REPORT OF COST ASSESSMENT TASK FORCE

EXECUTIVE SUMMARY

The Cost Assessment Task Force (CATF) was established by Eurocontrol in January 2001 to develop harmonised military cost assessment procedures/guidelines based on current best practices by individual states. These guidelines are intended to help provide a common understanding of cost assessment for those tasked with appraising the consequences of introducing into military ATM systems the changes required by European Air Traffic Management Programme (EATMP) proposals.

These guidelines complement existing Eurocontrol guidelines relating mainly to the civil sector (referred to in this document as the "EATMP guidelines"). The CATF reviewed the EATMP guidelines and concluded that they were generally a good and sound basis from which to assess impacts on the military. It was therefore decided that this report would take the form of an "attachment" to the EATMP guidelines, focussing on the military. It takes as its starting point the same cost and cost saving/benefit framework used in the EATMP guidelines. It is therefore best used alongside those guidelines.

The CATF reviewed military cost assessment mechanisms/working steps (chapter 2) currently used by individual states and found these to correspond broadly to those set out in the EATMP guidelines. The CATF recommended, however, that some additional emphasis be given to evaluation & feedback (transfer of lessons learned from studies into the impact of previous programmes) and analysis of risks affecting costs and benefits.

The EATMP guidelines categorise costs (chapter 3) into three broad groupings: investment, transition and operation costs. Approaches used in individual countries in their own military cost assessments can be adapted fairly easily into this framework. This report provides a more detailed breakdown of these categories. The CATF recommends that, since appraisals are currently carried out by states for budgetary as well as value for money reasons, guidance should incorporate the distinction between financial and economic appraisals (provided at annex 3).

The EATMP guidelines categorise cost savings and benefits (chapter 4) into: cost savings (whether accruing to the service provider or aircraft operator); capacity and reduced delay benefits; reliability benefits and other, mainly qualitative, benefits such as safety and the environment. To assess the relevance of this framework to the military, a survey of current Air Traffic Service/Control (ATS/C) provision was undertaken. This showed that, in contrast to the civil sector, ATC charges are in general not levied directly on military air operators. Any costs or cost savings to service providers resulting from EATMP programmes will not therefore generally be passed on to military air operators, at least directly.

Cost savings for new equipment and airline systems for the military can generally be assessed on the same basis as for the civil sector, as set out in the EATMP guidelines. However, this will often require detailed quantitative data on aircraft, equipment and systems (in addition to individual cost estimates) and it is therefore recommended that this data should begin to be collected early in the appraisal process. It was also established that flying hour cost data were generally available at a national level, suggesting that cost savings relating to reduced fuel consumption and flying time can be readily estimated for the military. If such data are not readily available, it is recommended that steps are taken to prepare it, preferably on a disaggregated basis to permit like-for-like comparison across countries.

Increased distance of military airspace from military bases was identified as a factor which could have significant impact on military costs and effectiveness. Re-routing (further away from optimal routes) could also have detrimental impacts on mission effectiveness (see below) as well as increasing direct costs. The CATF also identified additional costs to the military resulting from demand spreading. Capacity benefits to the military are particularly difficult to estimate. It is recommended that further study into the nature of existing constraints in the ATM system affecting the military and future military airspace requirements is undertaken.

On reliability benefits, it is recommended that, where this is not currently done, data relating to the frequency of ATM failure affecting the military and its impact should be collected. It is also recommended that the guidelines should refer to ways in which some of the "qualitative" benefits, such as safety and environmental, can in some cases at least be partly quantified (see annex 8).

Mission effectiveness (chapter 5) was identified as the key additional consideration when trying to assess impacts on the military. It was shown that it was possible to quantify impacts on achieving operational readiness through effects on a Tornado training programme. Possible impacts on operational effectiveness during war/crises could be more significant but could probably only be assessed qualitatively. It is recommended that further study be undertaken into possible impacts on mission effectiveness.

Finally, the CATF looked at the applicability of Key Performance Areas (chapter 6), as already identified primarily for the civil sector, to the military and, where appropriate, suggested possible indicators for these. Delay, access and flexibility were identified as the most important KPAs affecting the military. It is recommended that this chapter be used as the basis for the development of KPA/Is for the military, as this would help quantify the impacts of changes to the ATM system on the military.

Chapter 1: INTRODUCTION

This is the report of what came to be known as the Cost Assessment Task Force (CATF). The CATF was established in January 2001 by the Civil Military Interface Committee (CMIC) of Eurocontrol. The CATF resides within the Military Harmonisation Group (MILHAG), which is entrusted with the harmonisation of military positions against European Air Traffic Management Programme (EATMP) programmes across the ECAC states.

The purpose of the CATF was to develop harmonised cost assessment procedures based on the current "best practices" employed by the ECAC states' military for the calculation of costs relating to Air Traffic Management (ATM) activities. This would take the form of a set of guidelines. The guidelines would help to provide a common understanding of cost assessment assistance to those tasked with appraising the consequences of introducing into military ATM systems the changes required by EATMP programmes.

One of the first tasks undertaken by the CATF was to review the Eurocontrol document "Guidelines for the Economic Appraisal of EATMP Projects – The Effective Use of Cost-Benefit Studies" (reference PLC.ET1ST07.1000–GUI-01-00). This document focussed primarily on the civil sector. The CATF concluded that this document was generally a good and sound basis from which to assess impacts on the military. In view of this, the short time span (and limited resources) of the CATF and the need for a consistent approach, the CATF decided that its guidelines would take the form of an "attachment" to these existing guidelines. The attachment would highlight and explore the areas where there seemed to be additional issues/considerations in assessing impacts on the military. In many cases, however, assessing impacts on the military can be done within the same broad framework set out in the EATMP guidelines. This report is therefore not intended as a "stand alone" document, but rather as an attachment or supplement to the existing guidelines, focussing on the military.

Bringing the military into cost assessments of EATMP programmes has become increasingly important with the movement towards greater integration of airspace allocated to civil and military users (e.g. through the Flexible Use of Airspace Concept). Impacts on one sector are increasingly also felt on the other. Eurocontrol sees an important role for cost benefit assessments in appraising changes to the ATM system. Bringing the military into these assessments will provide a broader picture and hopefully a more complete assessment. These guidelines are intended to provide assistance to those making these assessments.

Chapter 2: COST ASSESSMENT MECHANISMS FOR THE MILITARY

The CATF reviewed how cost assessments for the military were undertaken currently in Eurocontrol countries and compared this to the existing EATMP guidelines (which relate primarily to the civil sector).

Use of Cost Assessment

In Germany, Sweden and the UK cost assessments are used to appraise the value for money of military procurement and other decisions involving significant public expenditure. Cost data are also collected for planning and budgetary purposes. In Belgium, cost data also serve as a planning and budgetary tool and are collected to set "tariffs" used, for example, in the recovery of costs in international operations. In Italy, costs relating to flight assistance services are analysed for the purpose of obtaining the refund of expenses sustained by the military in providing flight assistance to civil aviation. In Germany, cost data are also collected for the establishment of claims against third parties and, perhaps uniquely within the Eurocontrol countries, the German Air Force pays for the use of air traffic control services explicitly through charges. In Sweden costs are used to inform cost sharing agreements between the Swedish Air Force and the Civil Aviation Authority.

