to your graph to identify your true seasonal staff supply profile. It may be that the difference in staff supply between the two years can be explained in terms of a significant change e.g. your BCU/department head count significantly increasing or decreasing. Use your local knowledge to get to the bottom of your seasonal staff supply profile.

You can perform this calculation using absolute numbers of staff (e.g. number of heads) or number of teams regardless of the number of heads making up that team at any given time.

In addition this basic analysis of staff supply may have thrown up some interesting figures. For example you may wish to look particularly into days lost to sickness rather than abstraction as a whole. You may also want to repeat the analysis looking into training abstraction or annual leave abstraction patterns.

Continue with your analysis until you feel you have a truly reflective picture of your staff supply profile and abstraction profiles.

Step 5: Calculating Normalised Staff Supply

Absolute levels of staff supply (i.e. the number of staff available) are important for assessing staff abstraction. However as we are involved in a shift pattern review and we want to be able to compare staff supply levels across time and the impact they have on your BCU/Department's ability to meet demand. To do this we have to express staff supply **as the ratio of staff supply BCU/Department at any hour of the day, over the average staff supply usually available by hour. This gives us NORMALISED staff supply.** It is most effective to look at the minimum number of staff required for a unit to operate as representing 1 team. For example, one response team is required for a borough to operate at any given time of day based on the minimum model of staff. If you have overlaps or split shifts you might have two teams on or one and half.

In this scenario normalised staff supply is the number of response teams available at a specific hour of any day, over the average number of teams usually available per hour. Normalising data means that you can directly compare two measures that otherwise you would not be able to show on the same graph.

To do this you need to take the following steps:

- Work out the **average number of teams available per hour.** To do this work out the number of teams available for each hour of the week for the shift pattern. This information can often be taken directly from your shift pattern. For example, for the majority of the time 1 team will be available and 1 team hour is worked, however during overlap periods 2 will be available therefore 2 team hours are worked. If a shift is split you may have an additional part of a team available (e.g. 0.5) and a total of 1.5 team hours is worked. Total up the number of team hours worked in the week. Divide this total by the number of hours in the period (e.g. 168 if you have totalled for one week or 672 if you have done this for a period of four weeks).
- For each hour in the period you are looking at you take the total team supply in that hour (e.g. number of teams on duty that hour) and divide it by the figure you just worked out (average number of teams on duty in each hour of the period you are looking at). This gives you a ratio where 1= the average number of teams available, more than 1 means in that hour you had more teams available that hour compared to the rest of the period and a number less than 1 (e.g. 0.87) means you had less teams available in that hour compared to the average number for that period.

This ratio then allows you to compare your staff supply by hour for any given period, for example winter months with summer months; all you have to do is perform the calculation again using different periods such as summer and winter.

Step 6: Calculating Normalised Demand

Absolute levels of demand i.e. the number of calls received is important for assessing the type and actual number of calls a BCU/Department is dealing with. However as we are involved in a shift pattern review and not setting staffing levels we want to be able to compare levels of demand across time. We want to be able to do this so that we can compare this level of demand across shift patterns and perhaps even between BCU/Departments. To do this we have to express demand **as the ratio of demand made on the police BCU/Department at any hour of the day, over the average demand usually made by hour. This gives us NORMALISED demand.**

For this you need to take the following steps:

- a. **Work out the average demand** (e.g. number of calls received) for each hour. You do this by taking the total demand (e.g. number of calls received) in a complete shift pattern cycle (use the same period as you did in calculating staff supply (step 4 above)) and divide it by the total number of hours in that period. For example if you use the average demand week (calculated in step 2) you already know the average total number of calls received in a week. Divide the total number by 168 (which is 24 hours a day multiplied by 7 days a week).
- b. For each hour in the period you are looking at you take the total demand (e.g. number of calls received) in that hour and divide it by the figure you just worked out (average number of calls you received in each hour of the period you are looking at). This gives you a ratio where 1 = the average number of calls received, more than 1 means in that hour you took more calls compared to the rest of the period and a number less than 1 (e.g. 0.87) means you took less calls in that hour compared to the average number taken over that period.

This ratio then allows you to compare your demand by hour for any given period, for example winter months with summer months; all you have to do is perform the calculation again using different periods such as summer and winter ensuring you calculate the average based on the length of period you are looking at (i.e. it may not be four weeks).

You have calculated both normalised demand (Step 6) and staff supply (step 5).

Step 7: Plotting normalised demand and staff supply over time

Now you need to combine the information you have calculated in steps 5 and 6 into a visual format so that you can identify any areas of over or under supply collectively known as mismatch. You can do this using a graph in which the bottom axis is time by hour, the left hand axis is staff supply and the right hand axis is demand.

- a. **Plot a graph with Normalised Scale (0 to 7 should be big enough) on the y axis (vertical axis on the left) and the**

days of the week (Monday through to Sunday) by hour (00.00 through to 23.00 for each day) along the x axis (horizontal axis). Plot the normalised demand figures as points on the graph and join the points up with a line. Then plot your normalised staff supply figures and join these up with a line of a different colour line (you could also plot these figures as bars if you prefer the visual effect).

b. Analyse your graph visually.

- Where the demand line is above the staff supply line the number of staff you have is likely to be too few to meet demand at these times.
- Where the demand line is below the staff supply line the number of staff you have is likely to be more than adequate to meet demand at these times.
- Where the demand line is in the same place as the staff supply line the number of staff you have is likely to be just right to meet demand.

The areas of over and under supply will reflect those you already identified through steps 1, 2 & 3 if you have used the same period for analysis.

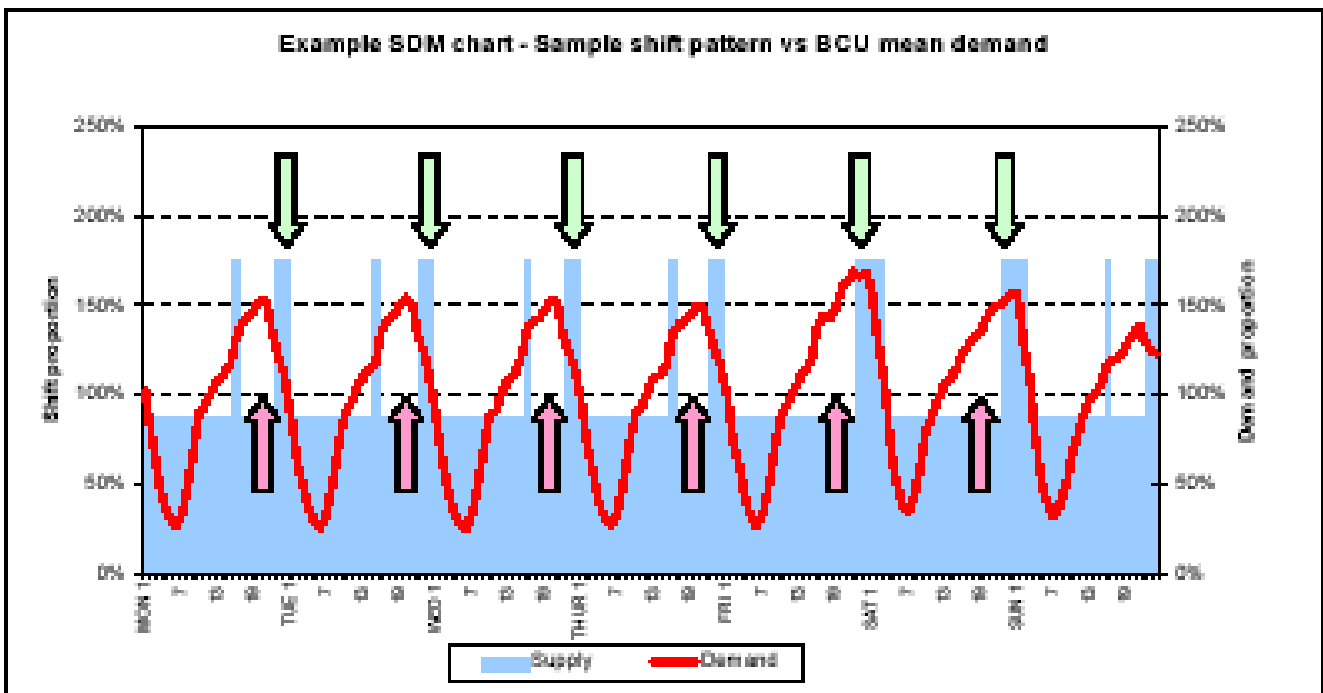


Fig 4.1 Supply-demand match chart

Step 8: Quantifying areas of Supply Demand Mismatch

In order to compare the areas of mismatch we need to know how big they are. This involves comparing the differences between the demand and supply ratios. In order to quantify areas of mismatch (the crosses and circles in the graph overleaf) work through the following steps:

- a) Divide the normalised staff supply figures for each hour by normalised demand at each hour. This gives you the **supply-demand ratio by hour** (the blue curve in the figure 4.2 below).
- b) You also need to plot on the graph the **optimal supply demand ratio** (the pink line in figure 4.2). The optimal supply demand ratio represents the ratio you would get if supply were perfectly matched to demand over the week. To calculate the optimal supply demand ratio you divide the average normalised supply of staff per hour (calculated in step 5) by the average normalised demand over a week (calculated in step 6, which is always equal to 1).
- c) **Plot a graph with Normalised Scale (0 to 7 should be big enough) on the y axis (vertical axis on the left) and the days of the week (Monday through to Sunday) by hour (00.00 through to 23.00 for each day) along the x axis (horizontal axis).**

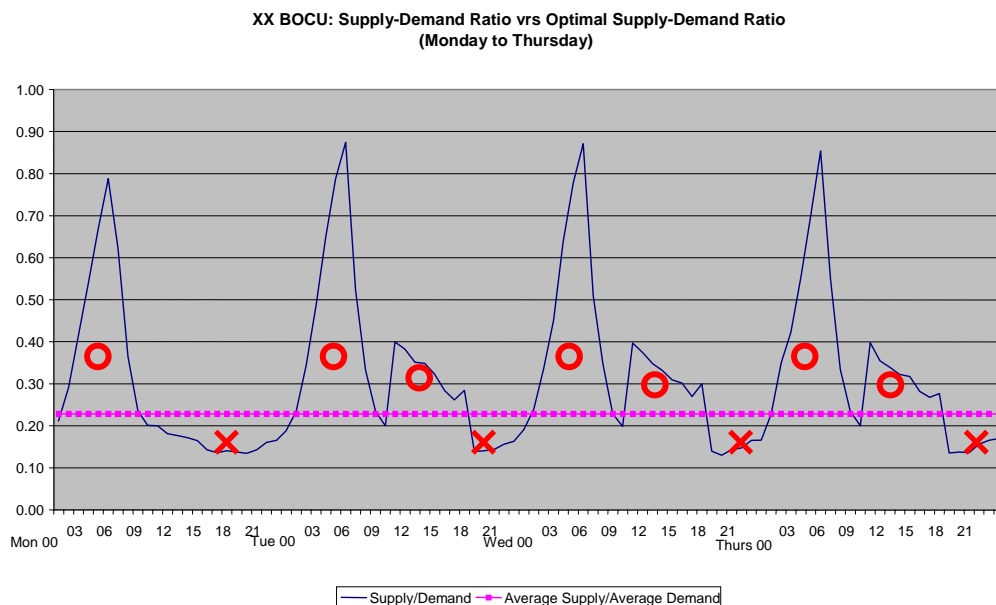


Figure 4.2

Step 9: Calculating your Supply Demand Match Score

The final step in the analysis process is to give your shift pattern a Supply Demand Match (SDM) score. This score will allow you to compare your shift patterns match to your demand profile with other

BCU/Departments/Force. Ultimately if you need to change or tweak your shift pattern it will help you identify if your new shift pattern has made the improvements you hoped for. You will know this by calculating the SDM score for your changed pattern and comparing the two scores.

To get your score and put an amount to the mismatch areas highlighted in Figure 4.2 you need to:

- a) Calculate the **differences between the supply-demand ratio** (calculated in step 8) and the **optimal supply-demand ratio** (calculated in step 8) for each hour. Do this by subtracting the supply-demand ratio from the optimal supply demand ratio for each hour. Ignore if the numbers are positive or negative.
- b) Calculate the **average of the differences** for the week by adding up the differences calculated in point a) and dividing this total by the total number of hours in the period (168 hours in a week).
- c) Divide this number by your **normalised average staff supply number** (calculated in step 5). This accounts for the fact that the total number of staff on duty over a week should not affect our score. You should now have a number somewhere between 0 and 1. **This is your SDM score**. If the number you have is negative, ignore the negative sign.
- d) **The closer your SDM score is to zero, the closer the match**. In reality a closely matched shift pattern scores around 0.2, a less well matched pattern around 0.4.

In summary, your SDM score shows whether the shift pattern matches demand but does not indicate whether the actual number of officers deployed at any one time is right.

Analysing the effects of Shift Handovers on Response Performance

You may also want to look into the effect of handovers on your ability to respond to demand. Around shift change over times performance often dips. However, some shift patterns help to minimise the drop in performance through, for example, overlapping handovers.

The simplest and most effective way to analyse this is visually, by looking back over the graphs you have produced. Look at your hand over times and whether these relate to dips in your BCU/Departments ability to respond. It may be that you want to consider the use of overlap periods if dips are present.

This completes section 4 of the toolkit. Make sure you have stored all of your analysis and data together. Think clearly about what this analysis has told you. Make sure you record your key findings.

Section 4a -The Principles of Patrol Planning

QUANTIFYING DEMAND

Section 4 provided you with the means to identify and assess your demand and whether you were meeting the peaks in that demand. This section takes that one step further; how to determine the number and distribution of patrol unit-shifts (or cars) and staff over time and area to meet that demand and your objectives and then match that to a shift pattern. **Please be aware that the next section is relatively complex in terms of the calculation you will be required to perform and the benefits of completing this analysis should be weighed up against the amount of time it is likely to take you.**

- The following has been adapted and builds on the resource management-training course run by P.S. Carl Mason Merseyside Police, which in turn derived from the 2-week resource management-training module from the US Senior Command Course, taken from the Police Personnel Allocation Manual designed by Dr William Stenzl, Northwestern University, Chicago.

