

BUILDING AN AERIAL FIREFIGHTING CAPABILITY IN THE PORTUGUESE AIR FORCE¹

EDIFICAÇÃO DA CAPACIDADE DE COMBATE A INCÊNDIOS RURAIS NA FORÇA AÉREA

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Abstract

The great fires of 2017 triggered a change to the Integrated Rural Fire Management System and led to a reform based on three pillars, one of which, professionalization and training, will require greater involvement from the Armed Forces. The Air Force is tasked with the centralised command and management of the country's aerial firefighting capabilities, both state-owned and others that may be required on a seasonal basis. The object of study is the process of building a state-owned aerial firefighting capability in the Air Force. To that end, the study will review the literature and legislation on the topic and conduct interviews with Air Force personnel and with personnel from the National Emergency and Civil Protection Authority. The study uses an inductive reasoning methodology supported by a qualitative research strategy and a case study research design. The result is a capability building model with three phases that will enable the implementation of a permanent aerial firefighting capability in the medium term; however, some factors outside the Air Force's control, such as funding, recruitment and training, may prove the most difficult to mitigate.

Keywords: Firefighting, State-owned aerial capability, Forest fires, Rural fires, Air Force, Military capability.

How to cite this article: Costa, F. M. L., & Pereira, J. F. B. (2020). Building an Aerial Firefighting Capability in the Portuguese Air Force. *Revista de Ciências Militares [Portuguese Journal of Military Sciences]*, November, VIII(2), 203-234. Retrieved from https://www.ium.pt/?page_id=5714

¹ Article adapted from the individual research work carried out in the 2019 / 2020 General Officers Course. The defence took place in July 2020 at the Military University Institute.

Resumo

Os grandes incêndios de 2017 foram um catalisador à mudança no sistema de gestão integrada dos fogos rurais, originando uma reforma assente em três pilares, sendo um deles o da profissionalização e capacitação, onde se exige maior envolvimento das Forças Armadas. Nesta vertente, é confiado à Força Aérea o comando e gestão centralizados dos meios aéreos de combate a incêndios florestais, por meios próprios do Estado ou outros que sejam sazonalmente necessários. Assim, definiu-se como objeto de estudo da presente investigação, a edificação da capacidade de combate a incêndios rurais com meios próprios do Estado na Força Aérea, tendo por base a análise documental, legislação e entrevistas a militares do Ramo e a entidades da Autoridade Nacional de Emergência e Proteção Civil. Segue uma metodologia de emprego de raciocínio indutivo, assente numa investigação qualitativa e com um desenho de pesquisa de estudo de caso. O resultado é um modelo de edificação de capacidades, constituído por três fases e que permite implementar a capacidade própria permanente de combate a incêndios com meios aéreos, a médio prazo, sublinhando-se que alguns dos fatores exógenos ao Ramo, serão os que se perspetivam mais difíceis de mitigar, como sejam, financiamento, recrutamento e formação.

Palavras-chave: *Combate a incêndios, Meios aéreos próprios, Incêndios florestais, Incêndios rurais, Força Aérea, Capacidade militar.*

1. Introduction

In 2017, Portugal's worst year in terms of forest fires, there were over 100 deaths and 500 thousand hectares of forest area were burned. The dates 17 June and 15 October in particular will remain in the public memory.

Lusa (2017)

That year, Portugal was the European country that recorded the largest number of fires and the third country with the largest burned area, only falling behind Croatia and Italy (European Commission, 2018, p.11).

The recurring scourge of rural fires was particularly severe in 2017, with the large fires in June and October leading to a new climate of apprehension, a sense of helplessness and a renewed awareness of the weaknesses of our social organization (Independent Technical Committee [CTI], 2018, p.7) both due to the number of human lives lost and to the scale and quantity of the damages to infrastructure and property.

In light of this, after the report by the CTI (the committee appointed by the Portuguese Parliament and created by Law No. 49-A/2017 of 10 July), the Presidency of the Council of Ministers issued Council of Ministers Resolution (CMR) No. 157-A/2017 of 27 October laying down the provisions to implement the Integrated Rural Fire Management System (SGIFR) by creating the Agency for Integrated Rural Fire Management (AGIF).

One of the changes to the implemented model will require greater involvement from the Armed Forces (AAFF), who are tasked with providing emergency military assistance, creating a logistic support system, conducting patrols, carrying out prevention initiatives,

participating in mop-up and rekindling detection operations, and providing post-disaster support to the population. Furthermore, the Portuguese Air Force (PoAF) is responsible for the centralised command and management of state-owned aerial firefighting capabilities or others that may be required on a seasonal basis (CMR No. 157-A/2017 of 27 October).

At this time, the PoAF does not have a Rural Fire Fighting (RFF) capability. However, it has a long history of cooperation with the Ministry of Internal Administration (MAI), whenever called upon to do so (PoAF, 2011, p.2).

As the “Air” has been the PoAF’s natural domain since its inception, this Branch is in a privileged position to cooperate with other public agencies to accomplish its assigned task of commanding and managing the State’s aerial capabilities and others that may be temporarily allocated to RFF efforts, in an efficient and effective manner, placing all its knowledge, expertise and experience at the service of Portugal and the Portuguese people (PoAF, 2017, p.4).

Therefore, to fulfill its assigned mission of serving the population, the PoAF must find a practical solution to build this capability that accounts for the national reality. As resources are limited, these capabilities must allow for “dual-use”, which will require optimising existing partnerships to create a streamlined, multipurpose and compatible system (Portuguese Government, 2015, p.1).

Therefore, this study is relevant because it addresses the need to build this capability to comply with the policy directives while bearing in mind the current context (2020).

In light of the strategic, political and military requirements, the PoAF’s current capabilities, and potential external limitations, the PoAF will have to build a permanent RFF capability.

As this study aims to *Build an RFF capability in the Air Force*, it will not address the other AAF missions. The study is delimited (Santos & Lima, 2019):

- In terms of time, to the period from 2011-2020, in addition to a future period of four to six years (medium-term prediction);
- In terms of space, to the Portuguese territory and the PoAF; and
- In terms of content, to building an RFF capability effectively and efficiently based on the device defined by the National Emergency and Civil Protection Authority (ANEPC) and the ministry directives that outline the PoAF’s responsibilities. Therefore, no foreign cases will be analysed. Furthermore, this study will not cover surveillance activities that do not fall into the scope of RFF.

According to the principles advanced by Creswell (2007, p.103), the object of study defines the research approach and is an essential part of any qualitative study. Therefore, it must be carefully constructed and defined in a clear and concise manner. To improve the clarity, feasibility and relevance of this study and to guide, delimit and systematise the investigation, a General Objective (GO), Specific Objectives (SO) and Research Question (RQ) were defined and outlined in Table 1.

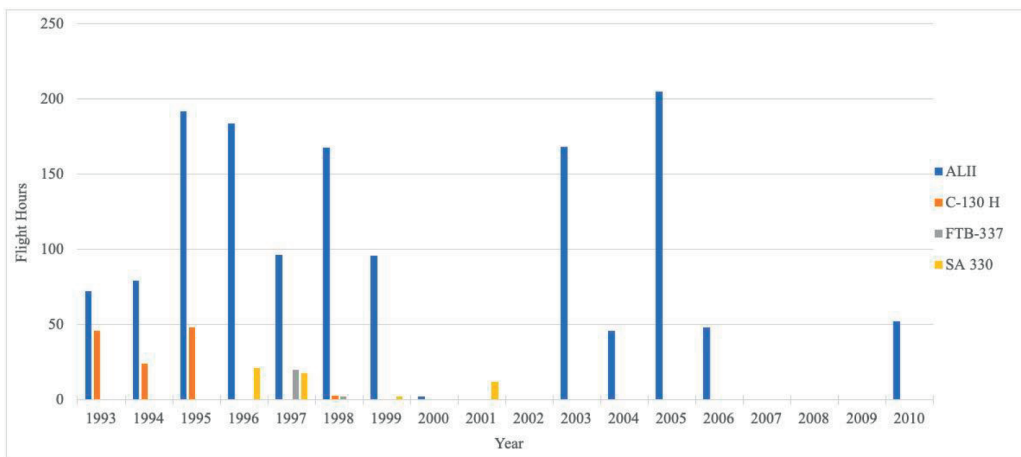
Table 1 – Objectives and Research Question

GO
To propose a model to build a RFF capability in the PoAF.
SO1
To analyse the command structure and the PoAF and ANEPC agencies responsible for managing the aerial RFF capability.
SO2
Identificar e descrever as ações necessárias para a edificação da capacidade de CIR na FA.
RQ
How can a RFF capability be built in the PoAF?

2. Theoretical and Conceptual Framework

2.1. Literature review

It can be said that managing a state-owned aerial RFF capability is a new area of operation for the PoAF. The PoAF was involved in firefighting operations until the 1990s, both with rotary wing aircraft and with a large fixed wing aircraft, the C-130H equipped with the Modular Airborne Fire Fighting System (MAFFS), in addition to aircraft leased from the private sector. However, this period does not fall within the time frame of this study. Since then, this collaboration has been drastically reduced (Figure 1) due to lack of requests, and the PoAF has only conducted assessment and coordination missions with a SUDAVIATION-SE 3160 ALOUETTE III (ALIII) helicopter (PoAF, 2011, p.2).

