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Executive Summary

This Research Paper considers the role of Italian fighter aircraft in missions abroad in the post-Cold War period, the current Air Power's trends and doctrinal evolution, as well as possible future scenarios of crisis management operations in the "Enlarged Mediterranean" envisaging the use of fighter aircraft. On the basis of such analysis, the needs of Italian military concerning fighter aircraft are outlined, and the possible procurement options to satisfy them are discussed. The last chapter addresses the Italian participation in the F-35 procurement programme and its industrial aspects.

The first chapter is aimed to outline the role of Italian fighter aircraft in crisis management operations that occurred in the last 24 years. Several missions abroad have been considered: the First Gulf War in Iraq (1991), the NATO operations in Bosnia-Herzegovina (1993-1998), in Serbia and Kosovo (1999) and Afghanistan (2001-2014), as well as the multinational air campaign in Libya in 2011, which came under NATO command after the first phase.

In the First Gulf War, under a UN mandate, the US led a "coalition of the willing" including 35 countries to conduct Operation Desert Storm aimed at freeing Kuwait territory occupied by Iraq. The bulk of air sorties was flown by the US (89,1%), while a non-marginal contribution was provided by the UK, Saudi Arabia, Kuwait, France and Italy. In particular, Italy deployed 8 Tornado which flew 2,326 sorties during the 40-day long air campaign. The military operation ended when Iraq withdrew its forces from Kuwait and accepted the ceasefire conditions.

Between 1993 and 1998, under UN mandate, NATO undertook several operations to deal with the civil war in Yugoslavia and particularly in Bosnia-Herzegovina. They included: Operation Sharp Guard in sup-

port of maritime embargo to combatants (1993-1996); Operation Deny Flight aimed to enforce a No-Fly Zone (NFZ) over Bosnia-Herzegovina (1993-1995); Operation Deliberate Force to protect UN-declared "safe areas" by targeting Bosnian Serb military capabilities (1995); Operation Joint Endeavour (1995-1996) a peace-keeping ground mission with considerable air support including fighter aircraft; finally Operation Deliberate Guard to support Operation Joint Guard (1996-1998). Italy contributed to all missions by deploying Tornado, AMX and AV-8B, conducting 5,023 sorties and flying for 11,973 hours. Italy also provided the military bases and the logistics support indispensable to conduct these operations. The set of NATO crisis management operations was instrumental to force the various Yugoslav parties to sign the Dayton Agreement in 1995, and to enforce it in the following years.

On March 1999 NATO undertook Operation Allied Force, aimed to put an end to the armed repression of Kosovar minorities conducted by the Serbian military and paramilitary forces. The air campaign lasted for 78 days with intense bombing against Serbian targets. Italy contributed with approximately 50 aircraft, including F-104, Tornado, AMX, reaching up 1,072 sorties and 2,903 hours of flight. Overall, the quantitative and qualitative effort of the Italian forces was highly regarded, as Italy was the third largest European contributor of aircraft and the fourth largest European in terms of number of air sorties. In particular, Tornado were utilized for Suppression of Enemy Air Defence (SEAD) tasks. As already happened for the operations in Bosnia-Herzegovina, Italian military bases and logistics support proved to be essential to conduct the air campaign. The operation ended in June 1999 with a military agreement between NATO and Serbia which envisaged the complete withdrawal of Serbian forces from Kosovo. The UN Security Council resolution 1244/1999 paved the way for the subsequent NATO peace-keeping mission in Kosovo.

Since 2001, the United States started operation Enduring Freedom in Afghanistan, with the contribution of several European countries comprising Italy, to undermine terrorist activities from groups linked to Al-Qaeda. Concerning the aerial component, the Italian contribution was mainly effectuated by AV-8B deployed on the Garibaldi aircraft carrier from 2002 to 2006, which carried on Intelligence, Surveillance and Re-