Calculating unit shifts per day

The basic formula for calculating unit-shifts per day is; $N = F \times W$, where N = the average number of unit-shifts per day, F = a factor that converts workload into the number of unit-shifts per day and W = the workload measure.

The two major issues relating to the basic formula are; what is the workload measure and how is F (the conversion factor) determined?

The workload measure could be determined by population, patrol (or other work) activities (unweighted) or patrol activities (weighted by time). The conversion factor (F) could be determined by local experience, examination of similar areas and historical data.

Whilst not dismissing the other two, the method advocated is historical data of patrol activities weighted by time. The basic formula for using time as a workload measure is; $N = Ft \times W$ (Total time) where; N = the average number of unit-shifts per day, Ft = a factor that converts workload into the number of unit-shifts per day and W = the total time in hours.

Example;

	Patrol Activity	Average Time (Hrs)	Total Time (Hrs)
Serious Crime	1533	X3	4599
Petty Crime	3758	X1.5	5637
Traffic Offences	6632	X0.25	1658
Traffic Accidents	2629	X1	2629
General duties	30880	X0.5	15440
Totals	45432		29963

Assuming that the Ft has already been calculated (0.0003424 unit shifts per day per hour of workload per year) then: $N = Ft \times W$ (Total time in hours) which is $N = 0.0003424 \times 29963 = 10.3$ unit shifts per day.

There are two ways of calculating the average number of unit-shifts using time as a workload measure (W): 1) to work out by year the total workload and 2) to work out by shift length the total workload.

Method One – Calculate unit-shifts by workload over year

Conversion factor for time = $N = Ft \times W$ (time)

Workload is measured in hours. The worth or value of unit-shifts per day can also be measured in hours. Assuming 8hr shifts, one unit-shift per day for one year provides, $8 \times 365 = 2920$ hours. Hence one unit-shift per day for one year is “worth” 2920 hours.

Accordingly, for every 2920 hours of work that must be provided in a year’s time, you need one unit shift per day. Therefore if;

$N = 1$, one unit-shift

(N1) gives us Ft (1/2920) of 0.0003424.

To calculate the number of unit-shifts required, we therefore return to the original formula;

$N = 0.0003424 \times 29963 = 10.3$ unit-shifts.

Method Two – Calculate unit-shifts by shift length

The basic formula for calculating by shift length is;

$N = (1/SI) \times \text{Average Daily Patrol Workload}$

Where SI = Shift Length (e.g. 8hrs)

Total workload for one year is 29963 hours

Then;

$N = (1/8) \times (29963/365)$ or 0.125×82.1

$N = 10.3$ unit-shifts per day

Note: These 10.3 unit-shifts will meet the 29963hrs of work, so there is no in-built resilience at this stage. We will call this the total committed time (TCT).

In order to more accurately calculate workload we should include total uncommitted time (TUT) better known as proactive patrol time, to provide the total patrol time (TPT).

$$\text{TPT} = \text{TCT} + \text{TUT}$$

Accurately calculating the uncommitted time can be very difficult. An alternative approach is to avoid estimating the TUT directly. Instead, estimate the TPT based on the total committed time and what we call a performance factor (Fperf);

$$\text{TPT} = \text{Pf} \times \text{TCT}$$

The burning question is, how long do you want your officers to be committed to patrol activities? This is then expressed as the factor. You may consider the ideal factor to be 3 (a third of an hour) and in any event, the maximum should be 2 (50% of the available time) to avoid burnout.

Therefore 20 minutes committed patrol (that is not uncommitted proactive patrol) work per hour = $60/20 = 3$. Hence the Fperf is 3.

Calculating TUT (total proactive patrol time) from the Fperf

Example

Assume: Fperf = 3

TCT = 29963 hours (daily workload, 8hrs a day, 365 days a year)

Therefore: TPT = Fperf (3) x TCT (29963) = 89889 hours (daily workload, 24hrs a day, 365 days a year)

Therefore: TUT = TPT (89889) – TCT (29963) = 59926 hours

This means that over the year, your entire patrolling workforce will spend 59926 hours on proactive patrol, non-calls for service work, paperwork, etc as opposed to 29963 hours answering calls for service.

But, how many unit-shifts do we require?

Again, there are two methods; 1) calculate unit shifts by shift length and 2) calculate unit shifts by workload over year.

Method One – Calculate unit shifts by shift length

Assume, as before, that the shift length (SI) is 8 hours.

Using the TPT of 89889 hours.

We need to convert the TPT into the average number of unit-shifts per day. Therefore;

$$N = Ft \times W$$

Where;

N = average unit-shifts per day, Ft = a time factor to convert work into unit-shifts and W = the average daily workload (ADW)

Therefore;

$$N = 1/8 \times ADW (89889/365) \text{ which is } 0.125 \times 246.3 = 30.8$$

$$N = 31 \text{ unit-shifts per day}$$

What this would not be is 31 unit-shifts divided equally between three shifts, as we haven't yet factored in the peaks and troughs in demand.

Method Two – Calculate unit-shifts by workload over year

Assuming a shift length of 8 hours.

Using the TPT of 89889 hours.

We need to convert the TPT into the average number of unit-shifts per day. Therefore;

$$N = Ft \times W$$

Where;

N = average unit-shifts per day, Ft = a time factor representing work by ONE unit-shift over the year (8 hours x 365) and W = the total workload over the year (TPT).

Therefore:

$$N = 1/2920 (0.00034) \times 89889 = 30.8$$

$$N = 31 \text{ unit-shifts per day}$$

Using committed time per hour per unit to determine the Fperf

Fperf = performance factor

Mc = Minutes per hour of committed time per unit (0-60)

Fperf = 60/Mc

Mu = Uncommitted time

Ready Reckoner

Mu	Mc	Fperf
0	60	1
15	45	1.33
20	40	1.5
30	30	2
36	24	2.5
40	20	3
45	15	4
50	10	6

Determining the number of unit-shifts using patrol activities weighted by time

1. For section 4, you would have collected the PA data (1-2 years).
2. Determine the number of PA categories to be used (serious crime, petty crime, etc).
3. Then list the total numbers of each category of PA for the data collection time period.
4. Estimate the average service time (in hours) for each PA category, considering travel time, on-scene time, arrest time, investigation time and report-writing time.
5. Calculate the TCT in hours, based on the total incidents (step 3) and the average service time for each category (step 4).
6. Determine the Fperf to be used, based on the average time (in minutes) to be spent on committed time per hour by each unit (Mc)
7. Calculate the average number of unit-shifts per day required based on the shift length (in hours) and the average daily workload.

Example – Determining the number of patrol units using patrol activities weighted by time

	No of activities	Average service time (hrs)	TCT (hrs)
Serious crime	1792	X 2.90	5197
Petty crime	9372	X 1.25	11715
Other	31732	X 0.90	28559
Totals	42896		45471

Mc = 24 minutes per hour per shift

Fperf = 60/24 = 2.5

TPT = Fperf (2.5) x TCT (45471)

= 113678 hours

Shift Length (SI) = 8 hours

N = (1/SI) x ADW

$$= 0.125 \times 311.4 (113678/365)$$

$$= 38.9$$

N = 39 unit shifts per day.

Do 39 (38.9) unit-shifts per day result in 24 minutes of committed time per hour for each unit shift?

TCT = 45471 hours

SI = 8 hours

Average unit-shifts per day = 38.9

Average committed time per day = $45471/365 = 124.58/24 = 5.19$ hours per hour

Number of shifts per day = $24/8 = 3$

Average number of unit-shifts per shift = $38.9/3 = 12.97$ units per shift

Average committed time (hrs) per hour per unit = $5.19/12.97 = 0.4$ hrs per hour per unit

Average committed time (mins) per hour per unit = $0.4 \times 60 = 24$ minutes

This is a useful method of back-calculating your commitments.

How many staff are needed?

There are two steps to calculating the number of actual staff you need to fulfil your demand.

1. Use different patrol unit types to determine the average number of on-duty staff needed each day to staff the average number of units per day
then
2. Use the shift relief factor (SRF) for the area determining the total number of staff required to maintain the daily on-duty requirement determined in step one.

In order to calculate the number of staff, we need to know the number of unit shifts we need to fill.

Example (Assumed data)

Annual Workload		
Shift	Patrol Activity per annum	Committed time (hrs)
Mornings	15238	13274.5 (15238 x time taken for each incident)
Afternoons	30063	38062.5
Nights	19785	23517
Total	65086	74854

Shift length = 8hrs

Fperf = 3

TPT = 3 x 74854 = 224562 hours

Average number of unit-shifts per day

$N = (1/8) \times 224562/365$

= 0.125 x 615.2

= 76.9

= 77 unit-shifts per day

How do we now convert unit-shifts per day into on-duty staff?

There are three steps;

1. Determine how many units of each patrol unit type are used
2. Determine how many on-duty officers are needed for each unit for each patrol unit
3. Use the results of steps 1 and 2 to convert unit-shifts per day to on-duty officers.

Example

Total unit-shifts per day = 77

Type	No of units	X officers per unit	= No of officers
Double-crewed	52	2	104
Single-crewed	15	1	15
Foot patrols	10	1	10
	77		129

We now know how many staff we need to fulfil our obligations, but we also have to take account of absences from duty. We do this by using the shift relief factor.

SRF = total hrs required to cover one shift position every day for one year/average number of hours worked on patrol per year per officer

Assuming a shift length of 8 hours, $SRF = (365 \times 8) / (365 \times 8) - \text{average time off patrol per year per officer}$.

How to calculate time off?

Rest days

Annual leave

Sick leave

Compassionate leave

Public holidays

Non-patrol assignments (training, court, etc)

The basic formula for calculating rest days is: $RD = D - (D \times AWW) / (7 \times SI)$, where:

AWW = average working week (hrs) and D is time period (days).

If time period is 1 year, $D = 365$, so:

$$RD = 365 - 365 \times 40 / (7 \times 8) = 365 - 260.71 (261) = 104.3$$

Example

Rest days = 104.3

Annual leave = 25 (average entitlement)

Public holiday = 8

Sick leave = 3.7

Non-patrol assignments = 4

Total days off = $145 \times 8 \text{ hrs per day} = 1160 \text{ hours off}$

$$SRF = 365 \times 8 = 2920 / ((365 \times 8) - 1160) = 1760 = 1.66$$

SRF = 1.66

Therefore, if we have an SRF of 1.66, we calculate the total number of staff (shift pattern and deployment comes later) as follows;

1. 77 unit-shifts per day requires 129 on-duty officers
2. SRF x on-duty staff
3. 1.66×129
4. = 214.14 (round up to 215)

So we need to post 215 officers to patrol duties...

Police Resource Allocation Measures

All allocation measures determine the number of units or staff to be allocated to each shift (or day of the week, or neighbourhood, sector, etc) by calculating an allocation criterion for each element of the allocation. An allocation measure is always expressed as a rate;

Allocation measure = allocation criterion / measure base

The measure base can be officer, shift, unit, day of the week, neighbourhood, etc.

Many criteria have been used for allocating police patrol resources.

Non-computer based

- o Staffing
- o Patrol activity (unweighted)
- o Committed time
- o Uncommitted time

Computer based

- o Probability of saturation
- o Reaction times

You could probably argue advantages and disadvantages for all of the above, but they all allow for a degree of reasoned planning in resource allocation. They can evidence planning, equity of workload and the exercise of duty of care, as well as providing support for increases in budget or resources where necessary.

Example

Annual Workload		
Shift	Patrol Activity per annum	Committed time (hrs)
Mornings	15238	13274.5
Afternoons	30063	38062.5
Nights	19785	23517
Total	65086	74854

Shift length = 8hrs

Fperf = 3

TPT = 3 x 74854 = 224562 hours

Average number of unit-shifts per day

$N = (1/8) \times 224562/365$

= 0.125 x 615.2

= 76.9

= 77 unit-shifts per day

You have determined that the average number of unit-shifts per day is 77. Now allocate these 77 unit-shifts per day over 3 shifts, using the following allocation criterion;

Patrol activity (TUT)

Hazard scores (Officer safety)

Committed time (Calls for service, TCT)

Patrol Activity

Allocate units in proportion to the number of patrol activities per shift.

Example

Shift Patrol Activity (One year)	
Mornings	15238
Afternoons	30063
Nights	19785
Total	65086

Assume 77 unit-shifts per day to be allocated.

Mornings $(15238/65086) \times 77 = 18$

Afternoons $(30086/65086) \times 77 = 35.5$ (round up or down)

Nights $(19785/65086) \times 77 = 23.4$ (round up or down)

This type of allocation profile points to a Variable Shift Arrangement (VSA) to ensure you meet the peaks and troughs in demand.

Hazard Scores

Allocate unit-shifts based on hazard weights assigned to patrol workload indicators.

Example

PA Type	Hazard Weight
Serious/Violent Crime	4
Petty/Non-violent crime	3
Other patrol activity	1

	Morning		Afternoon		Night	
	PA	Score	PA	Score	PA	Score
Type 1	1131	4524	5518	22072	3109	12436
Type 2	2150	6450	7358	22074	4686	14058
Other	11957	11957	17187	17187	11990	11990
Total		22931		61333		38484

Total score = $22931 + 61333 + 38484 = 122748$

Morning $(22931/122748) \times 77 = 14$

Afternoon $(61333/122748) \times 77 = 38.5$

Night $(38484/122748) \times 77 = 24.1$

Committed Time

As before, an informed management decision must be taken to evaluate the average time taken on each type of task, including paperwork, processing prisoners, etc (which is an average over the year).