**Figure 1 – Firefighting operations with PoAF capabilities until 2010**

Source: Adapted from PoAF (2011, p.2).

The almost total interruption of this type of mission and the ministerial directives and guidelines (Ministry of National Defence [MDN] and MAI) tasking the PoAF with building this capability, which discourage approaches that involve adapting foreign models, justify the need for this study.

The study begins by reviewing the national legislation and military regulations that underpin this type of mission, after which it will explain the concept's evolution, management models and the Portuguese *modus operandi*, which have undergone profound changes since 2011, when the PoAF effectively ceased to have a RFF capability (PoAF, 2011, p.4).

The extinction of the *Empresa de Meios Aéreos, S. A.* (EMA²) in 2014 and the subsequent transfer of all state-owned capabilities to the National Civil Protection Authority (ANPC³); the creation, in 2015, of a Working Group (WG) tasked with finding a solution to increase the involvement of the PoAF; and, finally, the devastating fires of 2017 led to profound changes to the management and operation models when the new SGIFR was implemented.

During the literature review, the four structuring concepts presented in Table 2 were identified to help define the state-of-the-art (Bryman, 2012, p.98).

Table 2 – Key concepts

RFF	Organized, incisive and robust response involving the mobilisation of appropriate or reinforced capabilities to extinguish forest or agricultural fires in rural areas and prevent reignitions (adapted from CMR No. 20/18 of 1 March). Aerial firefighting capabilities include all aviation resources used in two types of attack: Initial Attack (ATI) and Extended Attack (ATA) (ANEPC, 2020, p.17).
Command	The authority vested in an individual of the armed forces for the direction, coordination and control of military forces. It is the process by which a commander motivates subordinates to behave in a specific way when faced with a specific action (North Atlantic Treaty Organization [NATO], 2019, pp.1-34).
Management	The process of "...optimising how organizations work through rational decision making, using collected and processed data and relevant information to develop the organization and meet the interests of all employees and owners, as well as the needs and interests of its stakeholders or the general public" (Nunes, 2017). Nunes (2017) states that "according to the classic concept initially developed by Henry Fayol, managers are responsible for conducting planning, organization, leadership and control activities to accomplish the organizational goals".
State-owned Capability	(Military) capability - A set of elements that are harmoniously articulated and complementary, which are used to accomplish a set of operational tasks or effects. These elements include Doctrine, Organization, Training, Equipment, Leadership, Personnel, Facilities and Interoperability (DOTMLPFI) (Council of Chiefs of Staff), 2014a, p.38). State-owned – "which belongs exclusively to someone ... (plural) goods or property belonging to the State" (Porto Editora, n.d.).

2.2. Analysis Model

Table 3 presents the analysis model that guided this investigation.

² The Aerial Capabilities Company was established by Decree-Law No. 109/2007 of 13 April to manage the state-owned aerial capabilities assigned to fighting forest fires and other civil protection and rescue operations. This company had the exclusive right to contract any private capabilities that may be required.

³ The former designation of the ANEPC.

Table 3 – Analysis model

General Objective	To propose a model to build an aerial RFF capability.				
Specific Objectives	Research Question	How can a RFF capability be built in the PoAF?			
	Subsidiary Questions	Concepts	Dimensions	Indicators	Data collection
SO1 To analyse the command structure and the RFF management responsibilities to be established between PoAF and ANEPC.	SQ1 What linkages should be established between the PoAF and the ANEPC to ensure that the former can command and manage the RFF capability effectively and efficiently?	Management Command RFF	Legal	Legislation ANEPC regulations Military regulations	National legislation Regulations Interviews
			Passive phase	Contracts Directives Device Financing Leased capabilities State-owned capabilities Protocols	
			Active phase	Air Command (AC) ANEPC commands Air Operations Centre (AOC) Air Units (AU) Air Capabilities Centres (ACC) Contracts Leased aerial capabilities State-owned aerial capabilities	
SO2 To identify and describe the actions that must be taken to build a RFF capability in the PoAF.	SQ2 What actions must be taken to build the PoAF's RFF capability?	State-owned capability RFF	PoAF genetics	Credibility Doctrine Effectiveness Efficiency Leadership Organization Prestige Interagency linkages	NATO EMFA Interviews
			Resources	Financing Fusion Centre Facilities Interoperability Material resources Integrated communications system	
			Qualifications	Financing Outsourcing Personnel Training	

3. Methodology and Method

3.1. Methodology

This study uses an inductive reasoning methodology (which begins by analysing specific facts to draw generalisations) (Santos & Lima, 2019, p.18), a qualitative research strategy based on semi-structured interviews with military experts from the PoAF and with MAI officials, and a case study research design. This process aimed to answer the RQ with objectivity and rigor: What? Who? When? How?

3.2. Method

3.2.1. Participants and Procedure

Participants. The study sample consists of nine participants divided into two groups. The first group comprises six middle and senior managers from the PoAF who hold or have recently held positions that deal directly with the topic under analysis. The second group consists of three participants. Two are middle and senior managers from the ANEPC and the other is a member of the Portuguese Parliament's Independent Technical Observatory (OTI) and was National Operational Commander of the ANPC (and thus has profound knowledge of the topic).

Procedure. During the first phase, several exploratory interviews were conducted. Having defined the scripts and identified potential interviewees, the latter were contacted (by email or telephone) to inquire about their availability for a face-to-face interview. The interviews were conducted by email whenever it was not possible to do so in person. The interview script was sent by email to give interviewees the opportunity to review the questions beforehand. The interview questions were considered relevant and timely and there were no reservations regarding their publication. The full transcripts of the interviews, as well as the answers sent by email, are in the author's personal file.

3.2.2. Data Collection Instruments

Two semi-structured interview scripts were built, one for each of the groups described above. Four of the nine interviews were conducted face-to-face and recorded, transcribed and validated by interviewees. The remaining five interviews were conducted by email whenever there were scheduling issues and, later, due to the security measures implemented to manage the country's epidemiological situation. A literature review was conducted to complement the study, during which several military and ANEPC archives and an extensive legal framework were consulted.

3.2.3. Data Processing Techniques

To answer SQ1 and SQ2, and to complement the content analysis of the documents consulted in the literature review, a qualitative analysis was carried out by cross-referencing the key ideas discussed in the interview matrix and the dimensions and indicators in the conceptual framework, making it possible to identify trends.

4. Data Presentation and Discussion of Results

4.1. Linkages between the Portuguese Air Force and the National Emergency and Civil Protection Authority and their respective responsibilities.

4.1.1. Legal framework

To meet the State's need for an aerial capability that enables it to cooperate in Civil Support missions and in tasks related to the fulfilment of basic needs and the improvement of people's quality of life, this study will analyse the national laws and military regulations that regulate

this type of mission. Since the drafting of the first Constitution of the Portuguese Republic, one of the assigned tasks of the AAF is to collaborate in civil support missions, currently known as Public Interest Missions (PIM). Tables 4 and 5 contain the relevant national laws, military regulations and ANEPC regulations, as well as a brief summary of all relevant contents that address the AAF's role in civil support missions.

Table 4 – National laws

Regulatory document	Content
Constitution of the Portuguese Republic	Article 275(6) (Armed Forces) states that the Armed Forces may be called upon to cooperate in civil defence missions and in tasks concerning the fulfillment of basic needs and the improvement of people's quality of life (Constitutional Law No. 1/2005 of 12 August).
National Defence Law	Article 24(1)(f) (Armed Forces Missions) states that they may be called upon to collaborate in civil defence missions and in tasks concerning the fulfillment of basic needs and the improvement of people's quality of life (Organic Law No. 5/2014 of 29 August).
Basic Law on the Organization of the Armed Forces (LOBOFA)	Article 4(1)(f) (Armed Forces Missions) states that they may be called upon to collaborate in civil defence missions and in tasks concerning the fulfillment of basic needs and the improvement of people's quality of life. Article 6 (General organization principles) mentions the concepts of efficiency, effectiveness, rationalisation and optimisation (Organic Law No. 6/2014 of 01 September).
Reform of the system to prevent and fight rural fires	Establishes the AGIF. Chapter I, paragraph 12 tasks the PoAF with the centralised command and management of aerial firefighting capabilities, both state-owned and others that may be required on a seasonal basis (CMR No. 157-A/2017 of 21 October).
Creation of a Working Group	To study, propose and develop solutions to strengthen or build capabilities in the Air Force, among other tasks (MDN/MAI Joint Decision No. 10963/2017 of 05 December).