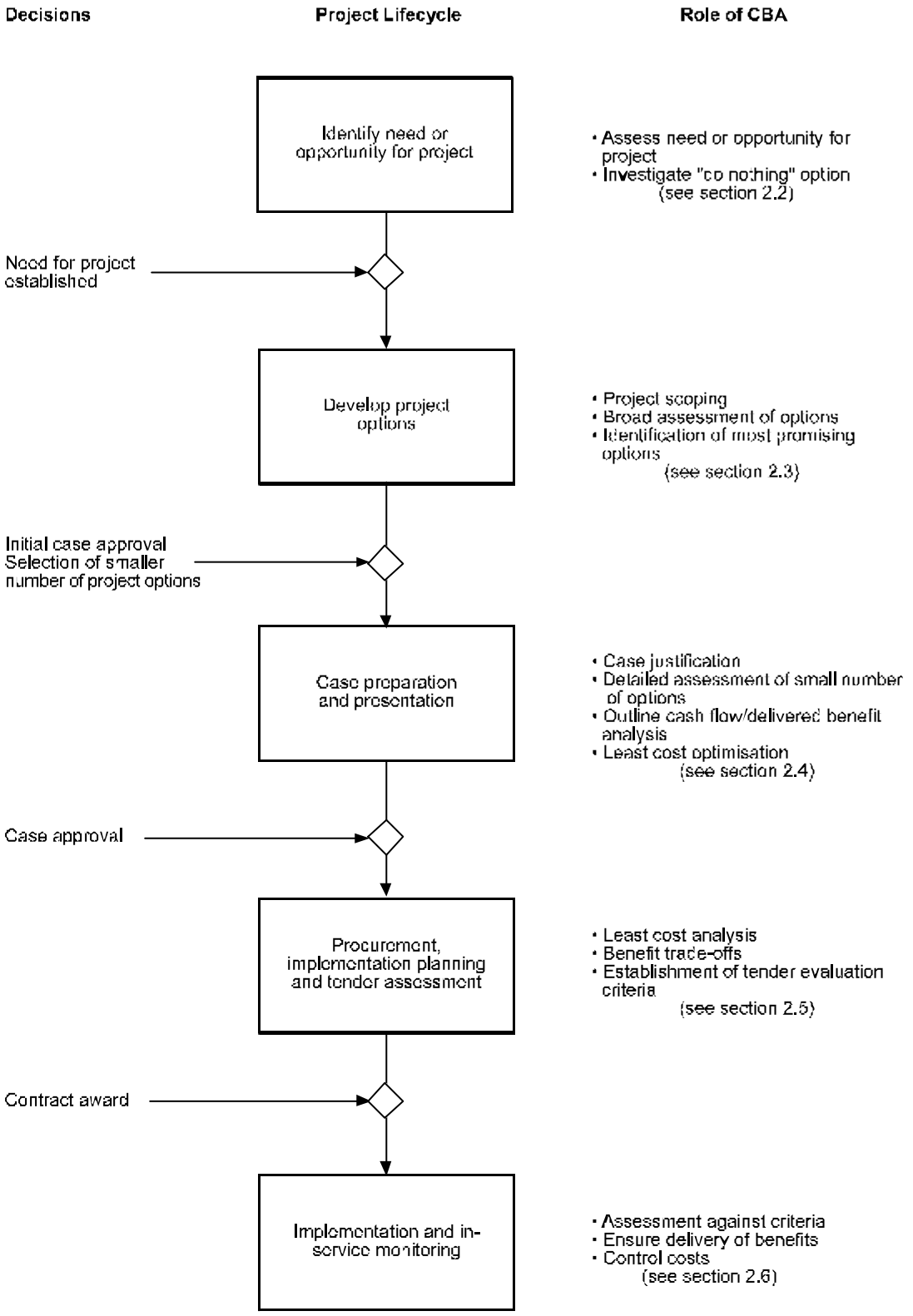
Requirements, Guidelines and Method

In Germany and the UK the requirement for a cost assessment is either enshrined in law or established government policy. The Ministry of Finance sets out administrative regulations or guidelines for carrying out assessments, with more specific working guidelines produced by the Ministry of Defence. Since the benefits of defence are either impossible or extremely difficult to quantify, in most cases assessment takes the form of a cost effectiveness analysis, i.e. the least cost means of reaching a given level of capability. Net Present Value (NPV) is generally the preferred method, although other techniques such as payback period are sometimes used.

Working Steps

Chapter 2 to 3.1/3.2 of the EATMP guidelines set out the working steps in undertaking a CBA. These are summarised in figure 2 - 1 from the guidelines, reproduced as figure 1 below.

Figure 1: ***Project life cycle***



Annex 1 to this report sets out the working steps used by the UK and Germany in carrying out cost assessments for the military. A comparison with figure 1 above shows that they are broadly in line with each other, suggesting that cost assessments for the military can follow the same broad framework.

The CATF felt, however, that additional emphasis could be given to two areas: evaluation & feedback and risk analysis. The cost assessment process does not stop at "monitoring". Both Germany and the UK place particular importance on evaluation and feedback, i.e. the transfer of "lessons learned" to future projects - as set out in the so-called ROAMEF (Rationale, Objectives, Appraisal, Monitoring, Evaluation and Feedback) framework in annex 1. Although the EATMP guidelines do recommend sensitivity testing (in section 3.6.4) the CATF felt that more could be said on the different types of risks facing a project. As such, annex 2 provides supplementary guidance on risk analysis.

There is one further area which the EATMP guidelines do not really cover and where there could be potential confusion. This is the distinction between economic and financial appraisals. Economic appraisals are concerned with establishing best value for money, i.e. the best use of resources. Financial appraisals are used mainly to assess the affordability of projects. The EATMP guidelines are, quite correctly, written from an economic appraisal perspective. Financial appraisals are sometimes additionally carried out in national cost assessments for the military because affordability is not uncommonly an issue. Guidance on the distinctions between economic and financial appraisals is attached as annex 3. This issue is discussed further in the next chapter, as some cost categories which feature in financial appraisals should not (explicitly) be included in economic appraisals.

Apart from these three issues, the CATF felt that the EATMP guidance on how to carry out a cost assessment was sound and comprehensive, and could be applied to the military. The CATF welcomed, in particular, the guidelines setting out:

- that CBA is an aid to decision-making (i.e. not the sole consideration);

- the "scoping to detail" approach (i.e. initially having a broad coverage of possible options, narrowing down later to more detailed study);

- that resources to be put into CBA/evaluation should be proportionate to the size of the project.

Some more detailed comments by the CATF on the EATMP guidelines are attached as annex 4.

CHAPTER 3: IDENTIFICATION AND CLASSIFICATION OF COSTS

DEFINITION OF COSTS AND AIRFORCE APPLICATION

No decision-maker can sensibly claim to be comparing the cost and benefits of his decisions unless he has a clear and defensible notion about the meaning of 'cost'. A useful perspective is to discern how a system acts upon what is given (the input) to produce what results (the output). The worth of the system depends essentially upon the link between output and objectives. Therefore one definition of the 'cost' of a system could be:

'The consumption of resources required as input for the system process during a given period, leading to an output in line with the objectives.'

In our specific area of interest, an air force could be considered as a system that operates weapon systems through a process, in order to achieve objectives. For the air force "system", the objective is to reach a readiness status in accordance with national air power doctrine. The number of flying hours or the realization of a flight plan could be used as quantitative indicators of an "output" toward achieving this objective, although qualitative factors also need to be taken into account.

RESOURCE CATEGORIES

In order to generate the costs of a defined system, in this case the air force, we need to start at the input side and provide an input structure. This means that resource categories (for equipment, facilities, manpower etc) and functional categories (maintenance, training, operations etc) have to be set up.