connaissance (ISR) and Close Air Support (CAS) operations, amounting to 328 sorties and 860 hours of flight. In the meanwhile and starting from 2001, the International Security Assistance Force (ISAF) has been deployed in Afghanistan under a UN mandate, in order to actively support the establishment of a peaceful and stable Afghan state that will not collude with Al Qaeda or other terrorist groups threatening NATO members. In August 2003, NATO took over the command of ISAF and extended the area of operation to cover the entire country with the contribution of fifty NATO members and partners. Italy has participated to ISAF since 2002. Italian General Mauro Del Vecchio took command of the whole ISAF operation between 2005 and 2006. Since the establishment of ISAF Regional Commands in 2006, Italy has maintained the Regional Command West. As of February 2014, Italy had 2,165 units on the ground, ranking fourth among contributing nations. Concerning air capabilities, in 2007 the Joint Air Task Force was established in Kabul as part of the Regional Command West. As of 31st December 2013, the fighter aircraft deployed by Italy, including Tornado, AMX and AV-8B, conducted a total of 3,301 air sorties in theatre, and 8,477 flight hours. Most sorties concerned ISR activities, but fighter aircraft were also used for CAS to ground troops engaged with insurgents. The ISAF mission is set to last until the end of 2014, when the transition of security responsibilities to Afghan national security forces and civilian authorities will be completed.

The reasons that led some NATO countries to plan and conduct a prolonged air campaign in Libya in 2011 are still a contentious issue and an object of studies and analysis. In March 2011 the UN Security Council resolution 1973 authorized the use of force, including the establishment of a NFZ to protect civilians and civilian areas targeted by the Gaddafi loyalist forces. On 19 March the US-led operation Odyssey Dawn started with French and British military support. On 31 March, NATO formally assumed command of the Operation Unified Protector, which lasted until 31 October 2011. Both operations resulted in the establishment and enforcement of a NFZ over the entire Libyan territory, as well as in targeting of Libyan government's military and paramilitary forces. The military operation ended with the collapse of the Libyan government, without, nonetheless, any follow-up NATO mission to support the stabilization of the country. Italian military contribution was three-fold. First, in a

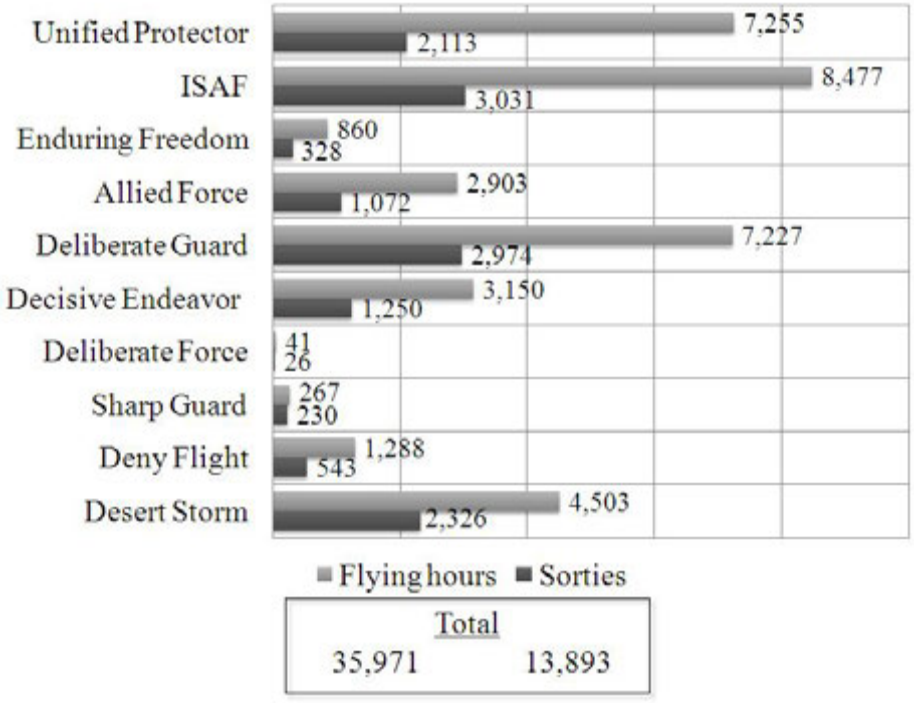
chronological order, the Italian Navy led the NATO naval operation to enforce the UN arms embargo. Second, the use of military bases in the Italian territory was crucial to carry on operations, which could not have been possible without such a large footprint close to the operational theatre. Third, and most importantly for the focus of this study, Italian aircraft conducted about 7% of the total allied missions in the Libyan skies. The bulk of committed Italian air capabilities were fighter aircraft including F-16, AMX, AV-8B, Eurofighter and Tornado. These aircraft executed different types of missions, such as SEAD, Defensive Counter Air (DCA), Offensive Counter Air (OCA), Strike Coordination and Reconnaissance (SCAR) and ISR activities. The Italian armed forces totalled 2,113 sorties flown and 7,255 flight hours during operations in Libya, being this the largest air campaign Italian Air Force has been engaged in since World War II.