Table 5 – Military regulations and ANEPC regulations

Document	Content
Military Strategic Concept (MSC)	Section "C5-Support to development and well-being" of the standard force concept includes the preparation, readiness and provision of military capabilities for surveillance and firefighting operations (Council of Chiefs of Staff, 2014a, p.24).
Armed Forces Missions (MIFA)	The mission of supporting development and well-being includes firefighting activities to support and protect people and property (Council of Chiefs of Staff, 2014b, p.6).
Aerial Capabilities used in Public Interest Missions (MAMIP)	Identifies a solution that proposes a model to build a state-owned firefighting capability (Portuguese Government, 2015, pp.44-47).
Organic Law on the ANEPC	Article 32 (Aerial Capabilities) sets out the responsibilities for defining the capabilities that will integrate the Special Rural Firefighting Device (DECIR) in coordination with the PoAF (Decree-Law No. 45/2019 of 01 April).

As for the nature of these capabilities, as part of the efforts to improve the SGFIR, CMR No. 157-A/2017 of 27 October introduces a reform to the system that manages the aerial capabilities in the Special Rural Fire Fighting Device (DECIR), and tasks the PoAF with the centralised command and management of State's aerial RFF capabilities and others that may be required on a seasonal basis, including both manned and unmanned aircraft.

4.1.2. Capabilities management

The PoAF is responsible for the command and management of the State's aerial RFF capabilities and others that may be required on a seasonal basis (CMR No. 157-A/2017 of 27 October). Thus, on 08 November 2018, the Chief of Staff of the Air Force (CEMFA) issued Decision No. 53/2018, which establishes a Mission Management Office to manage Rural Fires (GCMIR) to implement the centralised management of those resources. Among other tasks, this office is responsible for managing all leasing contracts and monitoring their implementation, as defined in the Public Procurement Code. This office has expert teams who inspect the ACCs and receive the leased aircraft.

Article 32(1) of Decree-Law No. 45/2019 of 01 April states that the ANEPC is responsible for defining "the number, type, characteristics, geographic distribution, period of operation, and dispatch procedures of the capabilities in the DECIR [...], in coordination with the Air Force [...]". In addition to the multiannual planning, it is responsible for informing the PoAF, by 30 November of each year, of the device required for the following year so contracts can be celebrated in a timely manner, thus reducing the risk of having to resort to direct award procedures (CMR No. 139/2018 of 04 October).

According to A.J. Branco (face-to-face interview, 05 February 2020), the GCMIR is responsible for managing the aerial RFF capabilities. Currently, this is still done using the Operational Decision Support System (SADO) provided by the ANEPC. Therefore, there is an urgent need to implement a Command and Control System (C2) that not only includes this type of mission but manages it more effectively and efficiently. J. P. Vicente (email interview, 7 February 2020) confirms that the PoAF will accomplish this new mission more efficiently because the contracts will be reviewed, as well as more effectively in the medium term (once the C2 system is implemented, including communications and information systems).

Both J. M. Costa (face-to-face interview, 24 February 2020) and J. M. Moura (email interview, 20 March 2020) agree that the fact that PoAF will be in charge of drafting and monitoring the contracts benefits the ANEPC as it reduces its responsibility and inherent risk. Another inference that can be made is that the ANEPC can now devote more time to its other tasks.

4.1.3. Command and Control levels

Whenever there resources, forces or military units are assigned to specific missions or tasks, regardless of their type, commanders at all levels (Strategic, Operational and Tactical) have with a certain level of authority that has a direct correspondence to the categorisation used by the North Atlantic Alliance (NATO, 2019) and adopted by the AAFP (Operational Directive No. 04/ECMGFA/02-ALT1 of 14 February). Those levels are: Full Command (FULLCOM), Operational Command (OPCOM), Operational Control (OPCON), Tactical Command (TACOM), Tactical Control (TACON) and Direct Liaison Authorised (DIRLAUTH).

4.1.4. Strategic level

Pursuant to Article 6(3) of Decree-Law No. 184/2014 of 29 December, the Chief of Staff of the Armed Forces (CEMGFA) is responsible for committing the forces and capabilities of the operational component of the System of Forces (SF). This includes cooperating with security forces and agencies and collaborating in civil protection missions. Through the Joint Command for Military Operations (CCOM), it has OPCOM over those forces and capabilities, which the AAFF Branches are responsible for preparing and supporting.

However, as CMR No. 157-A/2017 of 27 October tasks the PoAF with the command and management of aerial capabilities, the CEMFA must have OPCOM over them, as in other missions specific to the PoAF, such as aerial search and rescue operations.

4.1.4.1. Operational Level

E. F. Craveiro (email interview, 9 February 2020) states that while the TACON of both state-owned and leased manned aircraft is delegated to the ANEPC, the C2 of Unmanned Aerial Systems (UAS) is not.

J.P. Vicente (op. cit.) considers that, on the one hand, any changes to the device, such as the geographical redistribution of a capability, must be coordinated and authorised by the PoAF (as defined in the current legislation), and, on the other, that operating the State's aerial capabilities requires a C2 system that is both more robust and interoperable with the ANEPC. This can only be done by creating a fusion centre that integrates the existing technology with the capabilities described above. That is, OPCON should remain with the Air Commander and TACOM should be exercised through the AOC by installing Global Positioning System Trackers (GPST) and C2 software in all aircraft to monitor flight data in real time.

A. C. Benigno (email interview, 12 March 2020) agrees that OPCON should be delegated to the ANEPC, and that the crews should hold TACON. However, Benigno adds that there are conceptual differences between the military and the civilian component. The civilian concept of OPCON is similar to the military concept of TACON, while TACON is closer to the concept of simply operating an aircraft, in which the crew makes decisions regarding safety and use but does not have C2.

4.1.4.2. Tactical Level

4.1.4.2.1. Manned Aircraft

The ANEPC is responsible for the decision to dispatch aircraft to fight rural fires, as well as for prepositioning them and providing armed surveillance, always in coordination with the PoAF (Decree-Law No. 45/2019 of 01 April 2019). That is, TACON should be delegated to the ANEPC and any changes that may be required, especially changes to the device, must be closely coordinated with the PoAF.

As for the type of aircraft included in this capability, according to A. C. Benigno (op. cit.), the Commander of the National Emergency and Civil Protection Authority (CONEPC) has the authority to deploy Medium Airtankers (AVBM) (sometimes activated for ATI). The

remaining ATI capabilities are under the authority of the respective District Operations Commander (CODIS).

With regards to the location of the ACCs, E. F. Craveiro (op. cit.) states that it does not make sense for them to have different C2 levels depending on their location, even if they are located in a Base Unit (BU).

J.M. Costa (op. cit.) believes that, while it would be useful for the ANEPC to have OPCON over the aerial RFF capabilities, it may prove sufficient to delegate TACON, as all details have been defined in the contracts and protocols. However, while command is centralised, implementation is decentralised to all 18 district commands.

All interviewees agree that the ANEPC should have TACON over manned aircraft, whereas the CONEPC should keep C2 of heavy aircraft and AVBM, and the respective CODIS should hold C2 over the remaining capabilities.

4.1.4.2.2. Unmanned Aerial Systems

CMR No 8/2019 of 10 January acknowledges the importance of this capability for surveillance, firefighting and mop-up operations and authorises the PoAF to incur expenditure to build a RFF and prevention capability, which includes the use of unmanned aerial vehicles.

In 2019, the PoAF deployed a rural fire surveillance UAS to assess the operational requirements on the field, which will provide the basis for building this capability (Directive No. 11/ECMFA19 of 31 July).

Due to the specific requirements and operations concept of the air environment, the Air Commander has delegated TACOM to the AOC, specifically to the Intelligence, Surveillance and Reconnaissance Centre (CeRVI), and TACON to the UAS Mission Commander.

The ANEPC has kept an operations liaison officer to monitor and optimise the provided services, who primarily interacts with CeRVI or the AOC Liaison Officer (LOAOC) (CA, 2019a, p.9).

E. F. Craveiro (op. cit.) and J. M. Costa (op. cit.) agree that this C2 model (which does not delegate authority over the UAS to the ANEPC) has proved effective. One of the reasons for this is that these systems are not directly involved in firefighting. They are only used for surveillance and to increase situational awareness in a given area, allowing the manned aircraft to be deployed as effectively and safely as possible.

Furthermore, because it is a surveillance capability, it does not need to be at high readiness. Therefore, all interviewees agree that the PoAF should continue to have TACON over it, and that it should be activated in coordination and at the request of the ANEPC.

4.1.4.3. Coordination

Operational Directive No. 2-DECIR/2020 of 30 April provides the basis for all coordination procedures. Among other aspects, it defines the coordination mechanisms between the ANEPC and the PoAF concerning C2, dispatch procedures and use of aerial firefighting capabilities, in order to facilitate interagency coordination, regulation, cooperation and optimisation in all DECIR operations.

The Integrated Protection and Rescue Operations System (SIOPS) includes a National Operations Coordination Centre. The centre has an Operations Cell responsible for Managing Aerial Capabilities (CEGMA) with representatives from the AAFF and the PoAF has LOAOC whenever RFF operations are ongoing (Operational Directive No. 2-DECIR/2020 of 30 April).

J.M. Costa (op. cit.) and A.C. Benigno (op. cit.) both state that linkages occur at different levels in both institutions, and that these linkages are centralised in the CEGMA. This cell includes representatives from the PoAF who have all technical and operational information on the aerial capabilities, and who are crucial to ensure integration, coordination and communication between the ANEPC and the PoAF.