These resource and functional categories must be meaningful and useful from several points of view:

a. In easing the problem of data collection;
b. In permitting computational convenience;
c. In helping to indicate significant areas of critical resource impact, such as special equipments, facilities requirements, special manpower-skills;
d. In helping to ensure completeness in identifying all resources required to obtain the desired output;
e. In harmonising the cost assessment methodology.

COST CLASSIFICATIONS

For the classification of those input-oriented costs, a number of options can be taken into consideration. In his 'Studies in the Economics of Overhead Costs', J.M. Clark stated that there are different costs for different purposes. Costs can be classified according to:

a. The nature of the cost (e.g. personnel, operations, investments);
b. The relation with the organization (e.g. production unit, sales department, research department, wing or group);
c. The mission of an organization (e.g. air defence, offensive operations, airlift);
d. The relation with the output (direct and indirect costs);
e. The relation with the activity (fixed and variable costs).

Types a, b and c are the main drivers for cost classifications. Options d and e are often used as a subdivision of these.

COST CATEGORIES

The EATMP guidelines refer to a classification related to the nature of costs, i.e. a. above. According to the project phases, a distinction is made between investment, operation and transition costs.

During the *R&D phase*, investment costs occur under the form of acquisition costs. This phase also leads to an increase in operation costs as the proposed systems are tested.

The *implementation phase* is characterised by one-off investment costs as the new systems are installed and certified. When, for instance, parts of a current system need to be maintained during the transition to a new system, transition costs also occur during this phase. Due to lack of funds, European air forces are usually unable to change or improve their equipments as quickly as desired and transition costs might therefore be particularly important.

The *operation phase* stands for operation costs.

MILITARY COST CATEGORIES

The CATF reviewed the types of costs/cost categories used in military cost assessments. Details (relating to the UK, Sweden, Germany, Belgium and Italy) are attached as annex 5. These costs fit broadly into the three categories set out in the EATMP guidelines. For example, the "investment" and "yearly" cost categories used by Sweden align quite well with the "implementation/transition" and "operational" costs in the guidelines. In the UK, a similar distinction is often made between "one-off" (e.g. capital investment) and "recurring" (i.e. running or operating) costs.

The CATF therefore concluded that the assessment of costs to the military could be undertaken within the same broad framework set out in the EATMP guidelines.

To illustrate, it is fairly straightforward to adjust the cost classifications used by Belgium (see annex 5), which reflect current budgetary conventions used in that country, to align to those of the EATMP guidelines, as set out in table 1 below.

Table [1]: Military Cost Categories

INVESTMENT COSTS

DEVELOPMENT (Self explanatory)
ACQUISITION (Self explanatory)
MODIFICATION (Modification kits and manpower)
ONE OFF (Services, operating start-up costs and other project expenditures)

TRANSITION COSTS (costs for maintaining current systems, during transition to a new system)

INVESTMENTS
OPERATIONS
PERSONNEL

OPERATION COSTS

MAINTENANCE (Costs for spare parts and manpower, can be subdivided into Aircraft, GSE, Vehicle and infrastructure maintenance)
REPAIR & TESTING (Costs for acquisition of Test-equipment and special tools)
ACQUISITION OF NON-SPECIFIC GOODS AND SERVICES (e.g. maps, publications, clothing, outfits, etc.)
SUPPLIES (consumables, petroleum, oil and lubricants, chemicals, paints, office supply)
UTILITIES (water, energy, telephone)
RENTAL (rental of goods, services, ranges)
DISPOSAL (costs for disposal of weapon and other systems, i.e. dismantling, demilitarisation)
TRAINING (self explanatory)
RECRUITMENT (self explanatory)
PR AND RECREATION (costs for use of civil recreation resources, representation)
PERSONNEL (Salaries, allowances, per diem)

Remark : According to the desired cost analysis output, the above mentioned categories can be subdivided into fixed/variable or direct/indirect costs.

Table 1 provides sub-categories of costs under the EATMP guidelines headings, with explanations/examples where required. Annex 5 also includes a checklist of costs for inclusion in a cost assessment.

Although an ideal model of cost categories is hard to define, a combination of these categories, if interpreted broadly enough, should be comprehensive enough to include all relevant costs. The appropriate set of categories will vary depending upon the particular military capability being analysed. To emphasise the need of being comprehensive, it can be useful to distinguish costs according to their measurability, e.g. into:

a. Monetary expenditures of an organization (self-explanatory);
b. Other costs evaluated in monetary terms (e.g. stocks, manpower);
c. Other quantifiable costs that cannot be confidently evaluated in monetary terms (e.g. life cost);
d. Non-quantifiable costs (e.g. effectiveness).

In addition, as stated earlier and in Table 1, it can also be useful to classify costs into direct/indirect and fixed/variable. The latter is often particularly important as it can help identify the incremental costs that can be attributed to a particular project. The distinction between fixed and variable costs, including the treatment of overheads, is discussed further in the next chapter when we review flying hour cost data.

The cost categories at table 1 do not include depreciation or finance charges. Similarly, these were not included in the EATMP guidelines. This is because in an investment appraisal, *depreciation* is already allowed for by way of the inclusion of the initial cost of the asset and its residual value at the end of the project's life. The NPV approach to investment appraisal implicitly takes all financing cash flows into account within the discount rate used for the appraisal. To include financing charges within the cash flows would therefore normally be double counting. There may be exceptions to this, however, depending upon the type of discount rate/analysis used. Further explanation of these issues and the differences between economic and financial appraisals more generally is included at Annex 3. This additional guidance is considered necessary particularly as some cost data available in Eurocontrol countries includes depreciation and/or interest charges (see annex 5).

CHAPTER 4: COST SAVINGS AND BENEFITS

The EATMP guidelines categorise cost savings and benefits into the following:

COST SAVINGS

SERVICE PROVIDER	-	research and development
	-	implementation
	-	operational
	-	staff
	-	overhead
AIRCRAFT OPERATOR	-	reduced ATC charges
	-	new equipment and airline systems
	-	flight operations close to optimum
	-	reduced fuel consumption
	-	reduced flight time
	-	reduction in ATM-caused irregularities

CAPACITY AND REDUCED DELAY BENEFITS

RELIABILITY BENEFITS

OTHER BENEFITS	-	safety
	-	upgradeability
	-	contingency
	-	international commitments
	-	environmental

The rest of this chapter assesses the applicability of these categories to the military.

COST SAVINGS

As noted above, the EATMP guidelines split cost savings into those accruing to the service provider and those accruing to the aircraft operator. To assess the relative importance of this, the CATF considered it necessary to first review the nature of the existing civil military interface in ATS provision in Eurocontrol countries. This was done through a survey, completed by all eight countries represented on the CATF. A summary of the results of this survey are attached as Annex 6.

CIVIL-MILITARY ATS PROVISION

In most countries surveyed, ATC/M services to the military are supplied by both civil and military providers, with the former typically covering military aircraft flying as General Air Traffic (GAT) and the latter military aircraft flying as Operational Air Traffic (OAT). In the majority of these countries, the military is not charged for ATC/M services provided by the civil sector. In a significant minority of countries, however, the military does pay, either directly or indirectly, for such ATC/M services and in some cases there are also arrangements for the recovery of costs to the military of ATC/M services provided to the civil sector. In Germany, where civil and military ATC/M provision is fully integrated into a single corporation, there is an explicit charging system, summary details of which are included in annexes 6 and 7.

