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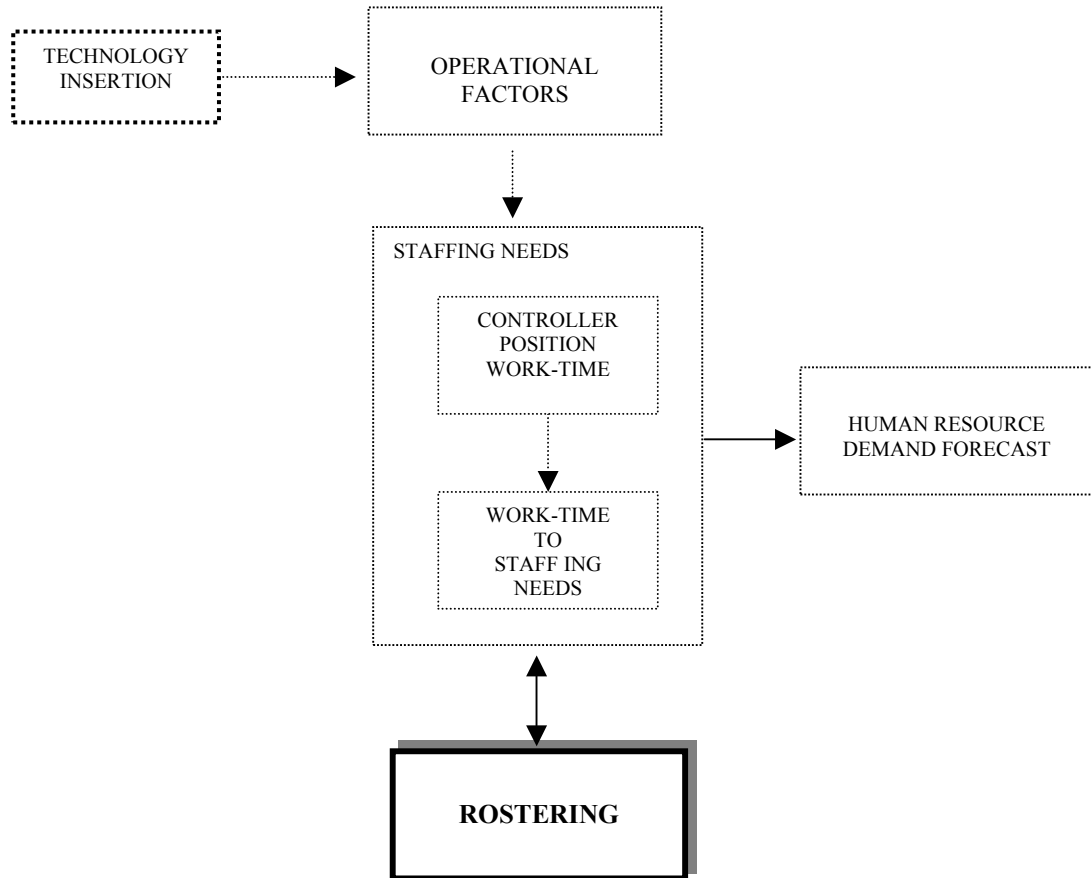
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# CHAPTER 3

## ROSTERING

### 1. THE ART OF ROSTERING



**Figure 3.1 Staff Rostering**

#### 1.1 The Shift Roster Process

*Rostering is the allocation of human resources in order to ensure service for the scheduled working hours in accordance with local procedures and policies.*

1.1.1 Figure 3.1 identifies where the rostering process is in the overall human resource planning process. Rostering is the final stage of the planning process and it is an integral part of the operational environment.

1.1.2 The list or plan generically identified as a ‘roster’ shows duties, days off and leave for staff. Typically the supervisory staff prepares the roster. However in some organizations another staff member or members maybe assigned this duty. In this case they would prepare the roster only after detailed consultation with supervisors. Rosters are the most obvious manifestation of tactical human resource planning.

1.1.3 In response to changing operational requirements, roster managers (roster planners and/or supervisors) can within reasonable limits, adjusts the roster. For example, by deleting one hour off an afternoon shift, increasing staff on a night duty, adding an extra position, adjusting break times. The ability to cope with rostering changes is an important asset for roster planners and/or supervisors to successfully cope with their task.