That is, in addition to the directives, protocols and C2 chain of command, there should be different levels of coordination on both sides to streamline the system and ensure that it is as effective and efficient as possible.

4.1.5. Brief overview and answer to SQ1

The military strategic, operational and tactical regulations were reviewed and nine interviews were conducted with experts who unanimously agreed with regards to the command, management and coordination mechanisms between the PoAF and the ANEPC. Based on this analysis, and to answer SQ1, all interagency linkages, chain of command, and C2 of the aerial RFF capability should be outlined as presented in Figure 2.

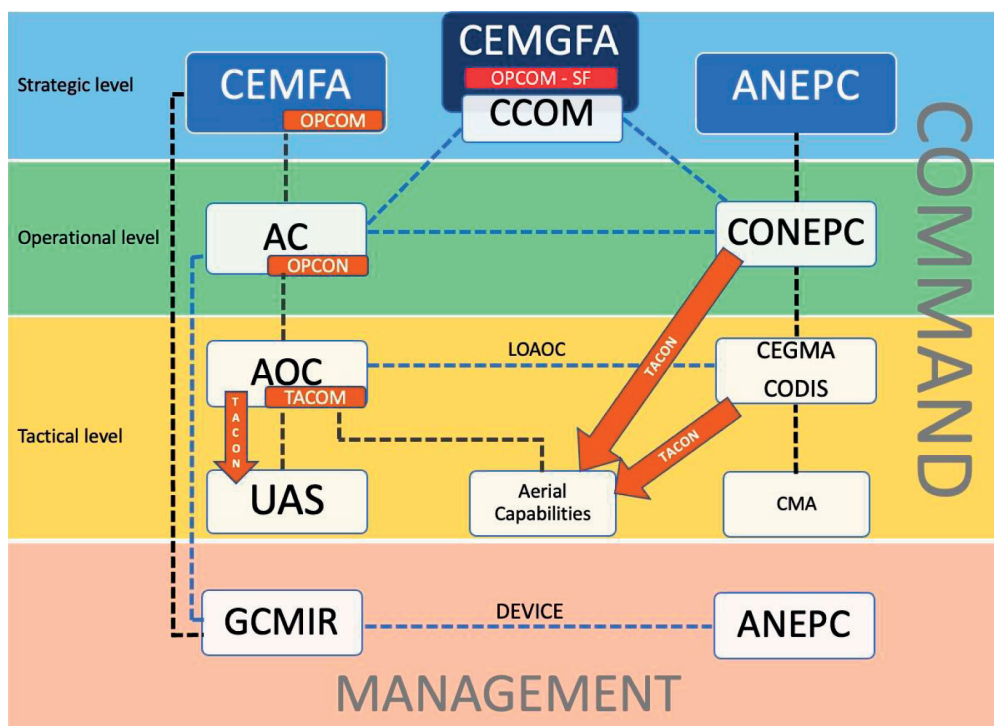


Figure 2 – C2 structure of the RFF operations conducted by the PoAF and the ANEPC

4.2. The Air Force's Firefighting Capability

Joint Decision No. 10963/2017 of 5 December 2017 issued by the National Defence and Internal Administration Ministers established a WG to study, propose and develop the process of transferring the ANEPC's permanent capabilities to the PoAF in a dual use perspective, and to prepare the future acquisition and / or leasing of fixed wing and rotary wing aircraft, both manned and unmanned.

CMR 139/2018 of 4 October established an Implementation Monitoring Group (IMG) to reform the centralised model to manage and command aerial capabilities. Paragraph 10 of this resolution states that a proposal should be elaborated to build a state-owned capability for civil defence operations, including RFF. This proposal should describe the type and quantity of resources to be acquired and identify the costs as well as possible sources of financing.

The PoAF considers that the issue of RFF should be framed within a broader civil protection framework that is mainly concerned with firefighting but that includes other tasks related to security, protection and rescue of populations and property, environmental protection and support to law enforcement (PoAF, 2017, p.3).

E. F. Craveiro (op. cit.) states that the goal is for the State to hold about 50% of all aerial RFF capabilities, which consist of helicopters for ATI, heavy aircraft for ATA and UAS for surveillance and prevention.

For P. A. Costa (email interview, 10 March 2020), these permanent capabilities should consist of all strategic RFF capabilities that are required throughout the year, while the equipment needed on a seasonal basis should be leased.

4.2.1. Device Created by the National Emergency and Civil Protection Authority

The required device consists of the distribution and use of different classes of aircraft (Table 6) according to payload capacity, which do not correspond to the military classification. These aircraft are divided into two types of RFF mission: ATI and ATA.

Table 6 – Classes of aircraft assigned to the devices since 2000

Type of aircraft	Standard capacity in lts	Aircraft assigned to the device	Installed capacity - lts
Light Helitanker (HEBL)	Up to 1,000	Ecureil AS350	900
Medium Helitanker (HEBM)	Between 1,000 and 2,500	Bell 205 and 212	1,200
Heavy Helitanker (HEBP)	Over 2,500	Kamov KA32	4,000
Light Air Tanker (AVBL)	Between 1,500 and 3,000	Dromader a)	2,200
Medium Air Tanker (AVBM)	Between 3,000 and 5,000	Airtractor FB	3,100
Heavy Air tanker (AVBP)	Over 5,000	Canadair 215	5,350

a) Descontinued since 2010

Source: OTI (2019b).

The operational effort that will be required is directly linked to the four hazard and risk assessment levels defined by the ANEPC, and is naturally linked to the seasons of the year and weather patterns. The higher the level, the more aircraft will be committed and the greater the operational effort (ANEPC, 2020, p.15).

As for the types of missions, the success of firefighting operations largely depends on ATI with light aircraft, which has an efficiency rate of about 90% (OTI, 2019a). This success rate can be achieved when these aircraft (the simplest and quickest to operate) are at high readiness, when they are stationed close to the operation sites and when fires are in still in the early phase.

To ensure a quick response and proximity to the sites, these light aircraft must be positioned strategically across a wide area, according to level of danger, as defined by the ANEPC (Figure 3).

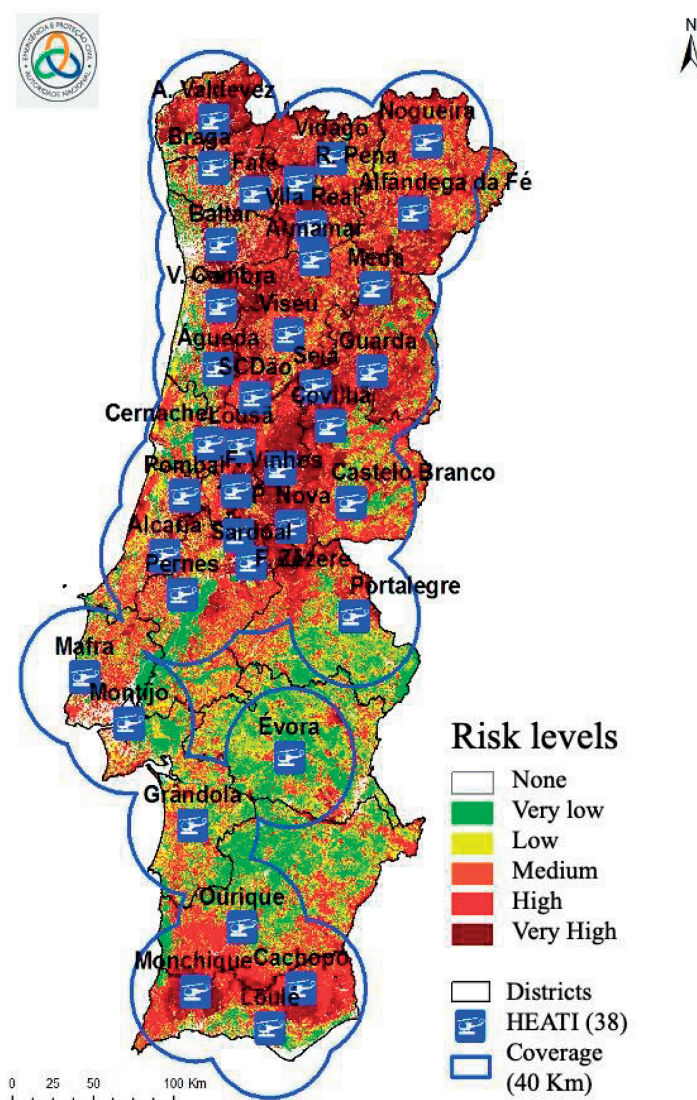


Figure 3 – Distribution and area of operation of ATI aircraft

Source: ANEPC (2020).

The aircraft used for ATA, which by definition occurs after ATI operations have failed, do not require such high readiness and proximity to the objectives. As the most relevant aspects are payload capacity, autonomy in the theatre of operations, and the effectiveness and frequency of water discharges, ATA operations are usually carried out by medium and heavy aircraft (OTI, 2019a). These aircraft have greater range and autonomy than ATI aircraft and thus require a more robust aeronautical infrastructure. Therefore, they are fewer in number and are not as dispersed throughout the territory, as defined by the ANEPC (Figure 4).