SERVICE PROVIDER

The EATMP guidelines' categories of research and development, implementation and operational mirrors that of the cost categories, as detailed in the previous chapter. As concluded in that chapter, data should therefore be generally available along these lines for the military. There do not appear to be any significant differences in the basis for valuing these cost savings in the case of the military. One might think that if EATMP projects have little impact on OAT then, since military service providers generally tend to only cover OAT, there would be comparatively little impact on military ATS providers. This is not entirely accurate, however. Many projects/programmes do imply changes in equipment, procedures, personnel etc, which impact, directly on military ATS providers.

The extent to which cost savings to civil sector providers benefit the military will depend upon arrangements for charging, cost-sharing etc and is considered in the next section.

AIRCRAFT OPERATORS

(i) Reduced ATC charges

As noted earlier, and detailed in annex 6, only in one country, Germany, is there a charging scheme for military flights which is akin to that for civil flights. In Sweden and the UK the military also pays for ATS provided by the civil sector but through different arrangements. In other countries, military air operators do not face charges for the use of civil ATS provision. Military air operators are, of course, not charged by military ATS providers. In many cases, therefore, the military will not benefit from any reduced ATC charges.

In many countries, the military provides ATC/M services to civil aircraft when they fly within its areas of responsibility. Civil aircraft operators are usually not directly charged for this. Rather, any form of cost recovery is between the military and civil ATS providers, e.g. in the form of an offset to charges to the military for services provided by civil ATS providers to military aircraft.

One issue identified by the CATF is the economic basis of charging for ATS services. In the minority of countries where charges are levied on the military, e.g. in Germany, this seems to be done on a cost recovery basis. However, this is not necessarily representative of the economic value of a flying slot. If the supply of flying space is generally fixed then its economic value will be mainly a function of demand – and therefore presumably mostly determined by the larger civil market. The wider issue of quantifying the economic value of flying space is perhaps one that requires future further study, to help underpin some of the values used in cost benefit assessments.

(ii) Cost Savings for new equipment and airline systems

Generally, military cost savings here can be assessed on the same basis as for the civil sector. The extent of cost savings (and also costs) will, of course, depend not just on, say, an estimate per aircraft or piece of equipment, but also on the numbers of aircraft and equipment. While this data might seem to be straightforward, in practice cost savings/costs are likely to vary considerably according to e.g. particular types of aircraft/equipment configuration and the CATF noted that this information might not necessarily be readily available. Arrangements for collecting this information should therefore be made early in the CBA process.

(iii) Flight Operations Closer to the Optimum resulting in:

(a) reduced fuel consumption
(b) reduced flight time

Again, the CATF considered that cost savings to the military can generally be assessed on the same basis as for the civil sector. An additional consideration, however, is that flight operations closer (or further away) from the optimum can have significant implications for what is termed “mission effectiveness”. This is discussed in detail in the next chapter.

Estimating cost savings relating to reduced fuel consumption and reduced flight time requires data on flying hour costs, in particular the split between fixed and variable costs. As part of the work on cost categories, the CATF reviewed the availability of flying hour cost data in Eurocontrol countries and the findings are included in annex 7.

FLYING HOUR COST DATA

Flying hour cost data are available in at least the UK, Sweden, Germany and Belgium – in the latter three countries by individual aircraft type. Costs seemed to fall into three broad groupings:

i) Those included by all countries

Petroleum, Oil & Lubricants (POL), maintenance, industry and logistical support (including spare parts) appear to be common components in each country's cost data. This is probably mainly because they are more clearly flight-related and perhaps in some cases relatively straightforward to identify. Although grouped together here, there is to some extent a spectrum within this category, with perhaps POL at one end (clearly proportionate to flying hours and easier to calculate) and some kinds of maintenance/industry support at the other.

ii) Those included by some countries

In particular, personnel and overhead costs are included by some countries but not others. This seems to be due to them being flying station rather than flying hour costs and therefore at least to some extent fixed. Even for those countries that do include these costs there are questions of where to draw the boundaries. For example, Germany includes ground staff and air crew costs but not infrastructure costs. The UK applies the principle of attributability to fixed costs, which means for example that costs of administration and provision of utilities at the flying station are included but not higher formation (central administrative) costs.

iii) Those generally not included

As noted earlier, it appears that in most countries the military does not directly bear ATC costs provided by civil providers and therefore these costs generally do not form part of flying hour costs. The notable exception is Germany, although even here ATC charges are not incorporated into the flying hour cost data, possibly because they take the form of a lump sum rather than per approach/departure/en route. Belgium does, however, include landing fees in its flying hour costs.

In conclusion, while there are (as one would expect) differences in the calculation of flying hour costs across countries there are also strong broad similarities and data are generally available in a disaggregated form, suggesting they could be constructed on a reasonable like-for-like basis.

(iv) Reduction in ATM-Caused Irregularities

The EATMP Guidelines identify three types of irregularities:

(a) delay of a flight (ground or airborne);
(b) cancellation of a flight;
(c) diversion of a flight.

The guidelines note that cost savings relating to (a) share some of the methodology used for flight time reductions. Clearly, many of the additional costs of delay referred to in the guidelines, e.g. additional services to passengers, do not apply to the military. The guidelines also state that (b) and (c) occur in "very exceptional circumstances only and usually cannot be considered when analysing an ATM system". This notwithstanding, as discussed later in this report, the CATF notes that the delay of a flight can impact significantly in terms of mission effectiveness when time on target (TOT) could be a major issue. In some cases, such a delay can lead either to an aborted mission or a failure to fulfil the training objectives, with negative consequences (re-planning, extra wear, fuel etc.) on initial planned budgets.

(v) Capacity and Reduced Delay Benefits

The EATMP guidelines state that any assessment of capacity must consider the following factors:

1) the *capacity* of en-route airspace (and also airports);
2) the *demand* for air travel;
3) the relationship between capacity and demand, which may lead to a situation of *constrained demand*;
4) the *economic costs of constrained demand* (the benefit of increasing capacity would be the avoidance of these costs).

The economic costs of constrained demand were divided into three categories:

a) demand generally less than capacity;
b) demand approaching/exceeding capacity;
c) unaccommodated demand.

Benefits tend to increase as we move from a) to c) but become harder to quantify.

a) is where demand exceeds capacity only during certain peak periods of the day, with excess demand accommodated by allowing delays to build up during the peak period and then recovering during the subsequent "quiet" period. The benefit is avoiding the costs resulting from this. The guidelines note that delay involves:

i) increased operating costs to airlines such as additional fuel burn, crew etc;

ii) costs to passengers in terms of time.

In general, i) can be assessed on the same basis as for the civil sector. ii) clearly does not apply to military flights. However, “lost time” will apply to the military personnel involved in a delay. This should be valued on the basis of “opportunity cost”, i.e. the next best activity foregone. Assuming delay time is ‘dead’ time for military personnel (i.e. no other purposeful activity can be undertaken during this time) then this cost can usually be proxied by the salary costs of those involved. Delays may impose further costs, in particular additional aircraft required and extra resources needed to support the air mission. In addition, delays can often result in military flights being cancelled due to bingo being reached because of unexpected fuel consumption.

b) is where capacity is, on a regular basis, insufficient to meet demand at certain times of the day and where airlines may be forced to operate services at less busy times (demand spreading) or to fly non-optimum routeings. The costs to airlines were grouped into two categories:

i) where planned *rerouteing* occurs the cost of additional flying time can be expressed in terms of aircraft operating costs;

ii) in instances of *demand spreading* the effect is more complex to assess and requires some form of economic model.