PA Type	Weight PA by Time
Type 1	3hrs
Type 2	1.5hrs
Traffic	1.5hrs
Service Calls	0.5hrs
Other	0.5hrs

	Morning		Afternoon		Night	
	PA	Hours	PA	Hours	PA	Hours
Type 1	1131	3393	5518	16554	3109	9327
Type 2	2150	3225	7358	11037	4686	7029
Traffic	678	1017	1878	2817	1166	1749
Service Calls	8393	4197	12519	6260	7326	3663
Other	2886	1443	2790	1395	3498	1749
Total		13275		38063		23517

Total time = 13275 + 38063 + 23517 = 74855 hours

Morning (13275/74885) x 77 = 13.7 (14)

Afternoon (38063/74885) x 77 = 39.2 (39)

Night (23517/74885) x 77 = 24.2 (24)

On-Duty Factor

Finally, having calculated the number of staff we need to post, we need to understand how many of them are likely to turn up for work. Most informed stakeholders would agree that about a third of posted staff are unlikely to be available for duty on any given day, so we have to allow for this in our calculations.

Firstly, it is a case of working out the average number of regularly scheduled workdays each week (RSWD). We have two givens, the average working week (AWW) and the shift length (SI) in hours.

$$RSWD = AWW/SI$$

Example

If AWW is 40 hours and the SI is 8hrs, RSWD/week = 40/8 = 5 work days per week

The on-duty factor then = the average fraction of scheduled officers that will appear for duty each day.

Average number of staff = on-duty factor (a value between 0 and 1) x number of officers scheduled to be on duty.

The basic formula for calculating the on-duty factor is $(7 \times \text{shift length}) / (\text{AWW} \times \text{SRF})$, where the AWW = average working week and SRF is the shift relief factor.

Example

$$\text{ODF} = (7 \times 8) / (40 \times 1.66) = 56 / 66.4 = 0.84$$

Assuming 20 staff are scheduled to be on duty each Monday

$$0.84 \times 20 = 16.8 \text{ (rounded down)} = 16$$

We round down here as we are erring on the side of caution.

The Patrol Plan

Purpose of the Patrol Plan

The patrol plan is designed to help you address the following questions;

What are the total number of staff required to provide acceptable levels of patrol and

How should these staff be deployed by geographical location, or time periods to maximise your productivity.

The patrol plan will provide both immediate and long-term benefits. It will assist in determining staffing levels and selection of shift patterns; it will assist in completing health and safety risk assessments; it will aid your monitoring of performance (the fit between availability of patrols and demand) and finally, it may even aid your need for additional personnel or equipment.

How to use the Patrol Plan

Although at first sight, it looks long-winded and complicated, the patrol plan does follow a logical and explicit format for you to work through. It does not require a significant level of mathematical skill or knowledge. The plan should be completed in conjunction with any complementary spreadsheet on your HR Pay & Benefits intranet site.

Step 1 – determining the data collection effort. You need to compile a list of the input data requirements in your area.

Step 2 – initial activities will then focus on that data collection.

Step 3 – Consultation – you will need to consult widely when determining variations to core shifts, minimum staffing and crewing levels.

The more you involve key stakeholders in the completion of the plan, the more accurate it should be and the more readily it will be accepted.

Step 4 – completing the worksheets. Once all data input items have been collected, the worksheets can be completed.

It is important to note that the Patrol Plan is based on a model of staffing and deployment and that all models are limited by the assumptions on which they are built and by the data used. The Patrol Plan provides you with the tools to assess the data you have collected and formulate a staffing and deployment proposal. It should not though be considered in isolation of other factors, (political, economic, etc) before adopting it as a final plan.

Example

Patrol Strength

The following basic information is required;

Number of deployments to command and control incidents for the previous year

Average amount of time each incident takes to be completed

Performance Factor

The work undertaken in each hour of the day can be classified under three categories, CFS (Calls for Service, plus travel time), non-CFS work (admin, training, etc) and patrol time (proactive patrol). The three periods MUST add up to 60 minutes.

Non-CFS Work

You need to work out how many minutes in each hour are spent on these activities. For example, in every 5-week period, there is a 4-hour training session, which equates to 2% of working time (4hrs / 200hrs x 100). This is 1.2 minutes per hour (2% of 60 minutes). Repeat this process for all non-CFS work.

Activity	% Time spent on each activity	Total time spent on activity per hour
Training	2%	1.2
Refreshments	10%	6
Administration	3.4%	2.04
Parades/De-briefings	4%	2.5
Court	4%	2.5
Self-generated work	4%	2.5
Total non-CFS work per hour		16.70

CFS Work

A logical way of making this decision is to work out what the total non-CFS work is per hour. Then take this away from 60, which will give you the average number of minutes available for CFS work and patrolling. If you divide this figure by 2, you will split evenly the amount of pro-active patrol and CFS work. By doing this, you will be able to accurately predict that on average your patrols will spend approximately 50% of their time whilst in patrol answering calls for service.

$$60 - 16.70 / 2 = 21.65$$

CFS	21.65
Patrol Time	21.65
Non-CFS	16.70

Performance Factor

The performance factor (the total TCT and TUT) is 60 minutes / CFS work per hour = 2.77.

Total Patrol Time

Having worked out the total committed time (TCT) for answering CFS and the performance factor, we can bring these two elements together to calculate what the total patrol time for the year will be.

$$TPT = F_{perf} (2.77) \times TCT (24642) = 68258.34$$

Average Number of Unit-Shifts Required

Now we have the TPT, we can start to calculate the number of staff required to meet this demand. The first step is to convert the total patrol time to unit-shifts.

$$N = 1/SI \times ADW \text{ (Average Daily Workload)} / 365$$

$$N = 1/8 \times 68258.34/365 = 23.37 \text{ (round up to 24)}$$

Conversion from Unit-Shift to Staff.

Total number of unit-shifts = 24. There are three steps to convert unit-shifts to on-duty officers.

Determine how you will distribute the above unit-shifts

Determine how many on-duty officers are required for each patrol unit type

Use the results of steps 1 and 2 to convert unit-shifts per day to on-duty officers

	No of Units		No of Officers		Total No of on-duty Officers
Single Crew	12	x	1	x	12
Double Crew	10	x	2	x	20
Foot Patrol	2	x	1	x	2
Total					34

On-duty staff per day = 34

Shift Relief Factor

You know how many on-duty staff you need to satisfy your demand, but as you know, staff work an average number of hours a week and have rest days, annual leave, training courses and court to attend. Therefore, you need to calculate how many additional officers you need in order to accommodate these abstractions and still provide you with the correct number of on-duty officers. You do this by using the SRF.

Total officers = SRF x On-duty officers

SRF = Total hours to cover one shift position 365 days a year / average number of hours worked on patrol per year per officer.

Assuming a shift length of 8hrs.

Scheduled rest days = $365 - 365 \times AWW / 7 \times SI$

$365 - 365 \times 40 (14600) / 7 \times 8 (56) = 260.71$

Rest Days = 104.29 days

Calculate the other non-patrol days (converting them to 8hr days or equivalent if you are calculating 9, 10 or 12hrs) and complete the table below;

Abstraction	Number of Days
Rest Days	104.29
Average Annual Leave	26
Public Holidays	12
Other abstractions (court)	16
Average Sick Leave	10
Average full training days	8
Total	176.29

SRF = $365 \times SI (8) / 365 - \text{total abstractions } (176.29) \times SI (8) = 1.93$

Total number of staff required

Total = On-duty officers (34) x SRF (1.93) = 65.62 (Round up to 66)

Demand for hour of day and day of week

We now need to calculate the number of patrol units required per hour of day and by day of week.

Example**Average deployment rate for each hour of the day: Table 1**

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	1.23	1.82	1.57	1.42	1.86	1.61	1.40
0800	2.07	1.96	2.19	2.32	2.55	1.94	1.63
0900	2.40	2.13	2.61	2.40	2.03	2.51	1.90
1000	2.51	2.76	2.74	2.65	2.73	2.77	1.82
1100	2.15	2.42	2.48	3.30	3.42	2.77	2.71
1200	2.55	3.21	3.38	3.46	3.75	3.48	3.44
1300	3.55	3.44	3.61	3.34	3.48	4.00	3.69
1400	3.92	3.46	3.17	3.73	4.23	4.13	3.88
1500	3.63	3.86	4.01	4.28	4.63	4.53	4.48
1600	4.44	4.92	4.63	5.05	4.90	4.98	5.03
1700	5.50	4.55	5.21	5.92	5.26	5.40	5.69
1800	5.57	6.84	6.53	6.51	6.32	6.50	5.25
1900	6.59	6.51	6.38	7.36	7.17	6.80	6.23
2000	7.61	7.19	6.65	7.00	8.80	7.19	6.75
2100	7.09	6.51	6.65	6.75	9.21	7.23	6.00
2200	5.88	6.05	6.11	6.23	9.44	7.67	6.55
2300	6.26	5.69	6.32	6.15	10.21	7.92	6.19
2400	5.30	5.80	5.07	5.73	10.80	9.11	5.34
0100	4.28	3.30	3.96	4.19	7.67	7.01	4.13
0200	2.75	2.63	3.25	3.86	7.57	6.88	2.75
0300	2.13	2.13	2.65	3.05	5.50	5.65	1.32
0400	2.07	1.63	1.26	1.76	3.55	3.76	1.07
0500	1.09	1.48	1.21	1.67	2.17	2.34	1.17
0600	1.38	1.07	1.07	1.07	1.48	1.21	1.07

Average service time per call (40 minutes)

Now use the call rate and the average service time to calculate the number of unit-shifts required each hour.

Units required = call rate per hour x service time per CFS (40) / 60 minutes

Amount of CFS for each hour (as an hourly value)**Table 2**

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	0.8	1.2	1.0	0.9	1.2	1.1	0.9
0800	1.4	1.3	1.5	1.5	1.7	1.3	1.1
0900	1.6	1.4	1.7	1.6	1.4	1.7	1.3
1000	1.7	1.8	1.8	1.8	1.8	1.8	1.2
1100	1.4	1.6	1.7	2.2	2.3	1.8	1.8
1200	1.7	2.1	2.3	2.3	2.5	2.3	2.3
1300	2.4	2.3	2.4	2.2	2.3	2.7	2.5
1400	2.6	2.3	2.1	2.5	2.8	2.8	2.6
1500	2.4	2.6	2.7	2.9	3.1	3.0	3.0
1600	3.0	3.3	3.1	3.4	3.3	3.3	3.4
1700	3.7	3.0	3.5	3.9	3.5	3.6	3.8
1800	3.7	4.6	4.4	4.3	4.2	4.3	3.5
1900	4.4	4.3	4.3	4.9	4.8	4.5	4.2
2000	5.1	4.8	4.4	4.7	5.9	4.8	4.5
2100	4.7	4.3	4.4	4.5	6.1	4.8	4.0
2200	3.9	4.0	4.1	4.2	6.3	5.1	4.4
2300	4.2	3.8	4.2	4.1	6.8	5.3	4.1
2400	3.5	3.9	3.4	3.8	7.2	6.1	3.6
0100	2.9	2.2	2.6	2.8	5.1	4.7	2.8
0200	1.8	1.8	2.2	2.6	5.0	4.6	1.8
0300	1.4	1.4	1.8	2.0	3.7	3.8	0.9
0400	1.4	1.1	0.8	1.2	2.4	2.5	0.7
0500	0.7	1.0	0.8	1.1	1.4	1.6	0.8
0600	0.9	0.7	0.7	0.7	1.0	0.8	0.7

With the information from the above table you can calculate how many patrol units are required in your BCU/Department.

You now need to use the call rate and the average service time to calculate the number of unit-shifts required each hour.

Unit shifts = call rate x Service time (40) / 60

Minimum and Desired Staffing Levels

Definitions

Minimum Strengths – The number of staff required to provide a basic service of customer demand factoring in officer safety

Officer Safety – sufficient staff in order to accomplish the job safely

Desired Strengths – The number of staff to satisfy customer demand with performance and efficiency factoring in officer safety

Minimum Strengths

You can use the figures from table 2 to develop minimum and desired staffing levels. Consider each hour, carrying out a risk assessment regarding officer safety, the geographical size of your area and customer demand; determining the baseline minimum number of unit-shifts required, applicable every day. This is the figure you would deem it unsafe to go below.

Baseline Minimum Units per hour = 8 (based on busiest period)

Safety Factor

Now examine each hour of the day and day of the week and decide how many free units, over and above those engaged in CFS, you require in order to minimise the risk to officer safety. This may vary depending on the type and nature of calls at various times of the day and day of the week.

Safety Factor – Number of free units over and above those engaged in CFS

Table 3

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	2	2	2	2	2	2	2
0800	2	2	2	2	2	2	2
0900	2	2	2	2	2	2	2
1000	2	2	2	2	2	2	2
1100	2	2	2	2	2	2	2
1200	2	2	2	2	2	2	2
1300	2	2	2	2	2	2	2
1400	2	2	2	2	2	2	2
1500	2	2	2	2	2	2	2
1600	2	2	2	2	2	2	2
1700	2	2	2	2	2	2	2
1800	2	2	2	2	3	3	2
1900	2	2	2	2	3	3	2
2000	2	2	2	2	3	3	2

2100	2	2	2	2	3	3	2
2200	2	2	2	2	3	3	2
2300	2	2	2	2	3	3	2
2400	2	2	2	2	3	3	2
0100	2	2	2	2	3	3	2
0200	2	2	2	2	3	3	2
0300	2	2	2	2	2	2	2
0400	2	2	2	2	2	2	2
0500	2	2	2	2	2	2	2
0600	2	2	2	2	2	2	2

Now take the figures in table 2, round them up, and add them to the figures in table 3. Compare this with the baseline minimum you decided upon earlier and place the higher figure in the table overleaf (table 4) For example Friday 2100 = 7.6 (rounded up to 8), added to the figure in table 3, will give you a total of 11 unit-shifts.