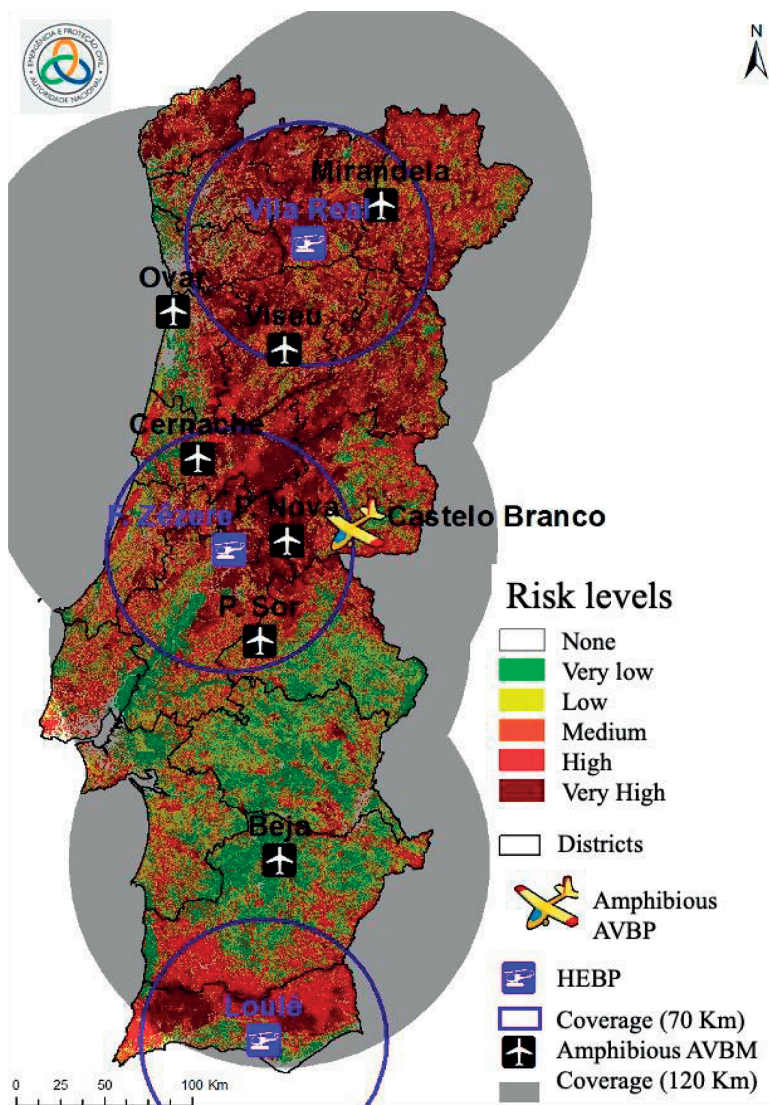


Figure 4 – Distribution and area of operation of ATA aircraft

Source: ANEPC (2020).

The ANEPC has exercised its mandate by defining the device for 2020 (outlined in Table 7), which will be complemented by three aircraft from the SF: a C-295M available on an on-call basis; an EH-101 and an AW-119 assigned to an ACC.

Table 7 – ANEPC device (2020)

CAPABILITIES	PHASES				
	01JAN-14MAY Level I	15MAY-31MAY Level II	01JUN-15OCT Levels III/IV	16OCT-31OCT Level II	01NOV-31DEC Level I
HEBL (Light Helitanker)	10	14	26	14	10
HEBM (Medium Helitanker)		12	12	12	
HEBP (Heavy Helitanker)			3		
AVBM/AVBP (Medium/heavy air tankers)	4	8	16	12	4
AVRAC (Reconnaissance, assessment and coordination aircraft)		2	2	2	
TOTAL	14	36	59	40	14

Source: ANEPC (2020).

4.2.2. The Air Force's current firefighting capability

As section 4.2.2.1. explains, at this time the PoAF's firefighting capability is limited, as it mainly relies on leased aircraft, and as such does not yet meet the State's need for a permanent, relevant capability.

The CEMFA is responsible for managing all aircraft leasing contracts through the GCMIR. Five ANEPC contracts were transferred to the PoAF (all of which have since ended), and the PoAF has already celebrated nine contracts for 2019/2022 and six for 2020/2023.

4.2.2.1. State capabilities transferred to the Air Force.

Three inoperative HEBP KAMOV 32A11BC without an active operation and maintenance contract and three ECUREUIL AS350B3 Light Helitankers (HEBL) with an operation, maintenance and continuing airworthiness management contract in force until 2023 (PoAF, 2017, p.7).

4.2.2.2. Capabilities owned by the Air Force.

Five HEBL AW-119MKII KOALA have been acquired to replace the ALIII, four of which have already been delivered. As three are currently operational, Initial Operational Capability (IOC) has been reached. Full Operational Capability (FOC) should be reached shortly after the last aircraft is delivered. After this phase, it will be possible to begin training helicopter pilots, conduct search and rescue operations along the coastline from Manoeuvres Airfield No. 1, as well as provide support to some operations, as the previous System of Arms (SA)

did. As for RFF, once FOC is reached, the limited number of available aircraft will only be sufficient for some reconnaissance, assessment and air coordination missions. In order to start building this capacity, the PoAF has asked the MDN to activate the option to purchase two additional AW-119MKII KOALA aircraft; however the request is still pending approval. An important aspect to remember is that the ATI mission will require the acquisition of a significantly larger number of light aircraft than what is currently available (cf. § 4.2.3).

As for monitoring, reconnaissance and assessment missions, the PoAF already owns aircraft equipped with sensors and state-of-the-art technology, such as real time imaging, communications and data transmission (the C-295M and the P-3 Cup+). Despite having a heavy operational cost, these capabilities are vital for decision making and for implementing RFF measures and tactics (PoAF, 2017, p.5).

While they do not constitute a separate capability, some of the surveillance missions carried out in 2019 included leased UAS to test and develop the concept, with encouraging results. The goal is to broaden the use of these platforms over the next years (CA, 2019a). However, one of the direct repercussions of the recent coronavirus pandemic has been a shortage of human resources. This has highlighted gaps that can be mitigated by using effective complementary means during the prevention, suppression and relief phases, as provided for in the integrated framework for rural fire management. As building a UAS capability was deemed quicker and less expensive, CMR No. 38-A/2020 of 18 May authorised the urgent acquisition of 12 Class I UAS⁴ for use in DECIR 2020. These aircraft are still being delivered to the PoAF, pending confirmation of compliance with the tender specifications.

4.2.3. Capabilities to be built by the Air Force

By decision of the Portuguese Government, CMR No. 139/2018 of 4 October establishes the GAI and tasks it with elaborating a proposal for the acquisition of a permanent state-owned capability, among other responsibilities. To that end, the GAI drafted and delivered a proposal and a timetable for implementing the device (GAI, 2019), which consists of a set of HEBLs for ATI operations, available year-round, medium and heavy aircraft (helicopters and fixed-wing aircraft) for ATA, and aircraft for surveillance, observation and aerial coordination, including Class II⁵ UAS. The latter will complement the 12 that are still being delivered, and will provide more autonomy, speed and altitude, which are vital characteristics in complex scenarios. Based on this report, the PoAF has submitted a proposal for a CMR to the Council of Ministers (which is still pending approval), listing the resources to be acquired, the timetable and the costs of building this capability.

Therefore, the capabilities that will be built should be those listed in the PoAF's proposal, and should be implemented gradually until FOC is reached, which will occur in four years, as shown in Figure 5 ("D" represents the year of the first delivery), thus progressively reducing the amount of leased aircraft.

⁴ Class I – Unmanned Aerial Vehicles (UAV) weighing up to 150 Kg (Ministry of Defence, 2017, p.18).

⁵ Class II – UAVs weighing between 150 kg and 600 kg (Ministry of Defence, 2017, p.18).

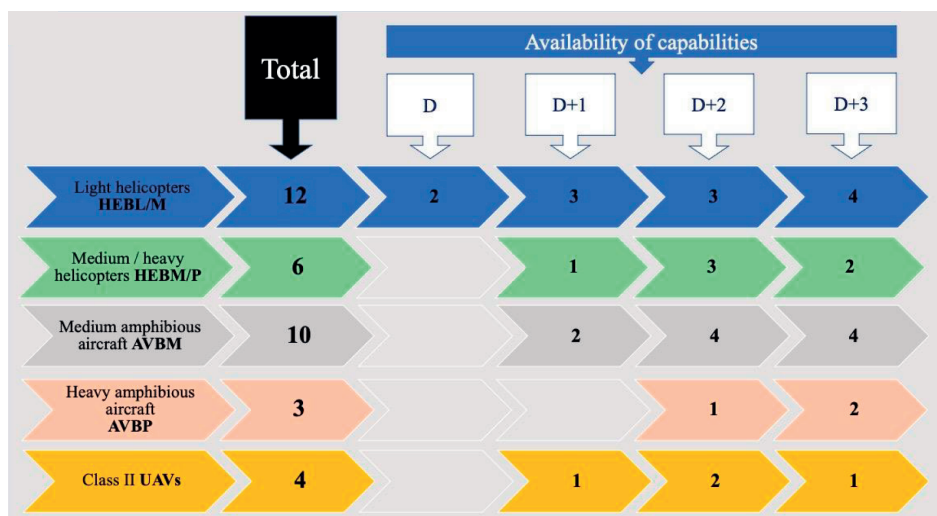


Figure 5 – Capabilities to be acquired

4.2.4. Resources required to build the capability according to DOTMLPFI vectors

4.2.4.1. Doctrine

The PoAF has not published any doctrine on the type of mission addressed in this study. There are no studies in its archives that address the operations concept (a critical aspect that affects all DOTMLPFI vectors) or the operational level. Furthermore, the last RFF missions carried out by the PoAF took place in 2009. Since then, the Branch's statistical yearbooks record only occasional collaborations for Reconnaissance, Assessment and Air Coordination missions.