Estimation of additional aircraft operating costs for the military in the case of *re-routeing* can generally be done on the same basis as for civil aircraft. As we saw earlier in this chapter, data are generally available on flying hour costs for military aircraft. However, flying non-optimum routes can also have implications for mission effectiveness. The (increasing) distance of military airbases from airspace needed for military use (e.g. temporary reserved airspace) was identified by the CATF as an increasingly important issue. Even in times of war/crisis, when military flights can be expected to take precedence, where access to the Area of Operation (AOO) is made crossing airspace unaffected by hostilities military aircraft can be penalised in terms of non-optimum routeing.

The EATMP Guidelines say relatively little about *demand spreading*, noting that it is a complex area. The CATF additionally noted however, that a requirement for the military to fly at “less busy times” (i.e. night flying) is likely to involve additional direct costs, such as overtime payments for civilian contracted airport staff required to remain in situ.

(c) “Unaccommodated demand” is where there are no available slots for further service provision and where demand spreading and re-routeing are not therefore possible. The EATMP guidelines identify the benefit of meeting unaccommodated demand as the additional revenue gained by the airlines as a result of the extra flights enabled by an increase in capacity (partially offset by the additional operating costs of providing these flights). The guidelines outline the complexities of estimating this.

For the military there is an added difficulty in that its outputs are not marketed, i.e. there are no fare-paying customers. The CATF also noted that any assessment of the benefits of extra airspace capacity potentially available to the military depended heavily on future military airspace requirements (an issue which MILHAG is looking into). A basic question would seem to be: if more aircraft slots were available would the military undertake more flights/flying time? If so, then the CATF noted that the benefit of these additional flights could perhaps be taken to be at least as great as the cost of undertaking them (the so-called "boundary value" in economics literature).

A further issue is whether, if an EATMP project will increase available airspace, will this *necessarily* increase airspace available to the *military*? This will depend upon issues such as the nature of any existing constraints on the military and current arrangements for civil military airspace priorities.

RELIABILITY BENEFITS

The EATMP Guidelines stated that investment in ATC/M services might increase reliability, i.e. a reduction in the likelihood of a failure. The EATMP guidelines identify two types of benefit:

i) reduced delay;

Estimated by:

Change in frequency of failure x change in downtime per failure
x no. of flights per hour x cost of delay per hour

ii) reduced maintenance costs.

Estimated by:

Change in frequency of failure x change in maintenance cost per failure

This framework would also seem to be applicable to the military. The CATF noted that an ATM failure would mostly result in the grounding or aborting of a mission, the cost of which could be expressed in terms of extra flying hours/missions. The framework also requires the availability of frequency of failure data affecting military flights, as exists for civil aviation. Data on ATM-induced occurrences which impact on the conduct of a planned mission are available in at least one country, Sweden, through the flight safety reporting system.

OTHER BENEFITS

The EATMP Guidelines identify five other possible benefits of EATMP projects:

i) Safety
ii) Upgradeability
iii) Contingency
iv) International Commitments
v) Environmental

These are treated by the Guidelines as mainly qualitative benefits. However, in some areas there is significant potential for quantification, as outlined below. This applies as much to the civil sector as to the military.

There are established techniques for placing values on reductions in risk of harm to human *health and safety* and the *environment*. These are outlined in more detail at annex 8. In summary, they fall into two broad groupings: contingent valuation and revealed preference. In the former, individuals are asked how much they are willing to pay/receive in return for a small change in risk. In the latter, an indication of how much individuals value risks is given in the market place, e.g. by how much more people are willing to pay to travel on an airline with a superior safety record. In the case of noise pollution (e.g. from aircraft), values of houses in areas exposed can be compared to the value of houses in areas not exposed but with similar other characteristics. (This technique is known as “hedonic pricing”).

Looking specifically at the military, any impacts on civilian health and safety and the environment resulting from the activities of the military can be incorporated within this framework. However, the willingness to pay approach lends itself less readily to impacts on the safety of military personnel themselves. This is because, in general, military personnel, once they have joined the armed services, are not in the same position to make choices about accepting risks. It is unlikely therefore that valuations based upon studies carried out in relation to the civilians could be directly applied to military personnel.

In addition to these (often termed “human” or “subjective”) costs there are also direct economic costs that result from accidents, such as damage to the aircraft and property on the ground, use of emergency services etc. Estimates can be made of the cost of this according to type and severity of accident. The same principles would apply to the military. The cost of replacing equipment and personnel are likely to be particularly high for the military.

In the case of *upgradeability,* there are sophisticated financial techniques which may help place a monetary value of having an “option” on, say, future equipment or capacity. Again, further details are included at annex 8.

CHAPTER 5: MISSION EFFECTIVENESS

In the previous chapter it was noted that perhaps the key additional consideration in assessing the potential impact of EATMP projects on the military compared to the civil sector is what is commonly termed “mission effectiveness”. This chapter looks at this in more detail and provides guidance on how impacts on mission effectiveness might be assessed, with particular reference to operational considerations laid down in relevant NATO and national documents on Tactical Air Mission Planning (e.g. GAF Flugbetriebshandbuch, NATO Joint Munitions Effectiveness Manual [JMEM] etc.) as well as training/readiness matters laid down in the German Air Force’s Tactical Combat Training Programme (TCTP).

In most countries military air traffic is usually performed as Operational Air Traffic (OAT). Due to the particularities of this type of traffic, it requires special assistance and support from air traffic control. Particularities of military air traffic are:

- Different flight profiles and operational procedures
- Establishment of special use airspace
- Access to special use airspace
- Co-ordination of specific military activities (additional restricted areas for operations/engagements and exercises, e.g. Operation "Allied Force").

These particularities are characteristic of different types of missions and flights:

- Combat flights to/from a theatre of operation
- Combat support and reconnaissance flights (e.g. SEAD, SOJ, SIGINT) with special area requirements
- Other support flights (e.g. air-to-air refuelling, E3-A orbits)
- Air Policing flights with high priority
- Training flights (to obtain/maintain a pilot licence or type rating)
- Training flights for maintaining operational readiness (e.g. formation flights, basic fighter manoeuvres)
- Test flights
- Ferry flights (also performed as General Air Traffic).

Mission Effectiveness during operations

In an operational context, mission effectiveness can be measured by the number of combat and combat support sorties necessary to achieve a certain tactical aim, like a desired effect on a given target. Effectiveness on target mainly depends on the amount and type of payload (mostly weapons) delivered to this target. This in turn determines the number of combat sorties dependent on combat aircraft payload capacity, range and availability of support. Flight operations at the optimum employ a minimum of combat sorties. This limits the overall threat own assets are exposed to within the area of operation and reduces in turn the required number of combat support (e.g. SEAD, SOJ, fighter sweep) and other supportive missions (e.g. AAR).

Sub-optimal operational conditions (e.g. due to imperfect routeing or reduced availability of airspace for supportive missions) may result in longer flight times, greater fuel consumption and hence less payload capacity per combat aircraft. In the worst case, desired tactical aims will be unachievable. This will have negative impact at the whole air campaign planning. All these factors increase the number of necessary combat sorties to deliver a specified amount of payload. The greater the assessed threat, and hence risk of losses/damage, the greater the combat support that will be needed.

Threat exposition, basically being a qualitative factor with moral and political aspects, may be included in the cost-benefit calculation by determining the risk of loss (percentage of total sorties flown) and calculating the cost to regain a particular asset lost in combat. This encompasses aircraft and crew cost. Additionally, investments into crew recovery assets (like Combat SAR assets) will have to be considered as well. The higher the absolute risk of losses, the greater the required effort to recover downed aircrew.

Other cost benefit factors like the a.m. decrease of sorties by optimising flight operations can be directly derived from relevant tactical planning manuals. These sortie savings may be calculated in the same manner as savings within the training environment (see below).