## 1.2 Elements of Rostering

1.2.1 One of the major decisions roster planners or supervisors, need to make is whether to apply individual or team rostering. These are the two primary methods of rostering. The sequence of consecutive shifts and off-time can be assigned to a particular individual (i.e. individual rostering), or group of individuals (i.e. team rostering). There is also the possibility of a third approach, which combines both elements. This hybrid may include staggered start and end times of duties, or by allowing individuals within a team to accumulate time during a busy season that is taken as additional leave during a low traffic season particularly in the case of air traffic control.

*The hybrid approach to rostering is essentially a team approach in which shift start and end times are staggered.*

1.2.2 There is less need for a systematic shift cycle to be followed for individual rostering, which in turn permits more flexibility. This leads to the perception that individual rostering is more efficient and thus cost-effective. The local environment will help determine the type of rostering that can practically be utilized. For example, in many organizations, transportation to and from the operational centre plays an important role in the planning of rosters. Handover briefings must also be taken into consideration when planning the shift start times.

1.2.3 Individual rosters, by their nature, allow planners to respond to the personal preferences of staff. However, this could quickly turn into a disadvantage for the roster planners if changes are too frequent.

1.2.4 The hybrid approach to rostering allows flexibility in coping with changes in start and end times of duties. Moreover, by introducing staggered start and end times the less desirable features in team rosters can be reduced. Working according to individual rostering exposes the whole human resource planning system to “swap effects”, for example, one person who changes his/her working schedule may affect a large number of staff i.e. the “domino effect”. Experienced roster planners know that this can easily turn into a major task to accommodate all, or even part of, individual preferences.

1.2.5 Team rosters foster a team spirit that contributes to the motivation level of each team member. This team spirit can be extremely important. Accepting assistance from a colleague that you know you can rely on is not a sign of weakness, but a normal reaction, especially in air traffic control environment. The team rosters enable better knowledge of colleagues both during and after work. Team rosters can normally improve communication between staff members and this can have a direct positive impact on safety.

1.2.6 In cases where there is little air traffic and limited support facilities, it might not be suitable to attempt to create strict team rostering. In this case, roster planners should consider the hybrid or even individual approach to rostering. Again, local conditions may dictate the shift timing.

1.2.7 In order to foster the acceptance of a roster, at a tactical level, an approach of give-and-take is recommended. If, for example, the roster planners need to maintain the flexibility to ask a staff member to cover an extra shift for another staff member who called in sick, they should be in the position to offer something in return. For example, giving a day-off when duties are light. A give-and-take approach basically comes down to creating an atmosphere, or an organizational culture of co-operation where one party understands the operational culture and/or social needs of the other party and is willing to attempt to meet them.

1.2.8 It is not unusual to find a lower sickness rate among staff working under team rosters, than those under individual schemes due to team personal relationships. In general, it seems that the sense of responsibility and caring for one's own team members can occasionally help to reduce the number of sick days. However, a workload can increase sickness whether under individual or team rostering .

### 1.3 On-the-job training issues

1.3.1 On-the-Job Training (OJT) is an important factor for the future of an ATS organization and essential to a trainee's success in becoming a qualified air traffic controller. The ability of the trainee to work with colleagues is a factor that is deeply related to the whole philosophy of OJT. However, there is a point of view that continuity of training is more important than team integration and therefore it is preferable that the student should start working with one OJT instructor (OJTI). It is also important that trainees performance be evaluated by several colleagues to ensure that he/she can relate to a team performance.

### 1.4 Rostering Parameters

1.4.1 Before preparing a roster, a number of qualitative and quantitative questions should be answered, including:

- What is the official duration of the working week (e.g. 40 hours/week)?
- What is the working cycle pattern or shift ratio (e.g. 4 days work, 2 days off)?
- What are the specific start and end times of shifts, including earliest and latest starts and ends?
- What is the minimum number of staff needed to cover the operational requirement on a daily basis?
- What are the seasonal factors?