Considering the aforementioned 10 air operations,[1] Italy has deployed its fighter aircraft 90% under UN Security Council mandate, and 80% under NATO's chain of command and control. This insight shows not only Italy's deep integration and commitment to those organizations, but also the strong influence of a globalized international system which requires the management of crises by the whole international community. Moreover, Italy's operational participation in missions abroad envisaging the use of Air Power has grown in qualitative and quantitative terms over the last 24 years.

Italy's use of fighter aircraft in the post-Cold War period has gone hand in hand with developments occurred in Air Power's doctrine. The second chapter of this Research Paper outlines the doctrine fundamentals and trends stemming from the recent operational experience, with the aim to understand current and possible future ways to utilize air capabilities, including fighter aircraft. Air Power is defined as the capacity to project power in the air to influence people's behaviour and the course of events. Coupled with increasingly capable technology, Air Power is a flexible, rapid, 24/7 available tool to influence the operating

[1] Desert Storm, Deny Flight, Sharp Guard, Deliberate Force, Decisive Endeavour, Deliberate Guard, Allied Force, Enduring Freedom, Unified Protector, and International Security Assistance Force (ISAF).

Figure 1. Italian Air Force activities in international missions



environment. As a result, Air Power can be considered as a force multiplier for deployed land and maritime military forces.

Overall, it is possible to identify four main roles in which Air Power finds its concrete application: Control of the Air; Intelligence, Surveillance, Target Acquisition, Reconnaissance (ISTAR); Engagement; Air Mobility. The first three roles are particularly relevant in relations to fighter aircraft. Achieving Control of the Air means being free to use a specific volume of airspace in a given period of time for one's own purposes, while denying its use to others, if necessary. Thanks to the acquisition of information, ISTAR activities contribute to planning activities and decision making during all air operations' phases. It improves the ability to gain and maintain information superiority, and aims to achieve Situational Awareness, that is having a full comprehension of the operational situation in theatre. In terms of Engagement, Air Power role includes various types of strike missions, with maritime and terrestrial targets.

In this context, some important trends seem to emerge from air op-

erations conducted in these latest 24 years. First, the recent operational experience has raised awareness at the political-strategic level that complex air operations require the availability of all air components to perform the four Air Power's roles, and that air capabilities are more and more intertwined among each other. Second, ISTAR is not provided only by dedicated platforms, such as the Remotely Piloted Aircraft Systems (RPAS), but by a number of sensors and systems embedded in a wide and complementary range of aircraft, including fighter. Third, Control of the Air should not be taken for granted: in Libya (2011), Kosovo (1999) and Iraq (1991) the priority of the first days of operations was still to ensure coalition's Control of the Air by destroying opponent command and control structures, most of its air defence fixed systems and combat aircraft. Fourth, with regard to Engagement, the use of Precision Guided Munitions (PGM) has exponentially grown from the First Gulf War to the Libya campaign. In the future, the need to attack individual targets accurately will continue to be paramount, especially to limit the number of collateral damages in highly populated areas.

Building on the analysis of previous crisis management operations, as well as on trends and doctrinal evolutions of Air Power, the third chapter of this Research Paper presents two scenarios, showing how air capabilities, in particular fighter aircraft, may be used in crisis management operations in the 2015-2025 timeframe. In the first scenario, it is exposed how air operations are undertaken to establish and enforce a NFZ, while the second outlines how air operations support land operations. Each scenario has been redacted on the basis of the same structure, which includes the following elements: Strategic Context; Mission Objectives; Critical Factors of the Operational Environment; Adversary Capabilities and Course of Actions; Air Component Course of Actions and Associated Capabilities.