Besides direct savings by operating less aircraft to fulfil a certain tactical mission, flight operations at the optimum and hence optimal mission effectiveness will have a positive long-term influence on force planning processes. Procurement and readiness requirements in terms of numbers may be downsized, resulting in overall cost savings while maintaining air forces' capabilities.

Mission Effectiveness and TCTP

In a training environment, mission effectiveness can be determined by analysing the flying and tactical requirements relative to the number of sorties and / or flying hours needed to accomplish them.

In most countries' air forces there are formalised training programmes. For example, in the German Air Force, the demands on the aircrews have been laid down in the TCTP. It describes the training programmes of the aircrews with regard to the required flying and tactical skills. The necessary qualifications depend on the type of aircraft and mission *(air defence, air attack, reconnaissance, transport, SAR, special operations.)*.

Requirements for military flight crews (flight hours / year):

Minimum: 70h: aircraft type rating/ licence (Non combat ready)

additional Tactical Requirements: 70-100h: to reach limited combat status

100 – 180h: to reach full combat status

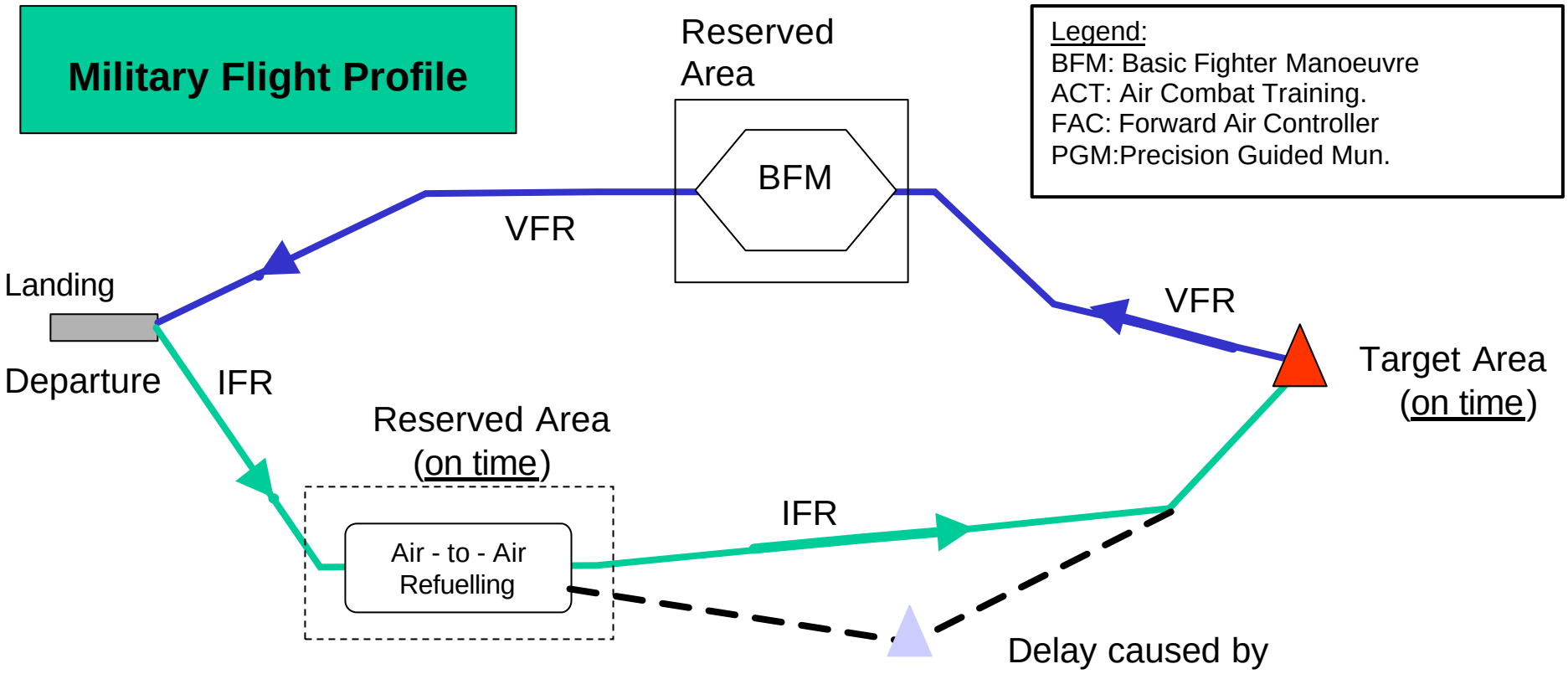
The degree to which training has been successful (i.e. fulfilment of the TCTP requirements) can be viewed relative to the required flight time (flight time model). The following figures illustrate this relation:

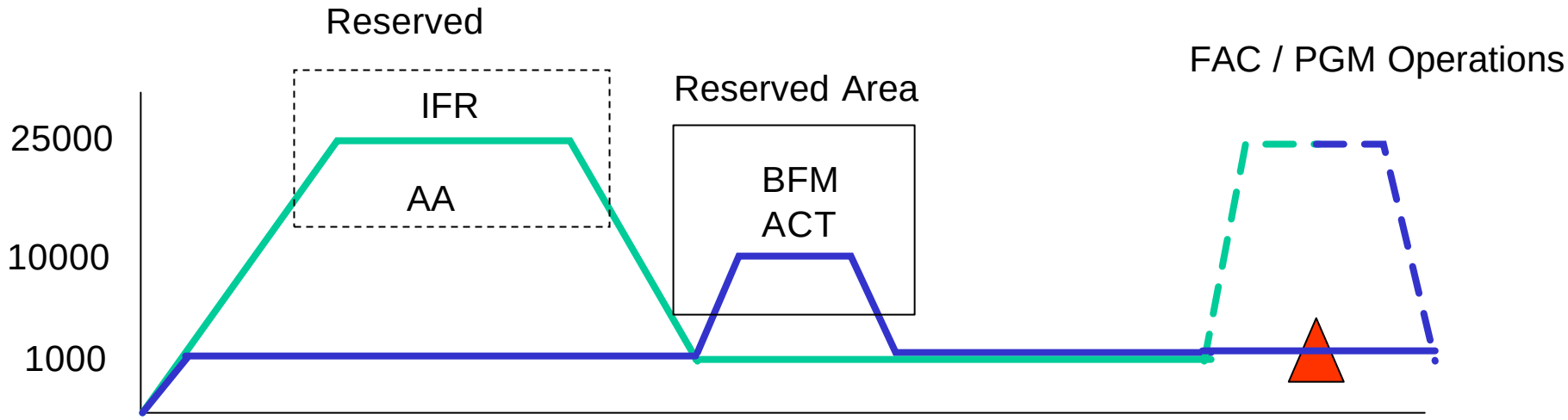
Phase of flight	***% of Flight Time***		***% of TCTP Demand***
Departure (IFR)	5	(25)	0
Ingress	30	(20)	10
Target	15	(15)	45
Egress	30	(20)	20
Additional Trng.*	15	(15)	20
Arrival/Landing	5	(5)	5

*: Add. Flight manoeuvres: AAR, Formation Flight, Air Combat Training

This is illustrated diagrammatically below.

Military Flight Profile





The following additional factors might also influence mission effectiveness, but are not included in the flight time model:

- Access to common use air space (en-route and off-route)
- Availability of reserved airspace (time, level, extension)
- Restrictions in transiting to/from reserved areas

The key question that must be answered is “what costs will be incurred to reach the operational readiness stated in the TCTP?” In addition to this purely quantitative analysis, other factors must also be addressed which are not included in this flight time model but which could have a direct impact on the entire mission or its quality. At the end of this chapter is a list of these factors (termed “additional aspects”).