Minimum Unit-Shift Levels**Table 4**

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	8	8	8	8	8	8	8
0800	8	8	8	8	8	8	8
0900	8	8	8	8	8	8	8
1000	8	8	8	8	8	8	8
1100	8	8	8	8	8	8	8
1200	8	8	8	8	8	8	8
1300	8	8	8	8	8	8	8
1400	8	8	8	8	8	8	8
1500	8	8	8	8	8	8	8
1600	8	8	8	8	8	8	8
1700	8	8	8	8	8	8	8
1800	8	8	8	8	8	8	8
1900	8	8	8	8	8	8	8
2000	8	8	8	8	9	8	8
2100	8	8	8	8	9	8	8
2200	8	8	8	8	9	8	8
2300	8	8	8	8	11	8	8
2400	8	8	8	8	11	9	8
0100	8	8	8	8	8	8	8
0200	8	8	8	8	8	8	8
0300	8	8	8	8	8	8	8
0400	8	8	8	8	8	8	8
0500	8	8	8	8	8	8	8
0600	8	8	8	8	8	8	8

Having set provisional minimum levels you now need to set provisional desired levels. To do this, you take the Fperf (2.77) and the information set out in tables 2 and 4. There are then 2 steps to follow.

Step 1

Complete the table overleaf (table 5) by taking the information in table 2 and multiply it by the Fperf (2.77).

Table 5

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	2.3	3.4	2.9	2.6	3.4	3.0	2.6
0800	3.8	3.6	4.0	4.3	4.7	3.6	3.0
0900	4.4	3.9	4.8	4.4	3.7	4.6	3.5
1000	4.6	5.1	5.1	4.9	5.0	5.1	3.4
1100	4.0	4.5	4.6	6.1	6.3	5.1	5.0
1200	4.7	5.9	6.2	6.4	6.9	6.4	6.4
1300	6.6	6.4	6.7	6.2	6.4	7.4	6.8
1400	7.2	6.4	5.9	6.9	7.8	7.6	7.2
1500	6.7	7.1	7.4	7.9	8.6	8.4	8.3
1600	8.2	9.1	8.6	9.3	9.0	9.2	9.3
1700	10.2	8.4	9.6	10.9	9.7	10.0	10.5
1800	10.3	12.6	12.1	12.0	11.7	12.0	9.7
1900	12.2	12.0	11.8	13.6	13.2	12.6	11.5
2000	14.1	13.3	12.3	12.9	16.3	13.3	12.5
2100	13.1	12.0	11.3	12.5	17.0	13.4	11.1
2200	10.9	11.2	11.7	11.5	17.4	14.2	12.1
2300	11.6	10.5	9.4	11.4	18.9	14.6	11.4
2400	9.8	10.7	7.3	10.6	19.9	16.8	9.9
0100	7.9	6.1	6.0	7.7	14.2	12.9	7.6
0200	5.1	4.9	4.9	7.1	14.0	12.7	5.1
0300	3.9	3.9	2.3	5.6	10.2	10.4	2.4
0400	3.8	3.0	2.2	3.3	6.6	6.9	2.0
0500	2.0	2.7	2.0	3.1	4.0	4.3	2.2
0600	2.5	2.0	2.0	2.0	2.7	2.2	2.0

Step 2

You now need to account for officer safety. Compare table 5 with the minimum levels in table 4 and where the strengths in table 5 fall below those in table 4 you will need to increase the staffing levels accordingly in the table overleaf (table 6).

Provisional Desired Unit Levels

Table 6

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	8	8	8	8	8	8	8
0800	8	8	8	8	8	8	8
0900	8	8	8	8	8	8	8
1000	8	8	8	8	8	8	8
1100	8	8	8	8	8	8	8
1200	8	8	8	8	8	8	8
1300	8	8	8	8	8	8	8
1400	8	8	8	8	8	8	8
1500	8	8	8	8	8	8	8
1600	8	9	9	9	9	9	9
1700	10	8	10	11	10	10	11
1800	10	13	12	12	12	12	10
1900	12	12	12	14	13	13	12
2000	14	13	12	13	16	13	12
2100	13	12	12	12	17	13	11
2200	11	11	11	12	17	14	12
2300	12	11	12	11	19	15	11
2400	10	11	9	11	20	17	10
0100	8	8	8	8	14	13	8
0200	8	8	8	8	14	13	8
0300	8	8	8	8	10	10	8
0400	8	8	8	8	8	8	8
0500	8	8	8	8	8	8	8
0600	8	8	8	8	8	8	8

Examination of the above table can assist in determining the desired number of unit-shifts in each BCU/Department but bear in mind that some may be mobile units whilst others may be foot patrols.

Vehicle Crewing Policy

In order to formulate a vehicle crewing policy, you need to consider a number of issues:

- Officer safety (Table 4)
- Customer demands (Table 2)
- Fperf (Table 6)

Example

Draft Vehicle Crewing Policy

Two vehicles to be double-crewed 24 hours a day

In addition, between 1800-0300 a further three vehicles per day to be double-crewed.

All other vehicles and patrols to be singly crewed.

We now need to take the above crewing policy and transfer it into a table (Table 7)

Number of double crewed units for every hour of the day and every day of the week

Table 7

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	2	2	2	2	2	2	2
0800	2	2	2	2	2	2	2
0900	2	2	2	2	2	2	2
1000	2	2	2	2	2	2	2
1100	2	2	2	2	2	2	2
1200	2	2	2	2	2	2	2
1300	2	2	2	2	2	2	2
1400	2	2	2	2	2	2	2
1500	2	2	2	2	2	2	2
1600	2	2	2	2	2	2	2
1700	2	2	2	2	2	2	2
1800	5	5	5	5	5	5	5
1900	5	5	5	5	5	5	5
2000	5	5	5	5	5	5	5
2100	5	5	5	5	5	5	5
2200	5	5	5	5	5	5	5
2300	5	5	5	5	5	5	5
2400	5	5	5	5	5	5	5
0100	5	5	5	5	5	5	5
0200	5	5	5	5	5	5	5
0300	2	2	2	2	2	2	2
0400	2	2	2	2	2	2	2

0500	2	2	2	2	2	2	2
0600	2	2	2	2	2	2	2

Once the policy is formulated, ask yourself two questions. Is it feasible and is it realistic? (Because it will affect the minimum and desired staffing levels).

Take the final, agreed crewing policy and apply it to your minimum and desired staffing levels (table 8 overleaf). Do this by adding the figures in table 7 to the minimum staffing levels (table 4), which will convert the units to the number of officers required to be on duty. Similarly, adding the figures in table 7 to the desired unit levels (table 6) will convert the units to the number required to be on duty.

Table 8

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	10	10	10	10	10	10	10
0800	10	10	10	10	10	10	10
0900	10	10	10	10	10	10	10
1000	10	10	10	10	10	10	10
1100	10	10	10	10	10	10	10
1200	10	10	10	10	10	10	10
1300	10	10	10	10	10	10	10
1400	10	10	10	10	10	10	10
1500	10	10	10	10	10	10	10
1600	10	10	10	10	10	10	10
1700	10	10	10	10	10	10	10
1800	13	13	13	13	13	13	13
1900	13	13	13	13	13	13	13
2000	13	13	13	13	14	13	13
2100	13	13	13	13	14	13	13
2200	13	13	13	13	14	13	13
2300	13	13	13	13	15	13	13
2400	13	13	13	13	15	14	13
0100	13	13	13	13	13	13	13
0200	13	13	13	13	13	13	13
0300	10	10	10	10	10	10	10
0400	10	10	10	10	10	10	10
0500	10	10	10	10	10	10	10
0600	10	10	10	10	10	10	10

1877

Having set them, you need, as stated previously, to re-examine them to ensure they are feasible and realistic. To do this, ascertain how many staff would be required to achieve the above minimum staffing levels. The first step is to establish how many unit-shifts are required. Assume a shift length of 8hrs.

$$\text{Unit shift} = 1/8 \times \text{Total hrs worked per week} / 7 \text{ (days in the week)}$$

$$= 0.125 \times 1877/7 \text{ (268.14)} = 33.51$$

We then need to account for abstractions via the SRF.

$$\text{Total officers} = \text{SRF (1.93)} \times \text{Total unit-shifts (33.51)} = 64.67 \text{ (rounded up to 65)}$$

If the number of staff required to satisfy your minimum staffing levels is greater than the number of staff assigned to uniform patrol work, there will be a need to submit a business case for more staff to be assigned to patrol, or change the vehicle crewing policy (without compromising officer safety).

Desired Staffing Levels

You will now repeat the process for table 8 for table 9 (below), to determine the desired staffing levels. Take the figures from table 7 and add them to the figures from table 6.

Table 9

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	10	10	10	10	10	10	10
0800	10	10	10	10	10	10	10
0900	10	10	10	10	10	10	10
1000	10	10	10	10	10	10	10
1100	10	10	10	10	10	10	10
1200	10	10	10	10	10	10	10
1300	10	10	10	10	10	10	10
1400	10	10	10	10	10	10	10
1500	10	10	10	10	11	10	10
1600	10	11	11	11	11	11	11
1700	12	10	12	13	12	12	13
1800	15	18	17	17	17	17	15
1900	17	17	17	19	18	18	17
2000	18	17	17	17	22	18	16
2100	16	16	16	17	22	19	17
2200	16	16	16	17	22	19	17
2300	17	16	17	16	24	20	16
2400	15	16	14	16	25	22	15
0100	13	13	13	13	19	18	13
0200	13	13	13	13	19	18	13
0300	10	10	10	10	12	12	10
0400	10	10	10	10	10	10	10
0500	10	10	10	10	10	10	10
0600	10	10	10	10	10	10	10

2143

Having set them, you need, as stated above, to re-examine them to ensure they are feasible and realistic. To do this, ascertain how many staff would be required to achieve the above desired staffing levels. The first

step is to establish how many unit-shifts are required. Assume a shift length of 8hrs.

$$\text{Unit shift} = 1/8 \times \text{Total weekly patrol time}/7 \text{ (days in the week)}$$

$$= 0.125 \times 2143/7 \text{ (306.14)} = 38.26$$

We then need to account for abstractions via the SRF.

$$\text{Total officers} = \text{SRF} (1.93) \times \text{total unit-shifts} (38.26) = 73.84 \text{ (rounded up to 74)}$$

If the number of staff required to satisfy your desired staffing levels is greater than the number of officers assigned to uniform patrol work, there will be a need to submit a business case for more staff to be assigned to patrol, or change the vehicle crewing policy (without compromising officer safety).

So far, we have set our staffing levels by hour of the day. We now need to relate them to a shift pattern. You need to fully understand Police and Working Time Regulations in order to do so.

**Example
Shift Pattern**

	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
Week 1	ND	ND	ND	ND	RD	RD	RD
Week 2	LT	LT	LT	RD	RD	ET	ET
Week 3	ET	ET	RD	RD	ND	ND	ND
Week 4	RD	RD	RD	LT	LT	LT	LT
Week 5	RD	RD	ET	ET	ET	RD	RD

ET – start time between 0700 and 1000
 LT – start time between 1200 and 1800
 ND – start time between 1800 and 2400

Teams could be split into sub teams (or increased to 10 teams) with sub team staff coming on earlier or later to adapt to peaks and troughs in demand.

Roster would then need to be adapted over a 52-week period in line with existing force policy.

**Staffing Policy
On Duty Factor**

In order for the shift pattern to have some predictability you need to establish a policy for those variations from core shifts.

In practice, you need to know how many staff there are on each section and how many of them will, on average, turn up for work. To do so, we calculate an on-duty factor.

$$\text{On-duty factor} = 7 \times 8 (\text{SL}) / \text{AWW} \times \text{SRF}$$

$$= 7 \times 8 / 40 \times 1.93 = 0.725$$

Once you know how many officers are on each section, you can multiply it by the on-duty factor to give you the average number of officers (table 10) who will report for duty for each hour of the day (without variations).

Table 10

Time	Mon	Tues	Weds	Thurs	Fri	Sat	Sun
0700	13	13	13	13	13	13	13
0800	13	13	13	13	13	13	13
0900	13	13	13	13	13	13	13
1000	13	13	13	13	13	13	13
1100	13	13	13	13	13	13	13
1200	13	13	13	13	13	13	13
1300	13	13	13	13	13	13	13
1400	13	13	13	13	13	13	13
1500	13	13	25.9	13	13	13	13
1600	13	13	25.9	13	13	13	13
1700	13	13	13	13	13	13	13
1800	13	13	13	13	13	13	13
1900	13	13	13	13	13	13	13
2000	13	13	13	13	13	13	13
2100	13	13	13	25.9	25.9	25.9	13
2200	25.9	25.9	25.9	25.9	25.9	25.9	25.9
2300	25.9	25.9	25.9	25.9	25.9	25.9	25.9
2400	25.9	25.9	25.9	25.9	25.9	25.9	25.9
0100	13	13	13	25.9	25.9	13	13
0200	13	13	13	25.9	25.9	13	13
0300	13	13	13	13	13	13	13
0400	13	13	13	13	13	13	13
0500	13	13	13	13	13	13	13
0600	13	13	13	13	13	13	13

There is no need to compare the number of staff who on average will turn up for duty with the minimum strengths as the desired strengths have the minimum strengths incorporated into them. You will though need to compare the figures in table 10 with the desired strengths in table 9. With this information, you can start to formulate a variation policy. For example, if, on average, you have enough staff turning up for duty that will allow you to deviate 33% of your staff, then you could consider splitting your team into three equal sub-teams so that each member of staff would work, for example, a varied night shift, every third week.

If you find that the staffing levels you have, even with variations, do not meet your minimum or desired levels, then you will have to either negotiate for more staff, or review your performance factor and/or crewing policy (not compromising officer safety).

In order to assist you, table 11 does the comparison.