- What is the maximum number of consecutive days that a staff member can work?
- What is the maximum and minimum length for each morning, day, night shift? Are variable shifts permitted to allow for varying traffic levels?
- What is the maximum length of time that an air traffic controller can work each position?
- What is the duration of breaks away from the operational position?
- What is the minimum break time within shifts?
- What is the minimum recuperation time between shifts?
- What is the minimum number of leave days per week (or, per year or per month)?
- Is there a limitation to the number of night duties in a year?
- Are there any restrictions on unusual start and end times of shifts?
- What is the average time duration for handovers and briefings?
- Are there any associated duties to be considered?
- In the case of air traffic controllers, is there a need to undertake medical examinations?
- What are the on-the-job training requirements?
- Are there requirements for refresher training?
- Are there any special arrangements for contingency planning?
- Is there a stand-by procedure in use?
- What new technologies are being introduced and, if so, when will they be introduced?

1.4.2 The answer to many of the above questions are required for the completion of *Worksheet 2 (ATS Staffing Operational Input Data)* in Chapter 2.

## 1.5 Associated Duties

1.5.1 In many cases, staff are not only required to perform their core duties but from time to time they may also be required to carry out other duties closely related to their primary duties. For example, the core duty of an air traffic controller is to actively work in an operational position such as a radar controller, data processor controller or assistant controller. This duty includes time allocated to breaks, training new controllers or to receive training. Controllers may also have other associated duties such as to participate in a project to evaluate a new operational display system or managerial duties.

1.5.2 Additional associated duties for the air traffic controller, such as drafting letters of agreement with adjacent centres, working on procedures or systems development are less apparent to roster planners than staffing for OJT. The lack of staff for duties such as, OJT, air space structuring, incident investigation and many other duties has an impact on human resource planning and the availability of staff for operational duties.

1.5.3 Roster planners should determine what kind of staff is required to complete core and associated duties. Air traffic controllers may also be required to carry out duties, which are not directly associated with their operational functions. A legitimate question to be asked is to what extent do associated duties need to be carried out by licensed air traffic controllers or by other qualified personnel?

## 1.6 Training needs and rostering

1.6.1 Generally staff is required to undertake regular refresher training on present and new equipment, emergency procedures or administration procedures. Planners should calculate the training requirements, both for the staff required to undergo training and staff needed to conduct training. This should include both training conducted in the operational environment (on-the-job-training) and formal training conducted away from the operational and technical facilities.

1.6.2 While on-the-job-training (OJT) itself, in theory, is not supposed to affect operational requirements; in reality it impacts operations. In many instances, particularly in the early OJT stages, the capacity of the student will be less than the capacity of the fully qualified staff. In the case of air traffic control, it is possible, that a sector may be opened earlier than usual in order to enable OJT in this sector under low traffic conditions. Roster planners should consider this in their plans.

1.6.3 Training technology is continuously progressing. For example web based training (WBT) and simulator training. Some of these training technologies have improved the quality of training and can reduce the amount of on-the-job training required to fully qualify staff. This fact is important for roster planners. Conversely, the new training technologies may also require additional operationally qualified staff to operate and maintain the technologies.

*A "balanced roster" contains a good distribution of age and experience staff.*

1.6.4 In principle, all available, sufficiently experienced, qualified and competent staff should be capable of assisting in the conduct of OJT. These personnel will need to have relevant experience and, should receive training in the conduct of OJT. Experienced roster planners should take into consideration that in a balanced roster, not all experienced staff are eligible to act as an OJT instructor. Lack of training or communication skills may also explain why not all staff members are suitable to conduct OJT.

1.6.5 Among the duties outside the operations environment, training could be considered the highest priority. There will be no future generation of qualified personnel without having fully qualified staff spending a substantial number of hours as OJT instructors. OJT is typically conducted within the operational working environment. However, training can take in a classroom, simulators and/or through computer-based training (CBT) exercises.

1.6.6 It is preferable that roster planners identify the percentage of the operational duty work to be performed out of the total working time (for example, 80% will consist of operational duties and 20% of other duties such as training).

## 1.7 Contingency Planning and Safety Margins

1.7.1 In addition to regular planning, a staffing contingency plan should be developed, taking into account possible systems failures and non-standard operations such as aircraft alerts and emergencies.