A comparison of the flight time and percentage of TCTP demand by phases of flight shows that while only 15% of flight time is Time on Target (TOT), TOT accounts for three times this amount in the TCTP. Therefore, anything (e.g. a delay) that caused the amount of available TOT to be reduced could have a disproportionate impact on the TCTP.

The following is an actual case study of the impact of insufficient ATS Support, causing the aborting of a Tornado mission.

Result of insufficient ATS support for a TORNADO ECM mission:

- departure delay of 70 min. resulting in a flight plan change and re-routing (1 min = DM 1.000) : 70.000 DM
- primary training part could not be fulfilled due to reduced availability of special training area POLYGONE (caused by the delay)
- additional training necessary for 3 missions at 102 min : 306.000 DM
- overall training delay caused by reduction of training flights due to termination of night flying activities
- ECM night flying was terminated before achieving the complete training
- additional 9 missions at 102 min: 918.000 DM
  Total: 1.294.000 DM = 660.000 EURO

This chapter has looked at assessing potential impacts on achieving operational readiness through the effects on a training programme. Of course, impacts which affected operational readiness or mission effectiveness during war/crisis could have even more significant consequences, which would be particularly difficult, if not impossible, to express in monetary terms.

The next chapter looks at the potential causes of possible impacts on mission effectiveness in the context of key performance areas/indicators.

Additional Aspects

Airspace and Procedures
Route planning (direct routing ?) sector reconfiguration according EAM04 Information exchange of military activities within airspace Information exchange of activation/deactivation of reserved airspace certain distance to reserved airspace or training areas sufficient reserved airspace for military training purposes
Co-operation between civil ATC, military ATC and Air Defence
Creating of compatibility and interoperability of different systems Introduction of flight data processing and –correlation between ATC and Air Defence Conformation of flight data processing systems Boarder-crossing co-operation between ATC and Air Defence Introduction of uniform standards within ATC and Air Defence
Human Resources
Additional operational personnel Selection and training of personnel Examination of personnel in the matter of quality management
Flexible Use of Airspace Concept (FUA)
Conformation and further development of FUAC under the feature of crossboarder airspace utilisation Establishment of a central crossboarding working AMC Expansion of task AMC
Additional Investments
new aircraft equipment necessary for participation on RNAV, RVSM and 8,33kHz, TCAS /ACAS new ground based equipment and systems data systems for flightplan processing and - transmission data exchange systems between ATC and Air Defence Conformation of existing systems
Operating Costs
Additional personnel Education and training mil. personnel Administration Repair and maintenance of new systems Remaining costs for the use of mil. aircraft Remaining costs for the use of new systems

CHAPTER 6: KEY PERFORMANCE AREAS AND INDICATORS

Introduction

Although not specifically within its remit, the CATF felt it would be useful to consider the potential application to the military of the Key Performance Areas and Indicators set out in the PRC document "European ATM Performance Measurement System". Although this would be useful in its own right, this was primarily done as a way of looking at costs and benefits, especially mission effectiveness, from a different angle.

The CATF considered the PRC paper to be a good basis from which to assess possible KPA/I for the military. However, the PRC paper only touched upon the military in a few places and acknowledged the difficulties of taking this further. As such, and given that this was not a central task for the CATF, the following represents a basis from which further, more detailed, work might be pursued by others in the future.

Military KPAs/Is

The CATF expressed a number of points to be taken into account in considering KPAs/Is for the military. In particular:

- It would be very difficult to quantify performance in areas such as access, predictability, availability, flexibility, flight efficiency and profiles and safety.

- It should be acknowledged that the military are operating in an environment not subject to market rules, but to security and defence policies established at the (international) political level.

- A possible approach to performance measurement for the military could only be based on concrete starting points. For example, what is the number of combat-ready pilots needed to meet current defence and security policy requirements? What is the number of flying hours needed to have so many pilots combat-ready?

Due to its particularities, OAT requires special assistance and support from air traffic control. In general, civil KPIs can also be used for OAT and they are often applicable to military requirements. In the PRC document, mission effectiveness is part of the KPA "Flight Efficiency". It is described as the "*distance from the base to the requested area vs. the distance from the base to the granted area".*

The CATF considered that several other KPIs must be added to the KPA *mission effectiveness*. Of course, many of these KPIs are already part of the civil KPA but in their current form they do not take into consideration all the military particularities.

The following is an initial analysis of which civil sector KPAs/Is might also apply to the military, which military KPAs/KPIs might be different or more difficult to determine compared to the civil sector and which additional KPAs/KPIs might have to be developed for the military.

The PRC document lists the following KPAs:

- Safety
- Delay
- Cost effectiveness
- Predictability
- Access
- Flexibility
- Flight efficiency
- Availability
- Equity
- Environment

and:

- Military flight profiles

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Safety:

According to the PRC document, the level of safety achieved by the in-service ATM system is measured by assessing the results. The role of safety is to ensure adequate separation between aircraft, between aircraft and other objects, from the ground and from other hazardous situations (e.g. penetration of dangerous areas like severe weather areas). The proposed KPIs apply to the military but particularities must be taken into consideration.

Proposed indicator:

Quantified record, such as number of "near misses".
Miitary operators' perception of the of the ATM system

Delay:

From the military point of view, the KPA *delay* (including its indicators) is among those whose impact on mission effectiveness is greatest. Delay is the difference between the requested flight time and the actual flight time. The proposed indicators are very similar to those used by the military but the analysis can be broken down into departure delay, in-flight delay and arrival delay.

Departure delay: the difference between the actual and scheduled/requested departure time.

Proposed indicator:

Total number of delayed departures/total number of military IFR flights
Average length of delay.

In-flight delay: the delays occurring during the different phases of flight between departure and arrival, e.g. waiting to enter/leave special airspace or change flight rules (IFR-VFR-IFR).

Proposed indicator:

Total number of in-flight delays/total number of military IFR flights
Average length of delay

Arrival delay: the difference between the scheduled and actual landing time.

Proposed indicator:

Total number of delayed arrivals/total number of military IFR flights
Average length of delay.

Causes of delay:

Delays can be caused by internal, ATM and external factors.
Internal factors: technical availability of aircraft, military organisation, military airport facilities

ATM factors: availability of reserved airspace, access to reserved airspace, direct routeing to/from special use areas or airspace

External factor: weather
ATM delays should be analysed within the context of all delay factors.

Proposed indicator:

Proportion of delays arising from each identified cause

Cost effectiveness:

The German MOD pays for the use of ATM services through en-route and departure charges and OAT charges according to a special agreement (special ATM services for military air traffic, flight inspection and ATC training for military personnel). Both types of charges can be taken into consideration for cost-effectiveness analyses.

Proposed indicators:

- *Total ATC costs per IFR movement as GAT/OAT or*
- *Total ATC costs per distance flown in kilometres/miles according to IFR*

Predictability

This KPA refers to the variability of delay; if delays become less predictable they are usually more costly. Potentially, this could also be an important issue for the military and may need to be monitored.

Access

This refers to accessibility of airspace and ATM services under controllable conditions. OAT must have access to the entire airspace needed for mission accomplishment. Reserved airspaces have to be established for daily military flight operations and additional large airspaces for military exercises. When access is denied or limited, military flight operations will be delayed or have to be cancelled. Access may be denied because of insufficient capacity or unavailability of ATC. A priority handling of military air traffic will ensure access for OAT to requested airspace. Free routing independent of the existing (civilian) route structure must also be possible.