Table 11

Time	Mon		Tues		Weds		Thurs		Fri		Sat		Sun	
0700	10	13	10	13	10	13	10	13	10	13	10	13	10	13
0800	10	13	10	13	10	13	10	13	10	13	10	13	10	13
0900	10	13	10	13	10	13	10	13	10	13	10	13	10	13
1000	10	13	10	13	10	13	10	13	10	13	10	13	10	13
1100	10	13	10	13	10	13	10	13	10	13	10	13	10	13
1200	10	13	10	13	10	13	10	13	10	13	10	13	10	13
1300	10	13	10	13	10	13	10	13	10	13	10	13	10	13
1400	10	13	10	13	10	13	10	13	10	13	10	13	10	13
1500	10	13	10	13	10	25.9	10	13	11	13	10	13	10	13
1600	10	13	11	13	11	25.9	11	13	11	13	11	13	11	13
1700	12	13	10	13	12	13	13	13	12	13	12	13	13	13
1800	15	13	18	13	17	13	17	13	17	13	17	13	15	13
1900	17	13	17	13	17	13	19	13	18	13	18	13	17	13
2000	18	13	17	13	17	13	17	13	22	13	18	13	16	13
2100	16	13	16	13	16	13	17	25.9	22	25.9	19	25.9	17	13
2200	16	25.9	16	25.9	16	25.9	17	25.9	22	25.9	19	25.9	17	25.9
2300	17	25.9	16	25.9	17	25.9	16	25.9	24	25.9	20	25.9	16	25.9
2400	15	25.9	16	25.9	14	25.9	16	25.9	25	25.9	22	25.9	15	25.9
0100	13	13	13	13	13	13	13	25.9	19	25.9	18	13	13	13
0200	13	13	13	13	13	13	13	25.9	19	25.9	18	13	13	13
0300	10	13	10	13	10	13	10	13	12	13	12	13	10	13
0400	10	13	10	13	10	13	10	13	10	13	10	13	10	13
0500	10	13	10	13	10	13	10	13	10	13	10	13	10	13
0600	10	13	10	13	10	13	10	13	10	13	10	13	10	13

Once you are satisfied that your variation policy will allow you to meet your targets regarding minimum and desired strengths you will need to commit this policy to paper in a clear and concise manner so that all staff can understand what is expected of them.

Example

Variation Policy

3 staff to be varied from ND on each day to perform an 1800-0300 shift from Monday to Sunday inclusive.

Section 5-Assessing Management & Staff Needs

ASSESSING MANAGEMENT & STAFF NEEDS

The model of finding an optimal shift system described in earlier sections includes considering management & staff needs.

In order to do this adequately you may need to collect data relating to the following:

- Sickness and Absence rates (by type).
- Work Accident rates (by type and perhaps more importantly time).
- Police Collision rates.
- Training Attendance rates.
- Performance against crime rates.
- Performance against charter response times.
- Overtime budget (by type including prisoner and court appearances).
- Custody throughput data (including type and time of arrest).
- Stop and search data.

It is recommended that you review information from the previous two years (104 weeks) to account for variations, but if this is not available, a minimum of one year. The level of detail you collect is up to you, however the more thorough you are the more likely you are going to be able to identify an optimal pattern for your BCU/Department. You are in essence trying to determine how productive the shift pattern is by gauging how well it is matching resources against demand and what factors may be acting as a barrier to that objective.

This information will need to feed into your Shift Review so your findings must be documented.

Identifying the ratio of staff needed to fill one position

Prior to developing the shift pattern, it will be necessary to identify the requisite number of staff required to fill the posts. A useful way of doing this is to calculate the **Shift Relief Factor**.

Example of how to calculate Shift Relief Factors (SRF) for patrol officers on VSP:

$$\text{SRF} = \frac{\text{Total Hours required to cover one shift position every day for one year}}{\text{Average number of hours worked on patrol per year per Officer}}$$

- Time Off:
- Regularly Scheduled Rest Days
 - Benefit Rest Days (annual leave, sick leave, compassionate leave, public holidays)
 - Non-patrol assignments (training, squads, court, research teams)

SRF = $(365 \times 8) / ((365 \times 8) - \text{Average time off patrol per year per Officer})$
 TYPICAL ABSTRACTIONS TO CONSIDER OVER THE YEAR (Assuming average 9.56 hour variable shifts).

- Sickness = 15.4 days
- Training = 10 days
- Rest Days = 156 days
- Annual Leave = 23 days (Var. shifts)
- PH = 9 Days (2002)

TOTAL DAYS = 213.4 abstracted

Total **Working Hours** Abstracted:
 = 2040 (assuming 9.56 hr variable shifts)

$$\begin{aligned} \text{SRF} &= (365 \times 9.56) / ((365 \times 9.56) - 2040) \\ &= 3489 / 1449 \\ &= 2.4 \end{aligned}$$

For **each** post needed to be filled, therefore, we typically need 2.4 Staff members; any less and any roster will not work.

A Practical Application of the Shift Relief Factor:

Two Police Station Enquiry Desks:

Central Station: Requires staffing between 07:00 and 23:00 on overlapping shifts (2 unit-shifts)

Eastern Station: Requires staffing 24 hours a day (3 unit-shifts)

This makes a total of FIVE unit-shifts (positions) needed to be filled each day. Using the SRF calculated earlier of 2.4, this means that, to staff the stations as we might wish, we may need to post **as many as 12 members of staff** (2.4 x 5) to the station desks.

Failing to post the requisite number of people (and thus failing to take account of the abstractions that take staff from their core posts) means that either overtime will be needed, the stations may have to close sometimes, or staff will have to be drawn from elsewhere. which, of course, then leads to further abstractions for THOSE staff.

Officer Safety and Adjustments To Minimum Requirements (ATMR)

Each BCU/Department sets minimum staffing levels for its staff for purposes of officer safety, levels that are agreed locally with Federation representatives. These should be borne in mind when evaluating existing and alternatives shifts. However, some staff have expressed concern that minimum levels are set arbitrarily and/or sometimes ignored. With duty of care under the Health & Safety at Work Act, this should clearly not be occurring.

Some also suggested that minimum staffing levels should vary at different times of the day and night, reflecting accurate risk assessments, in turn potentially reducing pressure on teams; again, this should be factored into shift designs.

In addition suggestions have been made in relation to assigning membership to a team based on a profile of skills. For example monitoring the number of drivers on a shift to ensure minimum staffing levels are met and redistributing drivers as is required to ensure officer safety.

Section 6-Statutory Requirements & Consultation

STATUTORY REQUIREMENTS & CONSULTATION

This section looks at the consultation with key-stakeholders and statutory regulations that reflect the legal interests of police officers and police staff. Both of these issues are key in the process of shift system review and must be paid particular attention to during the process.

Police Regulations 2003 (Statutory)

Your force will have a copy of the Police Regulations 2003. Of particular relevance would be Regulations 5 (for part time officers) 22, 25, 26 and 33. For police staff, you should refer to your in house police staff pay and allowances manual or terms and conditions manual.

Listed below are some of the general principles you should be aware of.

How many hours are police officers contracted to work?

Police officers are paid an annual salary based on 2080 hours per annum (40 hours x 52 weeks). This includes an entitlement to paid public holiday leave.

For police staff, the requirement is different and varies from force to force which does throw up planning issues for police staff who work alongside police officer colleagues. However this is not insurmountable. As a baseline, rosters have 36hrs x 52 weeks = 1872hrs (net).

There are also issues such as **shift disturbance** or **night duty allowance** that need to be considered by managers, details of which will be available in force.

How many rest days are staff entitled to?

The requirement is to have an *average* of two rest days per week (104 per annum) although for variable rosters this is increased, usually between 150 (9 and 10 hours) and approx 191 (12 hours).

How long should there be between each tour of duty?

It is recommended that there is a minimum of 11 hours between rostered tours of duty (as per Working Time and Police Regulations). Any period of less than 11hrs must be agreed with the relevant staff associations.

What entitlement is there to refreshment breaks?

This depends on the type of shift roster and whether an employee is full or part time. Please refer to the Police Regulations (determinations and annexes) and police staff pay & allowances manuals for further details.

How much notice must be given for a change of roster?

Any new roster can only be implemented with 28 days prior notice.

What are the requirements for a part time member of staff?

Part time rosters for police officers are normally 364 days in length (52 weeks) to ensure pro rata entitlements are calculated correctly based on the percentage of full-time hours worked (appropriate factor). The local Federation or union representative should be consulted before any part time roster is agreed between the individual and HR Manager.

If you are not completely clear on this then contact your HR Pay & Benefits/legal department in force.

Variable	Shift	Arrangements	(VSAs)
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There are a number of particular issues that are associated with Variable shift rotas (VSRs) that need special consideration in relation to reviewing and implementing this type of shift system. Firstly, many people believe that in choosing to work a VSR and accompanying working protocol (workforce agreement) entitles the force to “opt-out” of police regulations. This is NOT the case.

Administrative implications of variable shift arrangements

The implementation of a VSA must provide for hours of duty equivalent to those under a standard shift pattern (Regulation 22) and for annual leave equivalent to the annual allowance provided for in Regulation 33. Therefore leave should be converted into hours, using 8 hours for each day of leave.

Calculating sickness

If an officer is ill or injured then any period of sickness is measured in days away from work. National policy allowing staff to self certify up to seven days sickness is unaffected.

Annual leave

All annual leave will need to be calculated in hours and, as now; leave may be taken in half or day blocks.

The result will be that Annual Leave will be converted into hours and taken at the appropriate rate for the day or week in question. This will equate over the year to the same leave entitlement as individuals working a standard pattern. This advice applies equally to police staff working a variable shift.

Rest days

Where an officer is required to work on a rostered rest day (15 or more days notice), notification of the number of hours to be worked on that shift will need to be given and the officer will need to be credited with a rest day credit of an equal length of time. Similarly if a rest day in lieu were taken the appropriate number of hours rostered to be worked on that day would need to be recorded and deducted from the credit owed.

For police staff, you should refer to your Pay & Allowances Manual or terms and conditions manual.

Bank holidays

Under current police regulations a premium payment of double time is made to officers working a bank holiday

Police staff terms and conditions vary. For advice, speak to your HR/legal Department.

Training

In general training days and other courses tend to be based around a working day of eight hours so there is an issue of how the shortfall should be dealt with where shifts in excess of eight hours are being worked. In the most extreme VSAs this shortfall could be four hours.

There are practical solutions and options within the scope of existing legislation you can employ to manage training requirements. For further advice contact your HR Department.

Refreshment breaks and allowances

The duration of refreshment breaks is covered by Police Regulations, and varies with the number of hours worked:

Hours worked	Refreshment break
>8 but <9	45 mins
>9 but <10	50 mins
>10	60 mins

Officers will still be entitled to claim expenses and/or allowances in line with police regulations.

The Working Time Regulations also set minimum levels for “in work rest breaks”. Where regulations and contractual provisions are more generous, these will apply. If an individual declines to take their break(s), this does not entitle them to end their duty early. Managers should also consider the Health & Safety implications in cases where an individual never takes the appropriate breaks. It may be advisable to speak to local safety representatives or Health & Safety Branch.

Further implications for police staff

Where a VSA is considered it should be remembered that the impact on staff would be wider than those engaged in the immediate team. Early consultation with police staff is seen as essential.

Employment law rather than Police Regulations governs the pay and conditions for police staff. In particular, police staff are contracted to work a different number of hours per week to those prescribed by Police Regulations. There are important salary implications for police staff as they receive Shift Disturbance Allowance as part of their terms and conditions

Working Time Regulations (WTR) (Statutory)

Bear in mind the implications of Working Time Regulations and seek advice from your HR/legal department when considering a change to the shift pattern

Flexible and part time working

In a sense the many and varied shift patterns available and utilised by forces are practical demonstrations of flexible working. Whilst working shifts is a feature of the police service in general it should be remembered that for some staff the ability to work varied and sometimes-unsocial hours can be beneficial to those with caring or other responsibilities. Ultimately though, whilst considering the needs of the individual, the needs of the service will remain paramount.

Research demonstrates considerable business benefits when individuals are better able to integrate their needs outside work into their daily lives with no detriment to their work. There are three principal benefits to the organisation:

- **Recruitment** - by advertising posts as available for flexible working patterns, the recruitment pool is widened and will attract more candidates with the right skills.
- **Retention** - the adoption of flexible working patterns helps retain valued staff, as working patterns are adapted to suit their needs as well as those of the business.
- **Absenteeism** - evidence points to work-life balance practices reducing costs relating to sickness, absenteeism and decreased efficiency, giving rise instead to more motivated and committed staff.

Flexible working in its broadest sense includes part-time work; voluntary reduced working time (v-time); term-time working; annualised hours; job-sharing; teleworking/homeworking; compressed hours; flexi-time; and team-based self-rostering. If FW is perceived to be widely available and acceptable there may be challenges in staffing shifts that are predicated on the traditional team model.

There are though precedents for accommodating individual shift patterns:

The New York Police Department undertakes individual discussions with officers, as part of the HR annual appraisal process, to agree a shift pattern acceptable to the business and the officer. The level of flexibility required to allow successful delivery is dependent on the large number of officers involved and the ability of NYPD to move officers between BCUs to maintain operational effectiveness. Careful consideration needs to be paid to the development of close team communication, the availability of support equipment (cars etc.) and the resource required to manage the ongoing individual shift discussions. Indications are that the flexibility

achieved for NYPD and the officers outweigh the cost in dealing with these challenges.

Closely allied to the issue of FW are the needs of those with caring responsibilities outside of primary childcare. These may include caring responsibilities for seriously sick, elderly or disabled relatives, partners and family. Research by the MPS has shown that those with such responsibilities tend to be in the 40-55 years age range and represent an experienced resource, which would be difficult and expensive to replace. It is therefore in the best interests of your force to be sympathetic to the demands that such responsibilities make on the employee and, where possible, accommodate them in terms of FW.