Despite this Research Paper does not address the likelihood of these two scenarios, it is assumed that they are at least possible examples of air operations European countries such as Italy may join in the future. As a matter of fact, Italian fighter have been deployed in different contexts, that is in an interstate war (Gulf), in civil conflicts (Bosnia-Herzegovina, Kosovo and Libya) and in a failed state with some typical connotations of insurgency and civil war (Afghanistan). Indeed, armed conflicts will still

be a feature of the international security environment in the medium-long term, with conflict areas particularly concentrated in Africa, Middle East and East and South Asia. The phenomenon of "failed states" will also remain on the scene for long, especially if the level of violence in the aforementioned regions will not decrease. In this context, it is possible to imagine the future employment of fighter aircraft in those regions, either for combat or stabilization purposes. As one might argue that NATO will never go "that out of area," one might reply that probably at the end of the Cold War none would have expected to see NATO running peace-keeping operations in Kosovo first and in Afghanistan later, or carrying on military interventions in the Balkans and in Libya.

The analysis of past operational experiences, Air Power's trends and possible future scenarios of air operations pose a number of key questions that should be asked to Italian policy-makers, including civilian authorities – in primis the Parliament and the Government – and the armed forces. Therefore, the fourth chapter of this Research Paper aims to address such questions, to discuss the related procurement's needs of the Italian military, and finally to assess whether the F-35 procurement programme might be able to satisfy those needs or not.

The first key question is whether Italian participation in crisis management operations together with European and North American allies does serve national interests. The changes occurred in the international context make national interests affected by crisis, risks and threats occurring well beyond territorial borders. Globalization and economic interdependence have obviously played a fundamental role in this regard. The Italian participation in crisis management operations in the last 24 years has contributed directly or indirectly to protect and promote national interests. For example, the stabilization of Bosnia-Herzegovina, Kosovo and, generally speaking, the Western Balkans was a clear, direct national interest. Since the early 1990s, Italy had suffered both the flows of illegal immigrants from these regions and the emergence of illicit traffics or the development of organized crime. For that reason, international missions, including those conducted through Air Power, have been instrumental to pacify and stabilize a geographical area extremely close to the Italian soil and linked to Italy's economic system.

Italian participation in other missions abroad has served national in-

terests in a more indirect way. For instance, the active participation in NATO operations represents an investment in a kind of "insurance policy" for Italy's national security. Italy does not have sufficient capabilities to protect alone its security interests. In effect, they stretch well beyond national borders and include: safe trade routes in the "Enlarged Mediterranean," energy supplies from North Africa, Middle East and Central Asia, border control in the Mediterranean in relation to illegal immigration and maritime security. An active, reliable and stable Italian participation in all NATO missions is instrumental to gain the necessary credibility to push the Alliance to deal with the purposes of Italian international agenda. Furthermore, being these crisis management operations set up and led by international organizations, it allows Italy to share security risks and costs, to extend its intervention's range to protect national interests, and to enhance inter-allies solidarity. Finally, Italian participation in missions abroad is also a manner to maintain strong relations with its main security ally, the US. Being surrounded by unstable regions – from Western Balkans to the Southern Mediterranean shores – and unable as a "middle power" to shape the events in these regions on its own, Italy has traditionally relied on "asymmetric alliances" with stronger partners (such as the US) to address common security concerns. Italian participation in crisis management operations foreseeing the use of Air Power does not guarantee per sé the protection of Italy's national interests. Such protection depends, among other things, by the capacity of the Italian government to make the best of the military contribution provided vis-à-vis the allies. In this regard, Italy's participation in missions abroad, which also includes air operations, is a fundamental enabler for Italian defence and foreign policy.

If it is assumed that maintaining the capacity to project Air Power in crisis management operations does serve Italian defence and foreign policy, and ultimately Italy's national interests, the second key question is what kind of air capabilities are needed. As a matter of fact, the fighter aircraft fleet used so far will be phased out in the next decade. There is thus an unavoidable need to replace 253 aircraft belonging to three different line-ups, including 18 AV-8B of the Navy, 136 AMX and 99 Tornado of the Air Force. Many of them have been built in the 1980s, or even in the 1970s, and as far as their life-cycle reaches 35/40 years, they can-