1.7.2 In the case of air traffic control, even if an assistant position is not required at certain times in a shift, the roster planners may want to keep this position staffed. Once a sector has been opened, it is kept open for a certain time period. Fluctuations of traffic during the opening time do

not necessarily influence the number of air traffic controllers needed in this sector, but will lead to a varied workload. If significant seasonal fluctuations are identified, average opening periods may be shorter, but will not necessarily lead to a reduced number of staff required due to contingency measures.

1.7.3 Contingency planning may also refer to the provision of a safe air traffic environment. Safety margins are not only quantitative, but also involve some qualitative considerations. For example, when air traffic controllers are exposed to a heavy traffic load during a night shift, some additional relief may be necessary in order to increase the safety margins.

1.7.4 The practice of having personnel on a “standby” basis at another working facility or at their residence is not uncommon. This is often necessary to cover for such contingencies as unexpected increase in operational requirements and the absenteeism of a staff member. Should the standby procedure be an acceptable approach to an organization, roster planners will need to address this into their roster design, taking the staff conditions of service into consideration. This approach may be very beneficial during an introduction of new technology that would involve a major training requirement.

1.7.5 Rostering for air traffic controllers depends greatly on their ratings and endorsements. The ratings and endorsements provide indications as to what ATC positions can be staffed by which personnel. This also applies to technical certification (or equivalent form of task qualification) of maintenance staff. It is therefore important that roster planners, in aiming for an efficient roster, take into consideration which personnel have the appropriate qualifications to undertake the required duties.

1.7.6 In some States, particularly in large facilities, it may be practical or prudent to have limited endorsements, for example a State may issue endorsements only to one sector. In other cases, the endorsement procedure could be a qualification first on lower traffic sectors and only after a longer period of gaining experience to obtain a qualification on higher traffic sectors.

## 1.8 Technological Impacts on Rostering

1.8.1 Implementation of emerging technologies such as, global navigation satellite system (GNSS), aeronautical mobile-satellite service (AMSS) and automatic dependent surveillance (ADS) has some contradictory impacts on human resource planning. On the one hand, this technology enables controllers to have more accurate information on aircraft positions and it may even reduce the dependency on radio communication reports. On the other hand, it enables air traffic controllers to handle more traffic by allowing more aircraft into the same airspace by reducing separation. It still remains to be seen how these different influences will affect human resource planning. Past experience has shown that some major new technologies introduced over the last three decades did not reduce the number of staff required.

1.8.2 The number of staff required to support the introduction of new technologies are likely to increase the human resource needs during the transition period from old to new technologies. The two systems will need to run in parallel for a proving period to ensure that the new system work as planned and that all the operational staff are fully conversant with all new procedures. The roster planner must be fully aware of plans to introduce new technologies and be conversant with the training requirements to support them.

## 1.9 Minimizing Losses

1.9.1 Air traffic services and airports operate in a dynamic environment. The actual number of staff needed in a roster is invariably higher than the minimum that was calculated (refer to *Worksheet 2 and 3*, Chapter 2). This is due to losses that are a result of overlaps and redundancies and which cannot be recuperated. Losses occur due to a combination of practical habits, agreed working conditions and labour regulations that vary between States.

## 1.10 Breaks during operational duty time

1.10.1 In many States controllers are allowed to take approximately 20 percent of their duty time at a break (for example, one-hour for a meal and two breaks of 20 minutes each out of an 8-hour working day). Depending on local policy, personnel may be limited to a specific time-period in front of a visual display unit (VDU), or radar screen under normal conditions,

1.10.2 Local working conditions dictate rest periods and their duration, however, it is the responsibility of the supervisor to determine actual timing of these periods, which is dependent on traffic (volume and type) and available staff.