The direct impact of flexible working on shift patterns is unknown. However, there are valuable business benefits to be gained from clearly communicating policy and setting minimum standards of operation for local line managers. In addition, recent employment tribunals have underlined the need for managers to demonstrate a number of key competences in employee relations, including:

- Proper and meaningful consultation with their staff
- Flexibility in the application of policies
- The ability to show that decisions have been based on sound business reasons

Health & Safety Good Practice

The Health and Safety at Work Act (1974) and the Police (Health and Safety) Act 1997 both apply to police employees, and impose a 'duty of care' on employers with respect to their mental and physical health. One element is the requirement for a 'safe system of work', which includes working time, training, working practices, staffing levels and supervision. It also lays down the requirement for an employer to consult with employees upon the introduction of any measures likely to affect health and safety, such as a new shift system. Toolkit section 6.4 provides some ideas as to how you might fulfil this requirement.

In a climate of increasing litigation within the police service, the need for employers to demonstrate that they are exercising a duty of care to their staff and minimising the potential harmful effects of systems of work is greater than ever³.

This responsibility may at times be underplayed given the often vague and contradictory research arising from reviews of shift patterns and the health of shift workers. However, there is a general acceptance amongst researchers that shift working, and in particular night shift work, can be detrimental to workers and should be avoided if at all possible. For example:

³ Wardman, K., Mason, C. (1999) *"The Working Time Directive: Officer Health and Safety & Police Efficiency"* [in] *The Police Journal* Vol LXXII No.1 pp 2-13. Butterworths, Croydon.

“Cumulative sleep loss causes decrements in performance in the short term and potentially serious damage to health in the long term...shift workers complain of difficulties sleeping and loss of appetite and have increased incidences of digestive disorders and ulcers.”

Simpson, M. & Richbell, S. FBI Law Enforcement Bulletin [69(1) 2000]

The body's circadian rhythms (regular variations in physical and mental functions such as body temperature, heart rate, blood pressure, respiration rate and adrenalin production) experience regular variation through a 24-hour cycle and are at maximum activity during the day. Adapting to different shift patterns alters this rhythm to the detriment of the individual. It is true that partial adaptation may occur during successive periods of shift work, but reversion to standard patterns usually occurs during days off.

Consequences of this disruption include sleep related disorders, chronic fatigue syndrome, gastro-intestinal problems, mental disorders, heart disease and even reproductive problems.

There are a number of generally accepted actions that employers and employees can take to minimise disruption, and implementing these changes to a shift pattern can have the potential to increase performance and improve health at the same time. They include:

- Shift changes should be in a clockwise direction (i.e. early shifts to late shifts to night shift) to minimise sleep disruption and digestive disorders. This is in contrast to the old 'regulation' four-shift system for example, which required staff to change shifts in an anti-clockwise direction.
- Quick changeovers should be eliminated to ensure increased sleep over the shift cycle. In some cases officers prefer quick changeovers to having a rest day immediately after nights (which they see as wasted due to their need to catch up on sleep), but it is generally recognised to be detrimental to officer health.
- The number of consecutive nights should be minimised. It is generally accepted that the body can recover quickly from up to four consecutive night shifts; any more than this and the body begins to adapt to a 'nocturnal' pattern that can make readjustment difficult. The biochemistry, which governs mood, hunger, alertness and sleeping habits, will be subtly altered through the production of different levels of certain hormones. This process will have taken between five to seven days to progress to levels where improvements in adaptation can be recognised during the night. It may take at least the same amount of time to change back to a diurnal cycle. Researchers agree that weekly rotating shift patterns as employed in the police service are the most likely to produce health problems for workers⁴.
- Morning shifts should ideally start as late as possible (e.g. 0700 is better than 0600 or even 0630).

- The disruptive effects of shift work increase with age. In particular, shift workers over 40-45 years tend to sleep much worse after night shifts, possibly due to changes in circadian rhythms⁵; the age profile of a BCU/Department should therefore be borne in mind when assessing shift patterns.
- The need for shift periods (particularly nights) in excess of eight hours should be critically examined, with evidence suggesting performance begins to decline on shifts in excess of eight hours and where workers perform physically or mentally demanding or repetitive tasks.

Advice from the Police Federation is that risk assessments need to be absolutely clear regarding the justification for extending night duty shifts beyond 8-hours.

Risk assessments and/or operational requirements should also be absolutely clear in their reasons for not adhering with the additional good practice highlighted above.

HSE's Fatigue Index Explained

A number of these welfare considerations can be considered together by utilising the HSE's revised Fatigue Index. The index scores different shifts by assessing how they impact five key areas relating to fatigue. In summary these are:

Time of day – determined by looking at the shifts start time. The index weights against shifts that start late in the evening through to the early hours of the morning.

Shift duration – looking at how long the shift is and relating it to the start time. The index weights against long shifts, especially those that run through the night.

Duration of rest period – accounts for the duration and timing of a rest period prior to the shift. The index weights against short rest periods, especially those that end in the late evening. This is particularly relevant to quick changeovers.

Rest periods – this is most relevant to work which requires continuous alertness (e.g. driving).

Nature of the shift – each shift is identified as being either an early, late or night and assigned a residual weighting. This in effect builds up a cumulative fatigue index weighting against large blocks of consecutive shifts, especially if they are all of the same timing. This is specifically relevant to extended block shifts of nights.

Mason, C. (1999) *Healthy nights*. Home Office

Consultation

As previously stated there is a requirement for an employer to consult with employees upon the introduction of any measures likely to affect health and safety, such as a new shift system. This section of the toolkit looks at the ways in which you can fulfil this requirement in addition to other groups with which you may also want to consult as part of your review.

Consultation is a process of communicating with people about an issue involving asking questions and listening to the answers. There is no point in consulting with an individual or a group of people if you are not willing to take on board what they have to say. Consultation allows you to understand the needs of particular groups or individuals rather than second-guessing them. It allows you to build relationships with people but must be handled carefully to ensure that those relationships remain positive. A few rules of thumb include:

- Explain the purpose of the consultation and where it fits in the review to everyone you consult with.
- Ask lots of “How, Why, When, What, Who?” questions as this is the best way to get the information you need.
- Note down what people say so you can refer back to it later as you won’t remember everything.
- If you don’t know the answers to a question say so and give an indication of when you will have the answer for them.
- Don’t promise anything you can’t deliver or that is not within the scope of your review, you won’t be able to solve all the issues they might raise.

Ideally you are likely to want to consult with all key stakeholders identified through your efforts in toolkit section 3.3. The extent and methods used in this consultation will depend on the number of people in that group who would be affected by any change in shift pattern and the influence they have over the success of any new pattern that could be implemented. The sections below highlight the main groups you are likely to want to consult with and provide some ideas on how you could go about this.

Remember you know these people. Think about the most proactive and engaging way you can discuss their needs with them in relation to shift patterns. If you get this phase right the rest of the process becomes much easier.

Documenting your consultation

It is important that you document your consultation process in terms of who you have spoken to and what were the main points discussed through that consultation. You will need this information during the evaluation phase of your shift review and this information will feed into your Shift Review Report as discussed in the decision time and preparation section of this toolkit (section 7.4).

Methods of Consultation (Optional)

The methods you might use in consultation are similar to the methods of communication highlighted in toolkit section 3.7 and at this point it will be a good idea to refer back to this section of the toolkit and refresh your memory. The important thing to remember is to look out for how effective the method is at allowing you to hear what a group has to say. If you feel you aren't getting the information you need from a group ask them if there is anything you could do differently or if they would prefer another method of communication.

Another important factor is that in the evaluation stage you will need to repeat your consultation process to find out whether any changes you make are meeting the needs of the groups consulted. Design your consultation with this in mind so that groups or individuals do not feel 'over consulted' which can lead to boredom and inefficiency.

Suggestions for Consultation Groups

This section of the toolkit looks at the groups that you may wish to consult with during your review. It is not meant to be a prescriptive list but a starting point for you to work from and build upon with your BCU/Department's needs in mind.

Shift Working Staff and their managers

The requirement to consult with employees means that shift working staff and their managers will be the group that much of your consultation will be with. It is important that you include all groups who will be affected not just those who actually work the shifts, although you will need to spend less time with fewer representatives of these more peripherally affected groups. For example changing shift systems may mean that the meal times the bulk of officers taken will change. In this instance you would want to consult with catering staff to ensure that their new peak demand can be met by their own shift organisation.

As this group is likely to be the largest you will need to consult with you may wish to consider using methods of consultation such as running a number of focus groups or briefings or perhaps using a survey resources permitting. Go for methods that allow you to reach a good proportion of staff, 10 % would be an absolute minimum; around a third (33%) adequate although you should try and reach as many as possible through your consultation and get their opinion.

You will also want to ensure that all staff groups have been represented in your consultation. Talking only to Inspectors and Sergeants will mean you do not capture the opinions of PCs. In addition ensure you have talked to under-represented groups, from across a range of ages, as they may have needs that differ from others.

Specialist Units

There will be units across your force that perform specialist roles and may have fallen either inside or outside the scope of your review. You may

need to talk to people in these units to ensure that their requirements are met by any shift system and that the hours that they work fit with the shift system you are reviewing. A basic example would be if a burglary prevention team only processes requests for attendance in the mornings but the control room records most in the afternoon/evening there is a mismatch in terms of responding to requests quickly. Some work reorganisation may solve this issue or this unit may have to be considered in the shift review process if changes cannot be made.

Support Staff

There is a variety of support staff that may or may not work shifts. It is important that all groups are considered for consultation and made aware of the shift system review in progress. Consider the impact on them and whether you need to get their point of view.

Key stakeholders upon whom changes may impact

Key stakeholders must always be considered as the impact on them may not always be obvious. For example officers working longer day than 8 hours who are required to attend court, are required to return to work for the final hours of the shift. In planning terms are they taken as the initial equation for setting staffing levels?

Staff Union & Federated Rank Representatives

Your local union and federated rank representatives should have been involved from the start of the review as either a member of the working party or on the review team. You may want to double check now that all the representatives have been spoken to. In particular you will need to ensure that you have spoken to all representatives of each grade that will be affected by any change in shift system under your review.

Staff Association Representatives

You may wish to speak to some local or central staff association representatives to ensure that you have considered the wide range of issues that having a diverse workforce entails. Get in touch with local members in particular, as they will be able to provide you with a perspective from their own experience.

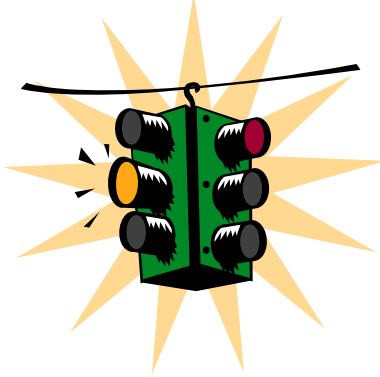
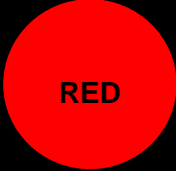

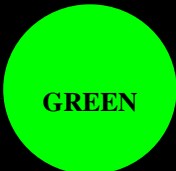
Local community groups

You will also want to talk to local community groups. Your force is likely to have channels of communication that are already open that you can use. They should be able to help you identify any changes in behaviour or trends that you need to respond to that are occurring now or expected in the future. Your review should take into account their views and your shift system should respond to customer needs.

Section 7-Decision Time and Preparation

DECISION TIME AND PREPARATION

Having gathered all the information you need you can now piece it together to decide what shift pattern will best meet all of the needs you have identified. Refer back to all of your analysis and consultation information to ensure that you have accounted for as many angles as possible.

	<p>Is your current shift system optimally meeting your operational demands and staff needs?</p>
  	<p>If the answer to this question is YES you do not need to alter your shift system or proceed working through the rest of this toolkit. Commit to completing another review of your pattern within the next 12 months or on major changes that could influence demand or staff needs. Go to section 11 of the toolkit.</p> <p>If you cannot yet answer this question you need to return to the previous phases of the process and gather more evidence. It is important you are certain in your answer to this question as it will directly affect your OCUs policing performance and the lives of your staff.</p> <p>If the answer to this question is NO, you need to find a shift system that better meets your BCU/Departmental needs. You need to proceed with pulling your analysis and consultation together and identifying a more optimal pattern. Continue through this section of the toolkit.</p>

Choosing a more suitable pattern

You may wish to contact your HR department. In addition section 6.2 of this document provides additional information you will need to read if you are considering Variable Shift Rotas (VSRs) and section 6.4 discusses flexible and part time working issues.

Choosing a shift system is a matter of best judgement and is not an exact science, although the margin for error can be minimised by adopting many of the methods highlighted in this toolkit. You will need to draw on your own experience alongside soliciting the advice of other professionals from across your force including Human Resources, Legal Department, Duties/Ops Offices, any duties administration teams and staff associations.

When choosing your pattern you must take into account the information you have gathered from your consultation, particularly with BCU/Departmental staff, to ensure you are making the right decisions on their behalf.

Producing a shift pattern

The design of shift systems can be a complex task, which is not easily done by hand. In reality, there is no magic formula, but there are options. Dependant upon your level of IT skills and knowledge, you may be able to utilise applications such as Excel™ to calculate the correct number of hours and rest days when mapping out a shift pattern.

There are, as you would expect, a myriad number of commercial computer shift scheduling packages (e.g. a search on the Internet under “police shift patterns” will yield a variety of available software packages) that can assist shift designers in their task. One such system is XIMES, a shift-scheduling package developed by Process Evolution. The Home Office Police Standards Unit has sponsored one user licence for each Force in England and Wales.

Typical Police Solutions to Shift work

All full-time Police Officers currently work an average 40-hour week. No duty roster will supply more working hours than another. Ten staff working 40 hours a week means that the manager has 400 hours to distribute over the working week. Duty rosters will not create any more *time*; merely distribute that time over the week in a more effective way or a less effective way.