For P. M. Santos (email interview, 10 March 2020), the lack of doctrine, experience and courses on RFF constitute a gap for the PoAF, and it would be useful to analyse foreign systems and acquire experience through exchange programmes for crews and operators.

The situation is different with regards to UAS, as there are already strategic guidelines for their development, integration and use (PoAF, 2013). The PoAF is currently developing a publication on the use of Class I UAS in operations (the class that was field tested in Lousã in 2019 (CA, 2019b)). This publication can be updated and adapted for operations with Class II UAS.

4.2.4.2. Organization

No changes are expected to be made to the PoAF operations concept, as only some changes and adaptations will be required at the level of staff, logistics, operations, infrastructure and legislation, which will depend on the aircraft to be acquired (PoAF, 2017).

These capabilities should be integrated into the PoAF according to the new principle of “centralised command and distributed control” (Goldfein, 2017, cited in Pereira, 2019),

which states that, in the absence of superior orders, there should be freedom and authority to take disciplined and informed action, and that this authority is critical in scenarios with multiple actors.

The coordination with the ANEPC and with the departments to which the C2 of air capabilities is delegated should be defined through interagency protocols (PoAF, 2017).

The PoAF must define requirements, issue calls for tenders, and award and monitor the procedures until the operation is launched. As for managing the leased aircraft (tenders and contracts), the PoAF has already adapted by creating the GCMIR (Decision No. 53/ECMFA/2018 of 8 November).

With regards to involving the national aeronautical industries in the Research, Development and Innovation (RDI) of components (specifically in the case of UAS), over the last years the PoAF has been developing partnerships with national companies with solid results in the field. Therefore, it should continue to promote RDI, experimentation and operational testing of UAS and sensors to develop multipurpose capabilities that can be used in a dual-use logic. This type of activity does not entail any organizational changes, and will have economic benefits in the long run (CA, 2019a, p.37).

Furthermore, the AF Academy Research Centre currently has several RDI projects under development in collaboration with the Defence Technological and Industrial Base and the National Scientific and Technological System (Air Force Academy, 2020).

4.2.4.3. Training

This is a fundamental vector for training the various experts. It is common to all phases, from building to sustainment, and can even be required during the modernisation and alienation phases.

The process includes military basic training, technical training, and the training to establish and maintain qualifications (Portuguese Government, 2015). This is a slow process because to become qualified, staff must acquire experience, which is assessed by the number of logged missions and flight hours (for crew members) or hours of maintenance work (for mechanics).

J.P. Vicente (op. cit.) states that the number of military personnel should be appropriate to the new mission, and that guidelines to recruit pilots through outsourcing contracts should be defined and implemented, as the PoAF does not have the resources to train the staff required at this stage.

Figure 6 shows the average training times of Contract Personnel (CP) by speciality, based on the curricula defined by the PoAF Training Directorate (DINST). UAV operators are subdivided into category (officers and sergeants) and area (mechanical engineers and operators). The average training times were based on the fact that this capability requires considerably less time to master.

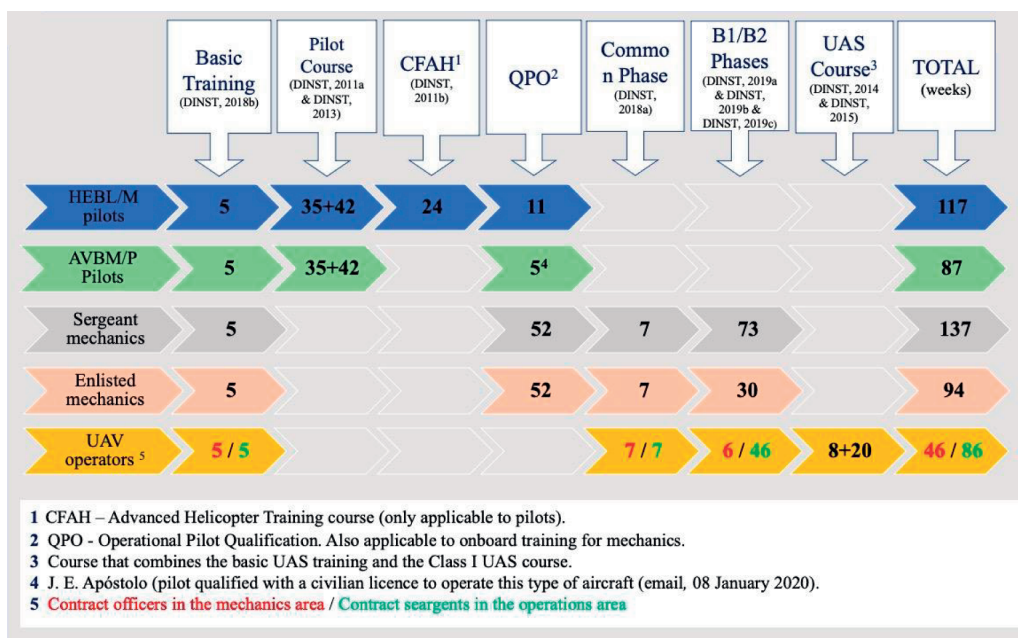


Figure 6 – Training times by CP speciality (in weeks)

Source: Based on Training Directorate (2011a, 2011b, 2013, 2014, 2015, 2018a, 2018b, 2019a, 2019b, 2018c).

4.2.4.4. Material

This vector includes the acquisition of all aircraft and maintenance, logistic sustainment and support equipment and materials required to ensure the readiness and sustainment of the AS and their C2 systems until the end of their life cycle.

As J. P. Vicente (op. cit.) points out, having different AS has a negative effect on training, qualification and logistics support chains. Therefore, it is not advisable to acquire different models of the same type of aircraft.

Furthermore, the C2 system must be capable of receiving and processing all communications and real time information from both the aircraft and the ANEPC. According to E. F. Craveiro (op. cit.), the C2 capability has significant gaps. One of those gaps is the lack of a communications system that integrates all ground, air and space capabilities and a fusion center that integrates critical rural fire prevention, coordination and mop-up capabilities, which are critical to accomplish the RFF mission and to improve the effectiveness, efficiency and safety of operations.

4.2.4.5. Leadership and Education

A new “non-military” capability involving external agencies requires a new mindset to streamline processes and facilitate coordination between all agents, as well as to raise overall awareness about this type of mission. Nevertheless, P. A. Costa (op. cit.) is optimistic with regards to this dimension because the aeronautical culture is robust and the PoAF already has a strong C2 and logistical network in place.

P. M. Santos (op. cit.) considers that the lack of protocols, courses, training and exercises between the agencies involved in this mission constitutes a gap that, when addressed, will have a positive influence on this dimension.

4.2.4.6. Personnel

Personnel shortages are a limitation common to all AAFP branches, including the PoAF. To build this capability in the PoAF, the required personnel must be recruited in a timely manner. The staff numbers are directly linked to the aircraft that will be acquired, the desired readiness and the number of units to be formed. The type of contract scheme used should not only meet urgent needs in a timely manner but also be sustainable in the medium- to long-term.

For J. P. Pires (face-to-face interview, 13 February 2020), the most relevant gap is the shortage of personnel, as it depends on recruitment and retention and has an impact on training and on the staff's level of experience. It should be noted that all PoAF interviewees agree with regards to the current personnel shortage, to the difficulty recruiting and retaining staff, and to the time it takes to train them.

Directive No. 2/CEMFA/2014 of 25 February, which defines the personnel modules that will operate and maintain the AS, states that the staff numbers correspond to the personnel directly involved in the operation and maintenance of each AS according to mission type, operations concept, characteristics and maintenance concept, and the effort scheme that will be applied. It should be noted that this document presupposes that all personnel have prior experience in the operation and maintenance of the AS in question.

The staff numbers required for the device proposed in 4.2.3 and shown in Figure 7 have been extrapolated from the above analysis and from extant studies (PoAF, 2017, p.22).