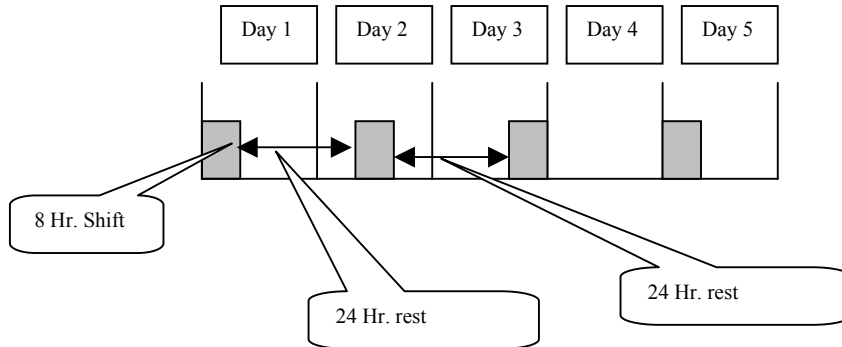
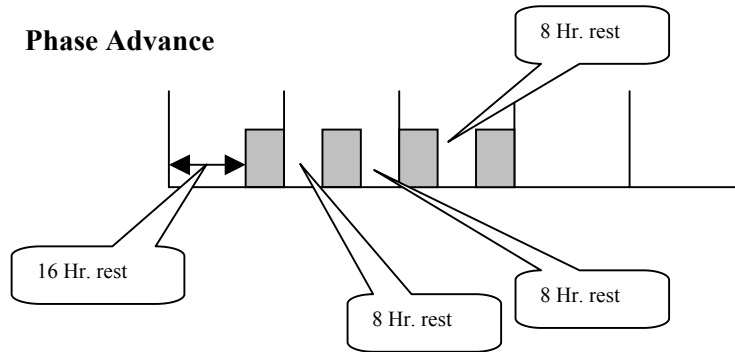
## 1.11 Regulated rest periods

1.11.1 Local regulations usually define duration of duties, including standby duty (if applicable), and rest periods/days. The purpose of limiting periods of operational duty and providing relief or recuperation time is to avoid acute fatigue effects, stress, health problems such as circadian rhythm disruption, other chronic effects of night work, or incidences of sleep difficulty.

## 1.12 Shift Rotations

1.12.1 It is necessary that roster planners consider the issues of work/rest schedules, sleep loss, sleep disruption, and fatigue all of which can affect personnel performance. There are many variations of roster schedules. Although the personnel assigned to a roster schedule should rest for a minimum specified period between shifts, the type of rotation between shifts and its impact on circadian rhythms and sleep patterns can potentially impact negatively on performance.

1.12.2 At issue, is whether there are ways to reduce the negative effects of shift working. If shifts are to be rotated, two issues arise. How often should such rotations occur and, if they occur frequently, whether they should be phase advanced or phase delayed. This decision is invariably based upon local organizational requirements, local culture and collaboration with the controllers.

**(a) Phase Delay****(b) Phase Advance**

**Figure 3.2 Examples of phased delay and phase advanced schedules.**

1.12.3 Figure 3.2 shows a simple diagram illustrating the two major types of shift rotation phasing, as follows:

**a) Phase Delay**

Figure 3.2 (a) indicates the “phase delay” approach. There is 24-hour gap between the ending of one shift and the commencing of the next shift. This creates a daily delay for the shift period (i.e., day 1 0001hrs-0800hrs, day 2 0800hrs-1600hrs, day 3 1600hrs-2359hrs)

**b) Phase Advance**

Figure 3.2 (b) indicates the “phase advance” approach. On Day 1 the shift period is 1600hrs-2359hrs, day 2 0800hrs-1600hrs, day 3 0001hrs-0800hrs and 1600hrs-2359hrs. This system provides an 8-hour break between shifts on day 2 and 3 and a 16 hour break on day 1.

1.12.4 Studies support rotating shift patterns rather than working several consecutive nights, but shift patterns should move in the direction of a longer biological day (*phase delay*), in other words, to later shifts rather than earlier ones (phase advance).<sup>1</sup>

### 1.13 Social Plans

1.13.1 All staff normally prefer to have a high degree of long-term predictability in the roster in order to plan their time after working hours. For example, they may wish time to enjoy holidays together with their children who may happen to have school breaks during peak traffic periods. Rosters, therefore, should be published well in advance to enable staff to make their personal plans. By the nature of their job and due to the necessity of working unusual hours, shift workers suffer from disruption in their social lives. Overly complicated schedules can make it difficult to plan ahead and enjoy any form of social life. In addition, changing teams will also break up the shift cycle. The team rostering system allows a staff member to predict working hours for example, during important holidays, typically, in advance.