Proposed indicators:

- *% of time a given restricted airspace is not available for pre-planned missions*
- *% of time a given restricted airspace is reserved and is not used or*
- *% of time a given CDR is available and is not used*

Access to airspace for OAT can only be assured if military aircraft carry the specified equipment. There are operational and financial incentives for military operators to invest in the necessary navigational equipment. The investment, e.g. in RVSM, B-RNAV and TCAS/ACAS equipment, and its financial impact on military budgets must be analysed and compared with the operational disadvantages due to inadequate navigational equipment.

Proposed indicator:

Investment in new airborne equipment and its impact on the average costs per flying hour

Flexibility

Quite often, military operators must adapt their flight operations to changing conditions. ATM has to assist military operators in changing their flight schedules. Changes of departure or entry/exit times to/from reserved airspace, changes of flight rules due to the prevailing weather or airspace structure (e.g. unplanned change from uncontrolled to controlled airspace) entail changes from planned VFR operations to operations carried out completely according to IFR. The military operators' need for a flexible ATM system has thus been on the increase, which is also due to the fact that their operations and training missions are not based on fixed long-term schedules like the annual schedules of civil operators.

Proposed indicators:

- *Number of unplanned military IFR flights/total number of military IFR flights or*
- *Number of changed departure times/total number of requested departure time changes or*
- *Number of unplanned entry requests to reserved airspaces/total number of entry requests to reserved airspace*

Flight efficiency

According to the PRC document, flight efficiency can be measured in terms of the deviation from the operators' preferred four-dimensional trajectory. Deviations can take several forms:

- excess of route length
- non-optimum vertical profile
- speed differences from optimum

In general, this KPA applies to the military. Like in civil aviation, the efficiency could be measured in terms of fuel consumption.

Proposed indicator:

Fuel consumption for a given distance compared to the optimum for the aircraft type.

Availability

The KPIs here apply to the military

Military flight profiles

Military particularities are mainly determined by special flight profiles depending on the type of aircraft and military mission, e.g. formation flights, air-to-air refuelling, supersonic and test flights, operational flights like air defence flights etc. The key question that must be answered is: was it possible to perform these flights according to the position, time and altitude requested by the pilot?

Proposed indicator:

Number of denied requests/total number of requests concerning military flight profiles

Equity

This KPA does not appear to be relevant to the military.

Environment

The PRC document notes that the impact of aviation can be separated into two categories: “noise” and “emissions”. Of course noise in particular can be an important problem in military aviation, especially in the vicinity of military airbases or in areas of low level flying activity. Although most military airfields are based in relatively unpopulated areas, the military does need to take into account environmental constraints in planning flight activities. Lack of data on noise levels and emissions attributable to military aircraft may, however, be a constraint in these assessments.

Summary

The above-mentioned proposals describe which civil KPIs apply to the military and which additional KPIs might have to be developed to determine the performance of an ATM system. Most of the civil KPIs apply to the military and are relevant to the mission effectiveness of OAT. From a military operator's view, the KPIs that are most important are *delay, access* and *flexibility*.

If the TOT is very important, ***delays*** could be of major concern. In some cases, individual missions or complete formation flights consisting of several aircraft forming part of a tactical scenario must be aborted because of delays. If training objectives cannot be achieved, re-planning as well as extra flight time and fuel will be needed to complete the Tactical Combat Training Programme.

Access to the entire airspace reserved for military flight operations is necessary to meet military requirements. In some cases, however, access can only be assured if military aircraft are equipped with the appropriate navigational equipment, which must be procured at considerable expense.

The importance of ***flexibility*** for military traffic has been constantly on the increase since military operators have to adapt their flight operations to changing conditions. In individual cases, unplanned flight rule changes from VFR to IFR can occur very often due to changing weather conditions. The ATM system has to cater for these military requirements by providing sufficient capacity as well as ATC personnel and facilities.

CHAPTER 7: CONCLUSIONS

This document provides supplementary guidance relating to the inclusion of the military in cost benefit assessments of EATMP projects. It is an "attachment" to the existing guidelines which focus primarily on the civil sector. These guidelines were reviewed by the CATF and were considered to be a good basis from which to assess impacts on the military. This document therefore needs to be used in conjunction with those guidelines.

Chapter 2 reviewed military cost assessment mechanisms/working steps currently used by national states and found these to correspond broadly to those set out in the guidelines. The CATF *recommends* that some more emphasis is given to evaluation and feedback, risk analysis and the distinction between economic and financial appraisals (see also next paragraph on latter). Annexes covering these subjects, plus some further (mostly minor) comments on the guidelines, are attached.

Chapter 3 looked at military cost categories. It concluded that these could fit broadly into the framework set out in the guidelines. A more detailed breakdown of these categories was produced. The CATF *recommends* that, since appraisals are currently carried out by states for budgetary as well as value for money reasons, guidance should incorporate the distinction between financial and economic appraisals (see annex 3). Thinking of costs in terms of whether they are variable or fixed may also be helpful in the appraisal process.

Chapter 4 considered cost savings and benefits. As with costs, the CATF took the existing EATMP guidelines' categories and assessed how military cost savings and benefits might fit into it. The CATF felt it necessary to undertake a survey of current ATS provision to establish the relevance of some of the categories to the military. For the service providers, military cost categories could generally be the same as for the civil sector. For aircraft operators, ATC charges were not levied on the military in most of the countries surveyed. A side-*recommendation* of the CATF is that work on the economic basis of charging for ATC services could be done to inform appropriate values to be used in future CBAs.

Cost savings for new equipment and airline systems for the military can generally be assessed on the same basis as for the civil sector. Since detailed quantitative data on aircraft, equipment and systems is required as well as cost estimates for CBAs, the CATF *recommends* that guidelines state that this data should begin to be collected early in the appraisal process. The general availability of flying hour cost data suggests that cost savings relating to reduced fuel consumption and flying time can be readily estimated for the military. If such data are not readily available, the CATF *recommends* that steps are taken to prepare it, preferably on a disaggregated basis to ensure like-for-like comparison across countries.

Increasing distance of military airspace from military bases was raised as a concern in the CATF. Re-routeing (further away from optimal routes) could have detrimental impacts on mission effectiveness (see next paragraph) as well as increased direct costs. The CATF also identified additional costs to the military resulting from demand spreading. Capacity benefits to the military are particularly difficult to estimate. The CATF *recommends* that further study into the nature of existing constraints in the ATM system affecting the military and future military airspace requirements is undertaken. On reliability benefits, the CATF *recommends* that, where this is not currently done, data relating to the frequency of ATM failure affecting the military and its impact should be collected. The CATF *recommends* that the guidelines should bring out that some of the remaining benefits, especially safety and environmental, can in some cases be at least partly quantified (see annex 8).

Chapter 5 looked specifically at mission effectiveness, identified as the key additional consideration when trying to assess impacts on the military. It was shown that it was possible to quantify impacts on achieving operational readiness through effects on a Tornado training programme. Possible impacts on operational effectiveness during war/crisis could be more significant but could probably only be assessed qualitatively. The CATF *recommends* further study into possible impacts on mission effectiveness.

Chapter 6 looked at the applicability of Key Performance Areas/Indicators, previously identified mainly for the civil sector, to the military. It identified delay, access and flexibility as the most important KPAs affecting the military. The CATF *recommends* that this is used as the basis for development of KPA/Is for the military, as this would help quantify the impacts of changes to the ATM system on the military.