Type Air Unit # Aerial capabilities	Qualification	Planned module (Staff)	Comments
HEBL 552 Squadron  15	Pilots Maintenance Fleet management	45 (20) 60 (27) 3	Data provided by 552 Squadron Commander (email, 08 January 2020)
HEBM/P New squadron  6	Pilots Maintenance Fleet management	36 70 2	
AVBM/P New squadron Medium Heavy  10 3	Pilots Maintenance Flight mechanics Fleet management	48 60 9 2	
Class II UAS New squadron  4	Operators (Operation and maintenance) Fleet management	15 2	The level of ambition for four UAS with 1,500 flight hours / year of operation, maintenance and sustainment (Air Command, 2019, p.38) was defined before the decision to purchase 12 Class I UAS, and should be reviewed in the future.
C2 Structure	Operations Cell	13	Data provided by the head of the Air Command AOC (email, 26 March 2020).
GCMIR Teams	Inspectors	3	Data provided by the GCMIR deputy director (email, 26 March 2020).
Total		321	This total does not include the staff of Squadron 552.

Figure 7 – Total staff numbers by AU

Source: Source: Adapted by the author from PoAF (2017).

Furthermore, as an AU integrates military personnel with different levels of experience, the capabilities described cannot be built using only newly trained personnel. Addressing this gap will require transferring staff between similar AU to maintain the required level of experience, a procedure that will naturally be rolled back over time.

4.2.4.7. Facilities

The required infrastructure usually covers four areas: operations; maintenance; readiness and support. Depending on the availability of the existing infrastructure and the definition of the new PoAF device, which will be influenced by the decision on the Montijo-Lisbon Complementary Airport, there may be a need to build or even to adapt some AUs and perhaps some of the ACCs. In fact, while awaiting further guidelines from the Ministry, some changes to the device have already been made, such as the transfer of the 101 Squadron to Beja Air Base No. 11, which required changing the existing infrastructure (Borrego, 2020).

As for the new HEBL, it would make sense to integrate them into the 552 Squadron, which has the same type of aircraft and mission, thus streamlining the process. As the remaining aircraft are an entirely new capability in terms of type, mission and existing models, they should form a new AU.

While UAS are mobile and can be operated from any location, they require permanent physical facilities for fleet maintenance and support. The PoAF Military and Technical Training Centre has facilities that can be adapted for the purpose, or new facilities can be built in another location that meets the strategic guidelines.

4.2.4.8. Interoperability

According to J.P. Vicente (op. cit.), a more robust C2 system is required to enable interoperability with the different agencies, both in flight and on the ground, using compatible equipment for real time voice and data transmission in extreme scenarios. To achieve this interoperability, all stakeholders must share the same doctrine and operational procedures. Thus, all acquired capabilities should be interoperable and allow for dual use.

Their operation should not be a problem given the PoAF's experience in joint / combined operations and in coordinating and cooperating with other agencies (e.g. the NATO Lisbon Summit, EURO 2004, the visit by His Holiness the Pope, among other events).

4.2.5. Brief overview and answer to SQ2

The answer to SQ2 is provided in Table 8, which outlines all actions that must be taken to build a RFF capability in the PoAF. These actions were organized according to the DOTMLPFI vectors with which the types of aircraft that have been identified as future State capabilities must comply.

Table 8 – Actions that must be taken to build the RFF capability

	HEBL	HEBM/P	AVBM	AVBP	UAS
Doctrine	- Analysing the RFF doctrine of benchmark countries.				
	- Creating the Operations Concept. - Creating the Operating Procedures Manual.				- Updating. - Adapting.
Organization	- Defining requirements. - Drawing up calls for tenders and awarding contracts. - Involving the national aeronautical industry in RDI projects. - Integrating the new capabilities according to the principle of “Centralised Command” and “Distributed Control”. - Establishing protocols to enhance coordination with all stakeholders.				
Training	- Training crews and mechanics. - Ensuring that all staff obtain and maintain RFF qualifications. - Holding joint courses and exercises with foreign stakeholders and organizations. - Using outsourcing.				- Training operators and operations personnel.
Material	- Developing the C2 system by incorporating and integrated RFF communications and data system. - Developing the fusion centre concept. - Acquiring AS (identified in Figure 8). - Providing logistic support to the AS at the required readiness.				
Leadership and education	- Changing mindsets to promote interaction between the institutions. - Streamlining processes, especially in terms of coordination and C2.				
Personnel	- Recruiting and training pilots, mechanics, managing the fleet, GCMIR and C2.				- Recruiting and Training operators
Facilities	- Adapting existing infrastructures.	- Building operational, maintenance and support infrastructures.			- Building or adapting existing infrastructures
Interoperability	- Ensuring full interoperability between all stakeholders. - Enabling dual use.				

4.3. Proposed Model to Build an Air Force Capability and Answer to the RQ

The answers to the SQs provided the basis for the model that will answer the RQ.

The model has a life cycle of four years that begins with the year of delivery of the first aircraft, marked “D”, and is subdivided into quarters, marked “Q”, and comprises three distinct phases which sometimes overlap: Phase I; Phase II and Phase III. A period of one to two years precedes this model, during which a set of processes known as “Initial Conditions” must be completed. These processes include securing funding, defining requirements, drawing up protocols, launching calls for tenders and awarding contracts, and are crucial to develop the next phases. Several actions included in this model are linked by arrows to indicate a direct dependence between them. This means that any delay or interruption to an action will entail a delay or interruption to the action(s) that follows it.

Phase I, “Preparation and Planning”, continues to include the drafting and monitoring of the contracts for the leased aircraft, which should end precisely when the new capabilities are delivered. Increasing the State’s capabilities and improving their readiness to increase efficiency implies a corresponding reduction in the number of leased aircraft. Therefore, the contracts will be reviewed at the end of the four year-

period. This phase begins with securing funding, which should not only cover the first steps to acquire the resources and to make payments in stages as and when deliveries are made, but also the support and operation of the installed capabilities when they reach FOC. It is during this phase that the doctrine for operation and use is drafted, and that the infrastructures are built or adapted. This process is expected to have a duration of one and a half years and should be completed before IOC for each capability is reached.

Phase II, or “Capability Building” is the phase that involves the most complex processes, as well as the longest in terms of implementation time. These processes include recruitment, training and qualification of military personnel and the delivery, adaptation and start-up of the acquired AS until they reach IOC. Recruitment may be the most complex problem to solve because it is largely due to factors outside the organization. Thus, any implemented incentive measures should will also increase retention, as most military personnel receive extensive training. Recruitment includes not only the crews (pilots and mechanics) that will operate the new AS and allow for more dispatches, but also the personnel that will operate the UAS, as well as support and C2 personnel to staff the new missions. Another limitation is that the PoAF does not have the resources to provide the required training. Therefore, for this phase to be carried out within the established timeline, training, particularly pilot training, will have to be outsourced.

The final phase of the model, Phase III or “Operation”, starts when all built capabilities reach IOC and ends when they reach FOC. This phase includes a training period that ideally includes exercises and/or exchanges with organizations with experience in the mission so RFF crews can acquire some experience. At this stage, the permanent RFF capability should already have about 50% of the required aircraft and an appropriate level of experience in the mission. However, it should be stressed that this model only addresses the immediate need to build this capability. Therefore, it will have to be implemented in addition to all other annual processes, including budget, recruitment, logistical support processes. That is, in the future, this expanded mission will require increased financing to maintain the human and material resources allocated to execute it (e.g. a significant increase in flight hours).

Thus, the answer to the RC consists of the model outlined in Figure 8, which describes how to build a RFF capability in the PoAF.