### 1.14 Staff Dialogue

1.14.1 Roster planners would be well advised to discuss proposed major changes to rosters and working practices with the relevant staff. Enhancement of staff communications and measures to maintain and/or improve morale are crucial to an organization's performance. In general, it is recommended to jointly determine long-lasting working practices with the shift workers themselves, since they could be found to be the real subject matter experts on this issue. Discussion and consultation with staff is necessary, but at the end of the day roster planners are required to take decisions and occasionally unpopular ones.

### 1.15 Use of Overtime

1.15.1 The use of overtime should be limited as an exception to very special cases. There is a real risk in using overtime on an ongoing basis as permanent and integral part of rostering. The safety affects, which are associated with such a practice, are not yet fully understood. However, an important issue is that staff working excessive number of shifts without any days off and the continuous use of overtime, become tired and fatigued and therefore their judgment can be impaired and the safety and efficiency of the ATC service can be put at risk.<sup>2</sup>

1.15.2 Apart from the possible safety risks, a procedure of a long-term planning, based on regular use of overtime is an undesirable management practice. This in turn may create a new challenge in organizations where overtime has become inherent in the organizational reward culture. However, it is recognized that in the day-to-day practice in many organizations, the use of overtime is sometimes inevitable.

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<sup>1</sup> + Human Factors Guidelines for Safety Audit Manual Doc 9806, Chapter 7, Human Factors in Air Traffic Service Shift work (7.4.15)

<sup>2</sup> Human Factors Training Manual Doc 9683, Chapter 5, Fatigue (pages 1-5-19/20) Human Factors issues in air traffic control

## 2 Electronic scheduling for ATC

### 2.1 Automated scheduling software for ATC

2.1.2 Rostering for air traffic control services is further complicated by the fact that the opening and closing times of sectors may vary from day to day. The flow of traffic is usually not steady or continuous. There are peak and low traffic periods within each sector, which can vary widely at different times. Air traffic control roster planning is a highly complex task of accommodating all constraints, regulations, parameters and preferences. In practice, it has been found that some area control centres (ACCs) that use individual rostering experience thousands of *ad hoc* requests for duty changes per year by staff. These requests require an enormous effort to manually calculate the affects and then manually re-optimize the roster.

2.1.2 Sophisticated automated scheduling tools can assist in optimizing the coverage of all duties and absences within the statutory number of working hours. Scheduling software usually aims at proposing a correspondence between the staffing requirements and the number of staff scheduled for operational and other associated duties.

### 2.2 Advantages of Automated Scheduling Tools

2.2.1 Some of the currently available shift scheduling tools are able to calculate the optimum and/or minimum number of shifts needed each day by analyzing fluctuations in the supply of staff. These tools will accommodate different shift cycles (for example, 3 days on, 2 days off) as well as different operational requirements (for example, opening and closing hours). The tools take into account, programmed criteria for balancing shifts with regard to skill mix and the need for OJT instructors.

2.2.2 Generally, scheduling software can efficiently reduce planning time, calculate the specific minimum legal rest time, and give warnings concerning insufficient numbers of staff or indicate the impact of granting annual leave.

### 2.3 Limitations of Automated Scheduling Tools

2.3.1 Scheduling software is a tool to assist an expert planner. Such tools should not be the sole or the final means of planning. Ideally, this kind of software should allow shift data to be easily retrieved and modified. Roster planners should be able to input special constraints based on their own qualitative judgement, even if it is not the most beneficial shift cycle or the most efficient one. An informed roster planner should establish the final work schedule.

2.3.2 While scheduling software may have many advantages, roster planners will have a wider scope of qualitative considerations to implement, or not, what the software recommends. Planners should be able to override software warnings, to lengthen or shorten shifts under extraordinary circumstances and after the staff concerned have been consulted, to move schedules backward or forward and to review specific shift preferences if they consider these necessary. Human judgement should always take precedence.

2.3.3 Scheduling software has limitations. For example, expert roster planners are able to judge when:

- a permanent application of “minimum legal rest” starts to affect stress;

- a specific shift pattern affects fatigue;
- some level of staff overlap helps to reduce stress;
- a shortage of staff starts to increase stress; and
- breaking up a specific team affects motivation.

2.3.4 In addition, only roster planners are able to:

- detect specific histories of sleep disorders among staff;
- recognize late-night or early morning type individuals and their preferred schedules; and
- identify periods when specific members of their staff do not like to take leave, or wish to come late or go early for personal reasons.