not guarantee safety conditions to the aircrew anymore. Besides, one should consider that, although RPAS are likely to complement future air fleets, they will not yet replace manned fighter aircraft completely. In this regard, to identify Italian future air capabilities' needs, several lessons can be learned from missions considered in this study. First of all, interoperability constitutes a crucial requirement, since Italian aircraft – both from the Air Force and the Navy – have always operated within international coalitions. Second, the capacity to connect fighter aircraft to other platforms, from units on the ground to the command and control centres is fundamental: the aircraft should be "net-centric," that is being fully able to gather and disseminate information from and to the other nodes of the net. A third crucial need is the radar low-observability (also called "stealthness"), as it greatly reduces the chances of an aircraft to be shut down by the opponent air defence system. Finally, the fact that all considered crisis management operations have taken place beyond national territory makes "deployability" at strategic distance another fundamental need for air capabilities.

If it is assumed that keeping the capacity to project Air Power through crisis management operations does serve Italian defence and foreign policy, and ultimately Italy's national interests; if it is assumed that current Italian fighter aircraft fleet needs to be replaced by aircraft which should be interoperable, net-centric, low-observable and deployable; then the next key question for policy-makers is what procurement options are available to acquire the kind of air capabilities needed by Italy. In theory, a first option is to develop a European procurement programme bringing together the main European countries in terms of defence capabilities, namely France, Germany and the UK, aimed to develop a 5th generation fighter aircraft. Such an investment should have been done in the mid-1990s in order to deliver a fighter capability by 2020. Yet, this has not occurred, either because European countries preferred to invest in national procurement programmes, like France for instance, or because they preferred to cut the defence budget and so benefit from the so-called "peace dividends", as Germany did. As today there is no political will in Europe to invest in this kind of programme, such procurement option remains off the table because of the choices made by major European countries back in the 1990s. A second theoretical option for

Italy, in order to obtain needed air capabilities to replace old ones, would be to develop and build a ground-attack version of the Eurofighter, the fighter aircraft designed by Germany, Italy, Spain and the UK in the 1980s, with a full 5th generation strike capacity. Again, this option should have been undertaken at maximum in the early 2000s, through significant European joint investments in research and development activities, aiming to modify an aircraft which was not originally designed to fulfil such a ground-attack role. Given that members of the Eurofighter consortium were (and are) not willing to undertake this path, therefore this option is off the table too.

The third and last option to satisfy Italian military needs in terms of air capabilities is to acquire F-35 aircraft. It has been estimated that more than 3,000 F-35 units will be procured, 2,443 of them for the US armed forces, and the rest for other 12 countries (Australia, Canada, Denmark, Italy, Israel, Japan, the Netherlands, Norway, Singapore, South Korea, Turkey and the UK). This will permit high level of interoperability to those countries taking part to the procurement program. The F-35 presents all the advanced features typical of 5th generation fighter aircraft: it is equipped with sensors and computing capacity for data fusion in a net-centric perspective; its low observability is ensured by a number of elements, including its airframe's design, the configuration of its internal bays where weapons are stored and a specific type of painting. Moreover, the F-35 internal bays avoid that weapon's systems located on the external side would damage aircraft's aerodynamic, its speed or manoeuvrability; in turn, this diminishes fuel consumption while favouring the aircraft range and deployability. The latter is greatly augmented by the presence of a specific version of the F-35 (F-35B) capable of vertical take-offs and landing from aircraft carriers, for instance from Italian Cavour carrier. This is particularly important for Italy in order to maintain Navy's air capabilities, so far guaranteed by AV-8B aircraft.

If it is assumed that the F-35 is the only available option to procure an interoperable, net-centric, low-observable and highly deployable fighter aircraft to satisfy Italy's military needs to participate in crisis management operations, the last key question for policy-makers regards how to acquire this aircraft. In principle, two ways are available: either to participate in the procurement programme, or to buy F-35 "off-the-