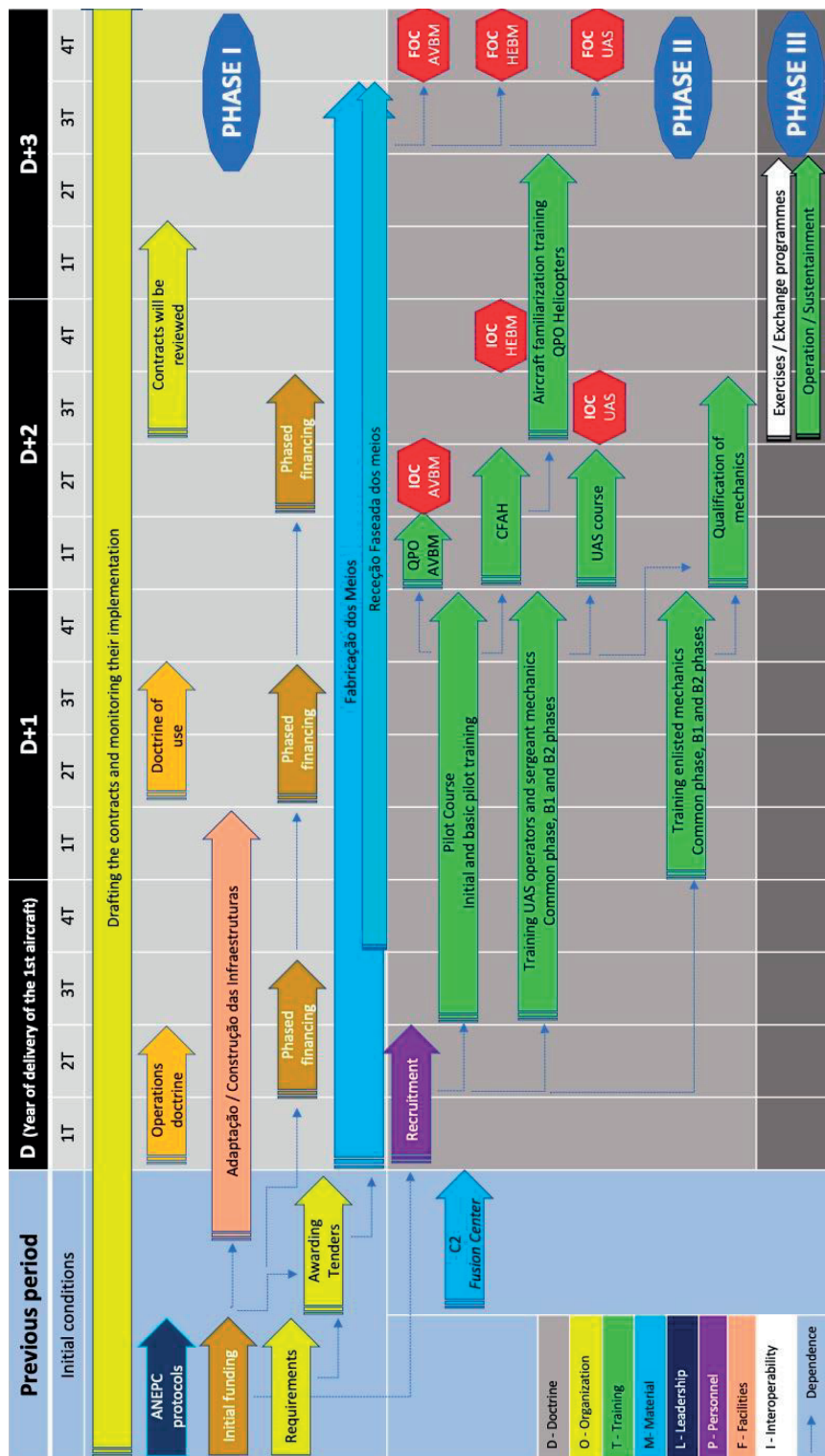


Figure 8 – RFF capability building model

5. Conclusions

The PoAF participated actively in the RFF mission until the mid-1990s, providing specialised capabilities such as equipped aircraft and qualified operators. Since then, this collaboration has been drastically reduced and the PoAF has only participated occasionally in assessment and coordination missions.

Over the last decade, both the RFF concept and management models and the Portuguese *modus operandi* have undergone several changes:

- In 2011 the PoAF effectively lost this capability and, although a study was conducted to recover the mission, it was not followed through;
- In 2014, with the termination of the EMA, the State's resources were transferred to the ANPC;
- In 2015, a Working Group was created and tasked with finding a solution to effectively involve the PoAF in this mission;
- The 2017 fires caused such human and material losses that in-depth studies were required to ascertain the causes, which in turn led to profound changes to the management and operation models, including the creation of a new system called SGIFR;
- Also in 2017, the AGIF was created and the decision was made to task the PoAF with the command and management of the State's aerial firefighting capabilities and others that may be needed on a seasonal basis. Since then, a wealth of legislation has been published to regulate this profound change.

This study addresses these changes, as well as the fact that the PoAF lacks this capability, by proposing a model to build a state-owned RFF capability in the PoAF.

This study used a case study research design, an inductive reasoning methodology and a research strategy based on qualitative analysis. The data were obtained through nine semi-structured interviews with senior and middle managers from the PoAF and the ANEPC, as well as by reviewing and analysing the legislation, regulations and military, national and NATO publications.

The object of the study, *Building a State-owned RFF capability in the Air Force*, was delimited: in terms of time, to the period from 2011 to the present day, in addition to a medium-term prediction; in terms of space, to the National Territory and the PoAF, and; in terms of content, to the entire process of building a RFF capability effectively and efficiently. The object of study was examined by answering a RQ "How can an RFF capability be built in the PoAF?" and two distinct SQs "What linkages should be established between the PoAF and the ANEPC to ensure that the former can exercise the command and management of the aerial RFF capabilities effectively and efficiently?" and "What actions are needed to build the PoAF's RFF capability?" These questions were based on two SO.

To achieve SO1, "To analyse the command structure and the PoAF and ANEPC agencies responsible for managing the aerial RFF capability", the study began by analysing the laws and regulations that underpin the involvement of the AAFF and the ANEPC in this type of mission.

Having done this, the responsibilities for managing the aerial capabilities were ascertained. The ANEPC is responsible for defining the device for the following year in

coordination with the PoAF, so the latter can draw up the contracts for the leased aircraft in an efficient manner, avoiding direct award contracts whenever possible. The PoAF has set up a centralised office to manage these resources and will have to enhance its C2 system with the addition of a Fusion Centre, an integrated communications system and a GPST in all aircraft.

The military regulations on C2 and the answers to the interviews revealed which types of authority can be delegated at different levels of command: strategic, operational and tactical. However, for both leased and state-owned UAS there is no delegation of authority to the ANEPC. As for the other capabilities, the CA has TACOM over all capabilities, whether or not they are assigned to an ACC or located in a UB, and TACON is delegated to the ANEPC CODIS or CONEPC, depending on the type of capability.

This study has also identified the linkages between the PoAF and the ANEPC that should be established on a permanent basis at different points of the chain of command.

With regards to SO2, “To identify and describe the actions that must be taken to build a RFF capability in the PoAF”, in order to comply with CMR No. 139/2018 of 23 October, the PoAF must prepare a proposal for a permanent aerial capability for civil protection operations. The proposal should include the type and quantity of resources allocated to RFF missions.

In light of the CRM proposal submitted by the PoAF, the capabilities under study should be integrated into a broader civil protection system that includes PIM and support and emergency missions as well as military missions to increase their effectiveness and efficiency, that is, to enable their dual-use. To achieve this, the PoAF should acquire twelve HEBL, six HEBM/P, ten AVBM, three AVBP and four Class II UAS to complement the 12 Class I UAS already acquired.

To that end, and to answer SQ2, this study listed all resources required to build this capability according to the DOTMLPFI vectors.

To answer the RQ, the study proposed a model that begins on the year of delivery of the first aircraft and has a foreseeable duration of four years, assuming certain initial conditions are met. Some of these processes, such as securing financing, defining requirements and drafting calls for tenders and awarding contracts (for an expected period of about two years) are highly bureaucratic and are outside the PoAF’s control, and are therefore difficult to account for.

The model is divided into three phases, which, although conceptually different, may overlap, with certain actions occurring simultaneously.

Phase I involves preparation and planning processes and continues to include the drafting and monitoring of leasing contracts, the construction/adaptation of infrastructure, monitoring the manufacture of the acquired aircraft and securing funding to pay for the acquired equipment as it is delivered. Still during this phase, but before IOC is reached, the operation and use documentation will be prepared. The date of renewal of all contracts must match the delivery date of the capabilities to avoid overlaps and increase efficiency.

The entirety of Phase II is devoted to building the capability in terms of human resources and aviation resources. This phase begins with the elaboration of a timeline for

recruiting personnel, training them in the different specialities, and ensuring they acquire the required qualifications, and ends when the built capabilities reach IOC. At this stage, the study identified a shortage of human resources. The PoAF does not currently have the ability to provide training, and particularly pilot training, therefore, this step have to be outsourced. Other essential requirements are to enhance the C2 capability by integrating a communications system and creating a Fusion Centre.

Phase III involves operational aspects, such as acquiring experience in the RFF mission after IOC has been reached. This will be done through exercises and exchange protocols until FOC is reached, by which time all human and material resources will have been acquired.

Thus, this study answers the RQ by proposing a model that describes and defines the different phases involved in building a capability to accomplish the RFF mission effectively and efficiently. Furthermore, the study identified that building these capabilities presents significant challenges due to factors external to the PoAF, such as financing and the ability to recruit, train, qualify and retain the required human resources, as some of these processes are long and others are highly complex.

This study's **contributes to knowledge** by analysing the most recent relevant documentation on a timely and innovative topic and by providing a model which the Branch can use as a guiding document to implement different capabilities. The study revealed that urgent decisions must be made at different levels, from the Ministry to the PoAF, as the following phases will be both slow-going and complex.

One **limitation** is the fact that, because the study addresses a new type of mission, the PoAF has not published any relevant studies on the topic. Another limitation is the fact that this topic has undergone several changes, especially over recent months, which required successive adaptations.

As qualified human resources are critical for this type of mission and the difficulty recruiting and training staff is a complex problem to solve, **future studies** may examine how to implement and sustain this capability in the medium to long term, either by contracting personnel or by admitting personnel into the career staff. A separate study may conduct a financial analysis to identify funding sources and schemes to implement the proposed model throughout the entire life cycle until the alienation phase.

Building capabilities that are both fit for purpose and provide lasting value requires deep strategic foresight, research and an understanding of the future operating environment.

Allied Command Transformation (2020)

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