2.3.5 Humans generally respond better than machines to the needs of other humans and for this reason should be the final decision-makers in any roster. Using the best software and the best planning practices will not guarantee an absolutely cost-effective roster. Staff can be healthier than expected in any average sick leave calculations, traffic can be lower than originally planned, and a sector can be closed earlier than foreseen. Therefore, it is almost unavoidable that during some hours in any particular day, more staff will be present on duty than necessary

## 2.4 Availability of Scheduling Tools

2.4.1 There are many commercial organizations that provide customized software tools to meet organizations' needs for scheduling of personnel. Larger organizations with more complex needs typically require more complex software. However, there are some commercial establishments that have developed a more simplified approach to shift scheduling utilizing of-the-shelf software application programmes such as Microsoft Excel. The cost of these programmes is very reasonable and they usually have considerable flexibility in their design. The use of this type of spreadsheet programme is a common practice.

## 3. SHORT TO MEDIUM TERM PLANNING CONSIDERATIONS

### 3.1 *Ad hoc* (Short-term) Adjustments

3.1.1 It is likely that after preparing a roster, the traffic volume or other conditions will change. The following are some possible short-term means to cope with a staff shortage:

- postpone refresher training courses;
- reassign staff from other areas;
- increase supervisors' time handling air traffic;
- restrict annual leave schedules;
- cancel participation in associated duties outside the operations room; and
- increase use of overtime.

3.1.2 If the short-term adjustments do not resolve the staffing problem, it may require operations management and human resource planners to review the operational constraints based on traffic volume and complexity and thus produce revised operational requirements.

3.1.3 A strategy commonly used by roster planners to meet operational needs is to move staff between sectors. An ACC may have several sectors, each having its own specific environment and peculiarities, each requiring a specific endorsement. If there are “spare” controllers in one sector they could be re-trained to work in another sector. However, this can be considered only as a medium-term measure, since re-training in each sector can be time consuming.

## 3.2 Medium-term Roster Planning

3.2.1 Part of the day-to-day tasks of roster planners is to monitor changes and predict trends. In medium-term planning, some of the activities roster planners are expected to carry out along with senior ATS staff, include re-evaluating future operational requirements that may result in a need to lengthen sector open durations, or even a need to create a new sector. Operational changes such as these may require a reassessment of the number of *ab initio* trainees that will be need to be recruited and trained.

3.2.2 In the medium-term, roster planners can propose:

- revalidating air traffic controller’s ratings who are serving in administrative or non-operational positions;
- optimizing the distribution of future personnel within the ATC organization; and

3.2.3 The following are warning signals that may require a planner to make adjustments to a roster:

a) Leave Carry-overs

Accumulations of remaining annual leave days or the necessity to carry over leave days for service reasons into following years could indicate an emerging human resource need. Therefore, leave carry-overs should be monitored closely.

b) Refresher Training Delays

Depending on the importance of the planned subject for refresher training, it would typically be carried out every one to two years. A delay in planned refresher training days may be the first indication of an emerging shortage.

c) Change in breaks

Supervisors should have the authority to change breaks to accommodate for variations in operational requirements. In the case of air traffic control, if the number of available controllers is greater than the minimum number of controllers required, the supervisor might consider granting longer breaks than previously foreseen. Experienced roster planners should monitor events of this kind as it could be an indication of an emerging surplus of air traffic controllers. Staff under-utilization is, in principle, not only costly but could also indicate an immediate human resource-planning error.

d) Overtime

Another warning signal is a sudden change in the pattern in the utilizing of overtime. Roster planners should keep track of overtime and check the reasons for unusual changes from the norm.