shelf" that is on the marketplace. From a military point of view, participating in the procurement programme generates several positive outcomes. First, it boosts the "operational sovereignty" – that is the possibility to have platform, weapons' system and ISTAR's functions at your complete disposal, without relying on third parties for technology, updates, security of supply of various components – which is clearly reduced, if not depleted, in case of "off-the-shelf" acquisitions. Second, it allows Italian pilots to start as soon as possible their training with partners' aircrews – particularly US ones – thus enjoying immediate benefits in terms of interoperability. Eventually, the construction of the Final Assembly and Check Out (FACO) of Cameri, as part of the procurement programme, implies that the Italian Ministry of Defence will not have to spend more to build another facility to maintain and upgrade the 90 F-35 Italy has committed itself to buy for the Air Force and the Navy. Indeed, FACO is already set to become the Maintenance Repair Overhaul and Upgrade (MRO&U) center for F-35 based in Europe. Regarding the timeline of F-35's acquisition and its related cost, Italy has chosen to wait the sixth tranche of Low Rate Initial Production (LRIP) to buy its first aircraft at the cost of around 130 million dollar, way less in comparison to the 230 million dollar of the first aircraft produced. The cost at the full rate production is estimated to decrease at 85 million dollar per unit.

The fifth and last chapter of this Research Paper discusses the industrial aspects of the F-35 multinational collaboration and the Italian participation in the procurement programme. Italy participation in the F-35 programme began in 1998 when the left-wing government decided to invest 10 million dollar in the Concept Demonstration Phase. In 2002, the Italian right-wing government confirmed this choice by committing 1,028 billion dollar in the System Design and Development Phase. In 2007, the left-wing government signed the bilateral Memorandum of Understanding (MoU) with the US for the Production, Sustainment, and Follow-on Development Phase, with an investment of 904 million dollar. In 2009, the Italian Parliament approved the acquisition of 131 F-35. At the same time, Italy decided to build the FACO/MRO&U facility at Cameri. In 2012, the Italian government reduced the overall fleet number of F-35 from 131 to 90 (60 F-35A and 30 F-35B). Since Italy is involved in the F-35 programme as Level 2 partner, sharing roughly 4% of

the total cost, it has limited opportunities to influence aircraft's requirements.

The F-35 entails a radical change of the way to envisage a multinational procurement programme in the defence field. In fact, it is based on the principle of "best value for money", which implies a certain degree of competition among suppliers to offer the best price/quality ratio to the prime contractor – Lockheed Martin. This is quite new considering Italian industry's past experience in programmes based on the "juste retour principle", whereby cost-share divided among participating governments must equal the work-share among national industries composing the industrial consortium. Nevertheless, it has been considered necessary to apply these two concepts – competition and best value for money – with certain flexibility to avoid to "overstress" the supply chain. For instance, Lockheed Martin foresees the possibility of signing agreements with two different suppliers of a given item, as it deems strategic to having more than a single supply source – the so-called "strategic second sources" method. This is the case of the Finmeccanica company Alenia Aermacchi that has a "strategic second source" status for the F-35 wings.

The majority of supplier agreements with Lockheed Martin have a one-year term, as the US government decides the number of F-35 to be purchased year by year, influencing the production planning of the prime contractor. Such a management system seems to overstress the supply chain and it does not encourage sub-contractors to adopt long-term investments plans, because it has to take on its own the risk to make investments without the assurance that the volume of production will be guaranteed in the next years. Another critical issue regards the lack of Italian industries' participation in development and integration phases, characterized by a greater use of high technologies. Obstacles are mainly, but not only, due to US regulation such as the International Traffic in Arms Regulation (ITAR), as well as to American National Disclosure Policy.

Around 90 Italian companies are involved in the procurement programme, and so far the contracts awarded to the Italian industries have reached an overall value of 715 million dollar. Of this amount, 565 million dollar are related to the Finmeccanica group, mainly through Alenia Aermacchi, which is responsible for the construction of more than 1,200

wings. The term "wings" includes both the two semi-wings – more than 2,400 units – and the central cell of the aircraft holding them together, being this 30% of the entire airframe with significant engineering challenges. Concerning Small and Medium Enterprises (SMEs), they proved to be flexible and adaptable in offering the best value for money within the F-35 programme. However, they suffered more than larger contractors the one-year contracts approach, this practice discouraging them to make long-term investments.