8 Hour Four Block

A standard Police duty roster, in accordance with the requirement of Police Regulations to roster duties of no more than eight hours.

Duties tend to butt-end each other, creating a situation where equal numbers of staff are on duty throughout the working day and thus throughout the week.

There are 25% rostered on Days, 25% on Lates and 25% on Nights, with 25% on Rest Day at any given time.

Managers tend to find that the increase in demand in the Afternoon forces them to create “Day & Evening” patrol sections to supplement operational strength. Paradoxically, these are often drawn from the existing operational strength, creating staffing difficulties during the day.

At first glance, four-block rosters may seem easy to manage, but they are difficult to justify against the flexible demand of modern-day Policing and the needs of staff.

Variable Shifts

Variable duties have to be agreed by the Chief Officer and the Police Federation under a Variable Shift Agreement, in order to remain within Police Regulations.

VSA's have to be carefully written and designed to maximise flexibility. Staff, particularly Managers, must then be educated in what the agreement actually means. Duty rosters do not run themselves and flexible rosters require a great deal of management attention.

VSA's usually entail duties between 8 – 10 hours in length, often with the longer shifts in the evening and at the weekend, where more duty hours are needed.

Recommended by the Home Office in “Effective Shift Systems for the Police Service”, a typical VSA shift will run on a five-week cycle, based on the “OTTAWA” duty roster. As research indicates that seven consecutive nights have detrimental effects on staff, it is recommended that night shifts, like all the other shifts, are split into blocks of no more than four consecutive duties.

There are typically 20% of staff on each core shift, and 40% of staff on Rest Day at any given time. The increased Rest Days provide recovery time for night workers. There is little or no operational point in creating extra rest days for non-night working staff.

Although the duty roster at first may appear to reduce staffing as there are on 20% of staff on duty, in reality, used properly as many as 40% of staff could be available at times of peak demand. Often only as few as 10% varied staff are needed to make a marked difference in performance at times of peak demand. There are considerable cost and efficiency savings in using such rosters, not least because the troughs in demand have less staff on duty to the benefit of the peaks in demand later in the day.

These rosters are a trade-off. Extra rest days for night workers allow managers to expect reductions in absenteeism. Staff should be educated to expect to work more late and evening shifts as a consequence.

Twelve-Hour Shifts

Twelve-hour shifts often have massive organisational and individual negative consequences, especially for operational Policing and Police Drivers. These duties also require a VSA to operate within Police Regulations

12 Hour rosters usually average a 42-hour working week, meaning that they require a robust management system for controlling the "additional" rest days every six weeks. This can be problematic for managers, who are often used to staff "banking" such days to be taken at their convenience.

12-hour shifts on a 40-hour week give 191 rest days a year. Add this to an average yearly abstraction ratio involving 18 days annual leave (corrected for 12 hour days, rather than the 8 hours under Police Regulations), 8 days sickness, 12 days training and five days in court. This implies that a staff member would only be available for about 131 working days a year.

In reality, rigid 12-hour duty rosters only allow for 25% of staff on duty at any given time, 50% are on rest day every day.

The potential for overtime, especially at the end of each shift and, to a lesser extent on Rest Days also should give cause for concern. Police culture in the UK still tends to resolve staffing crises with overtime rather than varying duties. This means that staff could conceivably work extremely long hours at high remuneration rates, with the added difficulty of adding to fatigue and exhaustion.

On Health and Safety grounds, there is evidence that suggests staff become heavily fatigued working long night shifts⁶, especially when driving. The implications for singly crewed drivers are high; particularly when one considers the Police Complaints Authority report on Police crashes indicating that a larger proportion of such vehicle crashes occur during the nighttime shifts⁷.

Other research from the US indicates that fatigued Firearms staff may find difficulty in "friend or foe" situations. Evidence from the Walter Reid Army Institute of Research (USA), quoted in Vila (2002), indicates that in a sleep-deprived state soldiers can shoot, "...and shoot accurately, but no longer can distinguish friend from foe..."⁸ .. Vila asks how this knowledge

⁶ Waterhouse, J.M., *et al* (1992) "Shift work, Health and Safety: an overview of the scientific literature 1978 -1990" HSE Contract Research Report No.31/1992

⁷ Police Complaints Authority (2002) "Fatal Pursuit" Investigation of Road Traffic Incidents (RTI's) involving police vehicles, 1998-2001: Identifying common factors and the lessons to be learned". PCA, London.

⁸ Vila, B., (2000) "Tired Cops - The Importance of Managing Police Fatigue". Washington DC: Police Executive Research Forum

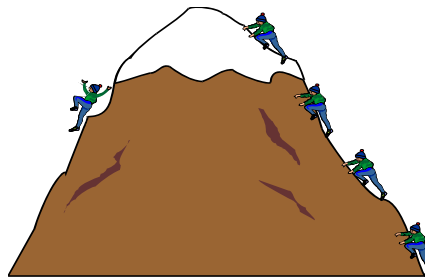
can be applied when we consider that Police Officers often face far more complex problems than soldiers.

In control room environments or roles other than operational Policing, 12-hour shifts may have a place. However, recent court cases have indicated the potential for long working hours to contribute to accidents on the commute home and Forces should take careful cognisance of the facts before introducing such patterns.

Working Seven Consecutive Night Shifts

For many years now, researchers into shift work have advocated the reduction in the number of consecutive night shifts for those on weekly rotation shifts.

For the purposes of this discussion, there are two relevant ways of working night shifts. One is to work seven consecutive duties and then take a period of time off to recover (often as few as two days). The other way is to work permanent night shifts, but this means that the worker has to live their days off as if they were night shifts also. Most night workers on permanent nights find that they become nocturnal in their time off as well as their working time - staying awake on their days off until the early hours.



Climbing the Night Work Mountain

Most research indicates that we should reduce the number of consecutive nights to a more manageable level, so as to prevent this circadian "phase-shift" (change from days to nights). Papers indicate that older workers (over 35) suffer less when they do this, especially in relation to fatigue. Therefore, it may be considered prudent on a rotating duty roster to avoid seven consecutive duties on Nights⁹.

Fatigue is a particularly insidious problem as it can often go unnoticed. As stated previously, Dr. Bryan Vila in "Tired Cops" (2000)¹⁰ speaks of the potential for staff handling firearms who can shoot "...and shoot accurately...", but who, due to fatigue, have "...difficulty in distinguishing friend from foe...". It would appear, therefore, especially important to manage this responsibly in as many ways as possible.

⁹ Folkard, S. (1999) *Transport: Rhythm & Blues; The 10th Westminster Lecture on Transport Safety* Parliamentary Advisory Council for Transport Safety, London

¹⁰ Vila, B., (2000) "Tired Cops - The Importance of Managing Police Fatigue". Washington DC: Police Executive Research Forum

It remains for managers to develop the duty roster itself. This may be based on large groups of staff or just one individual. Each roster must adhere to the legislation mentioned in section 6 of the toolkit - it is essential to ensure that it best meets demand as well.

It is important to note that duty rosters per se are not the only solution to the working time issue. With small groups of staff, it may be more appropriate to develop individual duty patterns, as below. Here, the *office* has a duty roster for **eight staff**, rather than a system where there are 2 "blocks" of four staff or four "blocks" of two staff. This way, any abstractions can be managed in advance, as duties can be changed. The numbers refer to the length of the shift; D means Days, L, Lates and N, Nights. R is a rest day.

Individual Duty Roster for Eight Staff (variable length shifts)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	D8	D8	D8	D8	D8	R	R
2	N8	N8	N8	R	R	D8	D8
3	L10	L10	R	R	D10	D8	D8
4	D10	R	R	N8	N8	N8	N8
5	R	R	L10	L10	L10	R	R
6	L10	L10	L10	L8	L8	R	R
7	D10	D10	D10	R	R	L8	L8
8	R	R	D10	D10	D10	R	R

An alternative is to group large numbers of staff together in groups or sections with a common goal. For example, many urban Response sections operate in this fashion.

A typical flexible roster is shown below:

Typical extended hour's roster with variations

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	N	N	N	N	R	R	R
2	A	A	A	R	R	D	D
3	D	D	R	R	N	N	N
4	R	R	R	A	A	A	A
5	R	R	D	D	D	R	R

D 07:00 - 10:00
 START
 A 12:00 - 18:00
 START
 N 18:00 - 23:00
 START

The variations in this roster are provided through a Variable Shift Agreement between the Police Federation and the Chief Constable under Regulation 26 of Police Regulations; without such an agreement, eight-hour shifts must apply. It should be noted that Police Staff do not operate

under the Variable Shift Arrangement except by local agreement. Many managers have the mistake of assuming that Police Staff can have their hours manipulated in a similar way to Police Officers.

Eight-Hour Shifts (Straight Eights)

Eight-hour duties over a 40-hour working week are notoriously difficult to fit within the Working Time Regulations. They are also largely inefficient because they tend to "butt-end" each other, meaning that staffing remains the same across the day, even though Police demand may increase by as much as 50% in the afternoon. The same inefficiencies apply to 12-hour shifts.

Below is an attempt to roster pure 8-hour duties, without breaching Regulation 11(1) of the Working Time Regulations. This regulation allows for one 24-hour period of rest in every seven days (in addition to the 11 hour period of rest between duties). You will note that there is only one weekend off in six - this may be problematic when attempting to show a work/life balance and may well lead to increased absenteeism.

A six-week eight-hour roster compliant with WTR 1998

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	8	8	8	8	8	8	R
2	R	8	8	8	8	8	8
3	R	R	8	8	8	8	8
4	8	R	R	8	8	8	8
5	8	8	R	R	8	8	8
6	8	8	8	R	R	R	R

There is a way to accommodate Regulation 11(1); in Regulation 11(2), which states that staff may be granted two periods of 24 hours or one period of 48 hours in any 14 days. However, it may be necessary to show why this was needed.

There is little evidence that Policing requires such a duty roster. In addition, there is the issue of the number of consecutive duties; research indicating that as the number of consecutive duties increases, so does the incidence of absenteeism¹¹. In fact, Bourgeois-Bourgrine states quite simply: "...absences increase with the number of worked days per cycle..."

¹¹ **Bourgeois-Bourgrine, S et al.** "Shift work schedules and absenteeism" Université René Descartes, Paris. (Paper presented at 15th International Symposium on Night and Shiftwork, Hayama, Japan 2001)

Standard eight-hour seven-day duty roster ("Continental")

	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1	r	8	8	8	8	8	8
2	8	r	r	8	8	8	8
3	8	8	8	r	R	8	8
4	8	8	8	8	8	r	r

This roster has some major failings not shared by modern roster design, such as

Seven consecutive days on duty (see previous notes)

A floating rest day (the cycle creates a working week of 42 hours, meaning that every four weeks the employer "owes" the employee time off).

Equal staffing across the day, regardless of demand.

High levels of fatigue and a tendency to create "short changes" (i.e. eight hours between duties from Lates to Days)

Duty rosters are dependent on staffing levels and robust abstraction management; without sufficient staff, there is no way a particular roster can work effectively. Although this may seem patently obvious, it is surprising how many employers labour under the belief that they can reduce staffing but keep a popular roster.

It is not the shift pattern that permits effective resource allocation, rather the number of working hours each employee can provide per day at a time that meets organisational demand. The skill remains in balancing that demand with staff needs, within the previously mentioned legal framework.

Documenting your decisions

Whatever your chosen pattern you need to clearly document the reasons for your decisions. This is firstly for your own reference and secondly so you can explain them to others. This information will feed into your Shift Review Report described in section 7.4 below.

Do I need to ballot staff?

The answer to this question is usually no. However, much may depend on the type of pattern you have chosen and whether staff are being asked to work outside of the Working Time Regulations (see toolkit section 6.1).

- A ballot **is** required if the shift system you have chosen requires staff to work outside of WTR's.
- This ballot should only ask staff which pattern they will work. Giving them a choice between the proposed shift pattern and an alternative WTR compliant pattern that fits along side your new pattern.
- You do not need staff to vote yes in the traditional sense of a ballot **provided** your consultation has been thorough and you

are confident that the staff needs voiced through your consultation are met by the new pattern.

You may however feel uncomfortable with this approach and want to offer staff a number of alternatives. Be very cautious in doing this through a ballot as you are setting up at least one portion of your staff to be disappointed when the pattern they have opted for is not implemented. In addition it demonstrates you are unsure what your staff really want. If this is the case, go back and review your staff consultation, why is it that you are not yet certain of their preferences? Would a survey, workshop or FAQ session help? In addition staff are generally resistant to change if you indicate that you are not sure about the change by asking them to decide this is likely to increase their resistance or more generally, pick a pattern that reflects a better life/work balance, than work/life balance. Change management is not easy but a clear lead based on thorough consultation is a good approach.

Balloting Systems

If you are implementing a pattern that requires staff to work outside of the WTR's and do need to ballot their decision to work that pattern consideration should be given to how this ballot is performed. It is important that the process is transparent and fair, accessible to all, and without influence. There should be no incentive offered to staff for voting in either direction by any party involved, any vote should not effect an individuals future path within force.

Consideration needs to be given in relation to who collates the votes and how they are collected (electronically or using a paper version). Make sure you communicate your arrangements to all staff and follow up with those who do not initially tell you which pattern they will be working.

Preparing your Shift Review Report

Before you can implement your new pattern you need to present a Shift Review Report to your chief officer team for approval of your chosen pattern and the review process undertaken in choosing that pattern. You cannot implement a shift system without this approval. Once obtained further approval may be required. The report must include the following:

- Details of your demand assessment, including revision of Step 2 (Under 4.3) calculating staff supply.
- Details of your consultation process, the outcomes and how you have taken into consideration these needs in choosing your shift system.
- A risk assessment of the shift system/s you are proposing.
- A copy of the proposed shift system/s.
- A description of your plans to evaluate the pattern/s including timescales and responsibilities.
- Signatures of the aforementioned stakeholders.