## 4. QUALITATIVE CONSIDERATIONS

### 4.1 The Qualitative Challenge

4.1.1 Most roster planners regard human resource planning as being primarily a quantitative challenge. However, quality related factors should be considered at a ratio of 60:40 to quantitative effects. For example:

- a decreased level of vigilance and decisiveness of operational staff during the last hour of a shift compared to the first one;
- prolonged duration of breaks (for example, longer breaks during a night shift are needed compared to day shifts); and
- when necessary, longer shift overlapping,

4.1.2 Some additional quality related subjects might include measures to avoid stress and boredom<sup>3</sup>. The incidence of stress-related issues among air traffic controllers compared with more general population varies in different contexts and may not be the same in all States. It has long been contended that air traffic controllers endure excessive stress because of their occupation. This has traditionally been attributed to aspects of ATC jobs such as high task demands, time pressures or responsibilities, or inadequate equipment. Two other factors may contribute to stress. One is shift work, which can disrupt sleep patterns and affect domestic and social relationships. The other is modern lifestyle which seems to induce stress-related symptoms in some individuals regardless of their job. Controllers with stress-related symptoms may have to be removed from active duties. This can be costly, but essential since the safety and efficiency of ATC must not be put at risk and problems of stress can be difficult to solve.

4.1.3 Compared with stress, there has been much less research in ATC on the subject of boredom<sup>4</sup>. Boredom may occur when there is little activity. However, boredom may occur when there is substantial activity but it has become routine, requiring little effort and devoid of challenge and interest. The remedy to this is to maintain direct and active involvement in the control loop. Boredom tends to increase as skill and experience increase: the remedy is to design tasks with a hierarchy of required skills, since opportunities to exercise high-level skills can help prevent boredom.

### 4.2 Quantitative and qualitative relationship

4.2.1 On a case-by-case basis human resource planners need to estimate and judge whether certain principally achievable quantitative gains or benefits are sufficiently balanced by qualitative gains or benefits. Planners need to carefully consider whether quantitative benefits can be achieved without impairing safety, staff morale or any other requirements.

<sup>3</sup> Human factors Training Manual Doc 9683, Chapter 5, Human Factors issues in ATC, 5.5.5 – 5.5.9

<sup>4</sup> Human factors Training Manual Doc 9683, Chapter 5, Human Factors issues in ATC, 5.5.10 – 5.5.13

## **5. Main Principles of Rostering in the ANS Organization**

### 5.1 Main Principles

5.1.1 The following summarizes some main human resource planning principles as related to “rostering” outlined in this chapter.

a) Rostering is the process of allocating human resources in order to ensure service for the scheduled working hours.

b) The task of human resource planners in ANS provider organizations is to fulfill the needs of operational requirements with suitably trained and qualified experienced staff.

5.1.2 After a roster is published, roster planners are not usually in favour of erratic changes to the rosters for understandable reasons. However, roster planners should recognize that staff will have personal needs that may require changes to the roster. Since one single change can create a number of other changes, roster planners will need to create solutions that will cause minimum further effects.

### 5.2 The Human Resource Planners

5.2.1 Human resource planners need to possess some informal or “tacit knowledge” of the discipline for which they are responsible for planning. For example, in air traffic control an understanding of the ability of individual controllers to handle different volumes of traffic.

5.2.2 This knowledge is also invaluable when planning for teamwork. Understanding the suitability of individuals to work and blend their skills with others in a group to provide mutual support and assistance when needed is essential. For the stability of a team, each individual must perform in a predictable way. Each individual should tacitly understand what teammates know and what he or she will do under the circumstances.

5.2.3 Data from operations indicates when a sector should be opened and closed and what the expected throughput is. Afterwards, it is up to roster planners to identify the staff that will work and at what time. Roster planners should always prepare contingency plans as staffing is normally based on average traffic levels and not peak levels.

5.2.4 In the case of air traffic control, planners could aim to make the most efficient use of staff time by providing controllers with “the minimum legal rest”. However, in reality, this is not desirable and not always achievable. There is a dangerous limit to the extent to which controller rest periods can be reduced but there will always be situations where longer than the “legal rest period” will be given.

5.2.5 An efficient software tool will propose a schedule where the minimum possible breaks are granted and losses are reduced to a certain minimum. However, roster planners should be attentive enough not to immediately accept any proposed ideal automated schedule without bringing more qualitative considerations in order to derive at a balanced roster. The planners should always use their experience in making judgments. Additionally, they should coordinate their plans across all organizational levels involved and should consult and involve staff in the

case of changes in shift cycles, time management or work allocation principles and seek a common understanding and support.

5.2.6 Examples concerning air traffic control rosters are used throughout this chapter. The concepts covered are also appropriate for other civil aviation jobs that are required to work on a shift basis. However, rosters for air traffic control is somewhat more complex due to the dynamic nature of the air traffic service.