If the report carries favour then relevant staff associations must be consulted.

Planning for your evaluation

Before implementing your chosen pattern you also need to plan how you are going to tell if it is an improvement on the previous shift system. In order to be able to demonstrate any improvements you must have something to compare your new pattern to. The most obvious point of comparison is the pattern you have just reviewed. You will need to compare your old pattern and new pattern on the basis of meeting demand, meeting staff needs and management needs. To do this you need to collect data. The review process you have gone through so far should give you a start particularly in relation to collecting data on your old pattern. However you need to think about whether there is any other information that you need to ensure you have before implementing your pattern. Remember if it is not being collected now you will have to put a lot more effort in later to find it and in some cases this will be impossible. You may want to read the evaluation section (9) of this toolkit now.

- Use the space below to list any types of information you need to collect that you have not already done so through the review process:

Contingency Planning

At this stage you also need to make detailed plans in relation to what you will do if the pattern you have selected is failing to make the improvements you think it will. You may wish to treat your implementation of the new pattern as a pilot. To do this you will need to:

- Have clear procedures in place for evaluating the shift system.
- Set clear deadlines for when evaluation will take place.
- Set clear courses of action based on the possible evaluation outcomes of no change, improvement or detriment of the shift system in meeting demand, staff needs or management needs.
- Communicate your contingency plans clearly to all affected staff.
- Do not be afraid to action them if the need arises, demonstrate you do as you say you will.

Section 8-Implementation

IMPLEMENTATION

All you have to do in this phase is put into place your well laid plans, monitor progress and make adjustments as needed. There are a few general points you might want to keep in mind during this stage of the process:

How do I get the shift pattern approved?

If you have chosen a new shift pattern for a team, then a report including a copy of the pattern, working protocols (if applicable), risk assessments and signatures of the BCU Commander/Department Head, Local Federation representative or staff association representative and the JEC must be submitted to your Chief Officer Group for approval. You should allow sufficient time for this process before announcing your commencement date as a period of 28 days notice is required before any new roster can begin.

Individual shift patterns (e.g. part time, compressed hours, etc) can be agreed between the individual, line and HR Manager.

Any shift pattern should ideally be reviewed annually.

Monitoring Implementation

As it is difficult to see changes as they happen it is important that you monitor the implementation of the new pattern. Your first port of call must be those who are actually working the pattern. You may want to perform some interim consultation after two complete cycles of your new pattern with your shift working staff. This option will help you to track any changes and provide a more formal way of monitoring what is going on. Alternatively you could talk to as many relevant people as possible during team briefings, meetings or on their lunch breaks as a more informal way of monitoring progress.

Either way make sure this consultation is documented as will it will feed your evaluation information.

Section 9-Evaluation and Assessment of Benefits

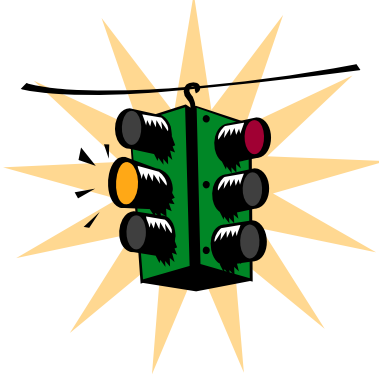
EVALUATION AND BENEFITS REALISATION

This is one of the most important parts of the process, which is also the most easily overlooked. In a virtuous cycle, it is either the first or last step. Having undertaken an evaluation you may determine that your existing pattern is the best fit, but equally it may highlight areas of improvement that as a last step, you are looking to confirm have been successful.

Essentially then, this phase will tell you how well your shift pattern is working and whether it is really meeting the needs of all of the groups you consulted. The reason it gets overlooked is that chances are due to all your hard work in the review phases the pattern seems to be working well and therefore there is no urgency to evaluate.

Your new pattern should be evaluated whether you think it is working well or not so you actually have evidence on which to base your decision to keep the new pattern or implement one of your contingency plans.

The evaluation criteria should include a method of assessing the benefits realised not only in performance terms but in cost terms. For example is the new shift system reducing the need for overtime?

	<p>Is the New Shift System an Overall Improvement when compared to your original shift system?</p>
<p>RED</p> <p>AMBER</p> <p>GREEN</p>	<p>NO, If the new shift system has not offered your BCU/Department overall improvement you need to answer the question why not? Go back to your contingency plans and choose the right course of action based on your current situation.</p> <p>There have been some improvements but in some areas the change has been detrimental. Consider what has caused the detriment in these areas. Go back and consider which of your contingency plans is the right option for your BCU/Department</p> <p>YES, first of all congratulations! There may still be areas in which improvements could be made; document these for the next review of shift systems conducted on your BCU/Department.</p>

Section 10-Frequently Asked Questions

EXAMPLE FREQUENTLY ASKED QUESTIONS

FAQs are an effective means of providing information and reassurance to staff. If you are using FAQ ensure that your answers for accuracy and confirm with staff associations.

Question	Answer
<i>What is the timetable for change?</i>	BCU/department specific but note comments in this document
<i>What is a variable shift?</i>	Variable Shift Arrangements (VSA's) are recognised by the Police Regulations 2003 and permit the average 40-hour week. Shift lengths may vary from the standard eight hours. (See section 6)
<i>What are the facts about moving to a variable shift pattern?</i>	Police Regulations still apply. Annual leave entitlement is converted to hours according to service bands. The half hour rule in respect of overtime still applies as per the 2003 Police Regulations. (See section 6)
<i>What are the benefits of a VSA for policing?</i>	If supply demand match is optimised, a better match of officer resource with policing demand and performance, increased visibility, officer safety and public reassurance. (See section 4)
<i>What are the benefits of a VSA to me?</i>	More days off in the rota period with consequent reduction in travelling time and costs and improved officer wellbeing and work/life balance.
<i>With variable shifts what breaks will officers get?</i>	Refreshment periods may be extended e.g. to one hour for a ten or twelve-hour shift. For an eight-hour shift the refreshment period will remain at 45 minutes. (See section 6)
<i>What is the effect of a variable shift pattern on my sickness record if I am unfit for duty?</i>	If you are ill or injured then any period of sickness is measured in days away from work. National policy allowing staff to self certify up to seven days sickness is unaffected.
<i>How are police staff affected?</i>	Police staff are contracted separately and their conditions are not governed by Police Regulations. A move to a variable shift system will need to be agreed separately.
<i>Police staff work a different length of week to uniformed officers,</i>	Any change will need to be agreed with police staff but we would encourage all parties to the agreement to be flexible and imaginative in

<i>how will this be resolved?</i>	arriving at a solution (see also section 6).
<i>How are part time staff affected?</i>	Their shifts are covered by Police Regulations; however, there are particular conditions that need to be taken into account in arriving at any new agreement. Flexibility must be considered in reconciling the requirements of the officer and those of the BCU/Department.
<i>How will training be delivered?</i>	As part of the development of a suitable shift pattern the needs of officers for training should be considered and adequate time should be programmed to allow this to be delivered.
<i>How many officers will work on the response teams?</i>	BCU/Department specific based on risk assessment and health & safety; should be included in the material provided as part of the communication exercise.
<i>What will happen to annual leave and rest days owed from previous years?</i>	All annual leave outstanding at the change of shift will be converted into hours (for VSA's) to be taken off in line with the new arrangements of the shift pattern. Rest days are slightly different. If you are moving completely away from an 8-hour shift pattern, all rest days should be rostered and taken before the new shift commences. If however your new shift pattern still incorporates 8-hour days, outstanding rest days can be rostered on to those days.
<i>If we move to fewer teams than we currently have which team(s) will disappear and how will they be selected?</i>	BCU/Department specific but good practice suggests that where this situation arises any decision will be based on a pragmatic and transparent appraisal of the impact. Minimum staffing levels and skill alignment however should still reflect good practice and be mindful of risk assessments and health & safety.
<i>Officers will not like a night duty finishing on a rest day will they?</i>	Some officers like a 'quick changeover' after night shift so as not to 'waste' a rest day. However, medical evidence shows quick changeovers to be detrimental to officers' long-term health – particularly those travelling long distances to and from work. (See section 6)
<i>Will not the night duty to rest day change risk increasing overtime costs?</i>	The increased risk is real, but evidence from other forces already running a VSA suggest it is a manageable one. However, there is a need for appropriate management supervision to be

	applied and robust overtime monitoring mechanisms to be put in place.
<i>From 0200 to 0500 does not the variable shift pattern leave us very light on resources?</i>	The benefit of a VSA is that it deploys more officers when they are needed; the flipside is that fewer officers are on at less busy times, and national analysis of average demand patterns across BCUs shows this to be the quietest period. Those BCUs already operating with reduced staff numbers report the risk to be an acceptable one.
<i>What is the downside of the VSR</i>	The VSR may have more shifts during evening hours
<i>In a vote how will the 'winner' be decided?</i>	Firstly, SMT's do not have to offer staff a vote on any new shift pattern. Staff must however be <i>consulted</i> and where a shift pattern proposes changes outside the Working Time Regulations, staff should be <i>balloted</i> . If however, you do choose to implement a voting system, the decision will be by a simple majority of those who choose to vote. Although we understand this to be the preferred option favoured by the Federation we have heard of different majorities being adopted, including a 75% acceptance level.
<i>What if I do not vote or my choice is not the 'winner'?</i>	<p>There is no requirement under the regulations for individuals to 'contract in' as the conditions are already permitted. However, each BCU/Department may need to consider with the individual appropriate steps if an objection to variable hours is pressed.</p> <p>Normally, there is a workforce agreement (usually in the form of a document that sets out the way a variable shift will operate) and a majority vote by the officers who will either work the pattern or be likely to work the pattern. This agreement does not require a 100% vote in order for it to be implemented. Theoretically a 51% majority vote is sufficient; however SMT and the JEC normally look for a much higher percentage to implement a change.</p> <p>A variable shift arrangement must be Police Regulation compliant and once agreed by the above interested parties officers can be required to work it.</p>

<i>Have the Federation agreed this change?</i>	As mentioned above, any shift may only be brought into operation in agreement with the Joint Branch Board via local Federation representatives
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Section 11-Checklists

CHECKLISTS

1. Checklist for initial considerations

Now you have done the initial preparation for your review in terms of the “Why” and some of the “How” you may want to use the checklist below as a record of your work so far:

Tick when complete	Date Completed	Activity	Key decisions taken and / or comments
<input type="checkbox"/>		Definition of why review is to be completed	
<input type="checkbox"/>		Project Management planning (and PID written)	
<input type="checkbox"/>		Key Stakeholders identified	
<input type="checkbox"/>		Key objectives defined	
<input type="checkbox"/>		Success Criteria defined	
<input type="checkbox"/>		Change Management Strategy written	
<input type="checkbox"/>		Communication Strategy written	
<input type="checkbox"/>		Intention to conduct a review communicated to all key-stakeholders	

1.1

1.2 2. Checklist for Assessing Demands

Tick when complete	Date Completed	Activity	Key decisions taken and / or comments
<input type="checkbox"/>		Consider each unit or team providing a business case for their inclusion or exclusion from the review	
<input type="checkbox"/>		Look at policing priorities	
<input type="checkbox"/>		Decide on a level of detail for your demand analysis.	
<input type="checkbox"/>		Calculate demand over time	
<input type="checkbox"/>		Calculate staff supply	
<input type="checkbox"/>		Plot demand and staff supply over time	
<input type="checkbox"/>		Quantify areas of mismatch	
<input type="checkbox"/>		Producing the Supply and Demand Score	
<input type="checkbox"/>		Analysis of the effects of shift handovers	
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			

3. Checklist for Assessing Management & Staff Needs

Tick when complete	Date Completed	Activity	Key decisions taken and / or comments
<input type="checkbox"/>		Collation of data relating to sickness and absence rates (by type).	
<input type="checkbox"/>		Collation of data in relation to Work Accident rates (by type).	
<input type="checkbox"/>		Collation of data in relation to Police Collision rates (POLCOLS).	
<input type="checkbox"/>		Collation of data in relation to Training Attendance rates.	
<input type="checkbox"/>		Collation of data in relation to Performance against crime rates.	
<input type="checkbox"/>		Collation of data in relation to Overtime budget (by type including prisoner and court appearances).	
<input type="checkbox"/>			
<input type="checkbox"/>			

4. Checklist for Consultation

Tick when complete	Date Completed	Activity	Key decisions taken and / or comments
<input type="checkbox"/>		Gained a clear understanding of the WTRs & how they effect your shift system	
<input type="checkbox"/>		Considered health and safety good practice in relation to the design of your pattern	
<input type="checkbox"/>		Consulted with staff	
<input type="checkbox"/>		Consulted with other key-stakeholders	
<input type="checkbox"/>		All consultation has been clearly documented	

5. Checklist for the preparation phase

Tick when complete	Date Completed	Activity	Key decisions taken and / or comments
<input type="checkbox"/>		Decision taken to change shift system or not	
<input type="checkbox"/>		A suitable pattern has been chosen	
<input type="checkbox"/>		Reasons for shift choice have been documented	
<input type="checkbox"/>		Staff ballot carried out if WTR are not met by pattern	
<input type="checkbox"/>		Shift Review Report Written	
<input type="checkbox"/>		Shift Review Report Ratified by JEC Secretary, Civil Staff Union Representatives and ACTP	
<input type="checkbox"/>		Planning for evaluation complete	
<input type="checkbox"/>		Contingency plans in place and communicated to staff	
<input type="checkbox"/>		Live date chosen and communicated to staff	
<input type="checkbox"/>			
<input type="checkbox"/>			

6. Checklist for Implementation

Tick when complete	Date Completed	Activity	Key decisions taken and / or comments
<input type="checkbox"/>		Interim consultation with relevant groups	
<input type="checkbox"/>			
<input type="checkbox"/>			
<input type="checkbox"/>			