The procurement programme presents potential revenues around 10 billion dollar for Italian industries, but this will depend on the ability to exploit the infrastructures created – first and foremost the Cameri FACO/MRO&U – to build components and to provide maintenance, support and upgrade, in particular regarding avionics and electronics. The Cameri site includes: a FACO facility to assemble the Italian F-35A and F-35B variants, the F-35A procured by Netherlands, and potentially the aircraft to be procured by other European partners such as Denmark and Norway; a wing construction facility which serves the entire procurement programme; the aircraft test facility aimed at testing low-observable performance, and the related final paint facility; buildings aimed to support F-35 operating by the US and allies in Europe. Being the only FACO outside US territory, Cameri represents a fundamental asset for the entire F-35 global production and maintenance system. Maintenance will also introduce significant technological developments and innovation because it will go hand in hand with the platform's upgrade and revision throughout its whole life-cycle of 30/40 years.

As a whole, the Italian participation in the procurement programme presents pros and cons, opportunities and challenges. In other past programmes, based on the juste retour principle, negotiations largely ended when the agreement on cost-share and work-share was reached. This is not the case of the F-35 programme. The new procurement approach based on the best value for money principle has imposed on the Italian industry to become more competitive and to take more risks in managing its own investments. It also requires the Italian military and government to assist the industry in this regard, by making an additional and constant effort in negotiating with US counterparts on technology transfer and other relevant aspects of the procurement programme.

Preface

Military expenditures seldom enjoy a popular position within the Italian public debate, except for experts and practitioners including the armed forces and defence industry. Therefore, the recent and still harsh polemics on one of the most important Italian defence procurement programmes of the last years are not surprising. Though, it is rather surprising that these controversies have basically regarded just one specific programme, almost omitting others which are financially more demanding.

In any case, the aim of this study is not that of analysing the reasons behind various polemics. Our purpose is rather that of grasping the core reasons which led Italy to find a future replacement for the current fighter aircraft of the Air Force and Navy, equipped with Tornado, AMX and AV-8B aircraft. Furthermore, we evaluate the way to satisfy military requirements by taking into account operational, logistic, technological and industrial aspects. The analysis is conducted by maintaining a realistic approach with regard to both international scenarios and the national and European industrial context.

We started from an historical overview in order to have a concrete idea of the action of Italian fighter aircraft during the post-Cold War period. It is a complex and still on-going historical phase, characterized by high level of uncertainty. This requires an extraordinary flexible mindset from policy-makers, which in turn implies the availability of likewise flexible policy tools – including military ones. In this context, Air Power has proven to play a crucial role. First, it enables other military components to fully exploit their potentialities, without worrying about any air threat. Second, in some cases, Air Power alone has led to desired political achievements, such as the signing of the Dayton Agreement after the 1995 air campaign in Bosnia-Herzegovina, or the Military Technical

Agreements after the 1999 air campaign in Kosovo, which provided ground forces the ability to operate in a permissive environment. Recent history shows the impossibility of renouncing to Control the Air.

The proverb says that generals tend to lose the next war by using the strategies used in the previous one – even if those were successful. Therefore, we put a creative effort to identify possible future scenarios of air operations not that affected by previous operational experiences – while taking advantage of them. These scenarios demonstrate that the full availability of Air Power is necessary to ensure security, mobility and logistics support to ground and maritime forces, as well as that of civilian organizations whose action is necessary to manage any crisis which often and tragically takes place in our neighbourhood.

From an operational point of view, Italian fighter aircraft are gradually becoming more and more obsolete, so Italy needs to handle the issue of replacing the current fleet. We looked at all possible options to solve this problem, which can ensure adequate timing, sustainable costs as well as interoperability with the necessary and potential partners and allies. Operational needs should be considered together with the overall economic situation in Italy, both in budgetary terms and from an economic-industrial point of view. Consequently, we devoted a specific focus to the industrial aspects of the procurement programme, in order to test its compatibility with current technological capacities and occupational trends within the country. The decision to join the programme for the production of F-35 aircraft seems to be the only feasible option. In fact, developing a ground attack version of the Eurofighter Typhoon would present technical uncertainties hard to solve, which imply very high costs and uncertain timing, and European partners seems not interested to do it. Moreover, because of the way the Eurofighter programme is conceived, choosing this path means that only 21% of the entire work-share will be carried out in Italy, whereas Germany, Spain and UK will benefit from 79% of the investment.

The Italian F-35 choice requires political and military authorities to pay attention to any single phase of the procurement programme, including the logistic support in the long term, in order to protect national interests from both an occupational and technological point of view. In other words, they must avoid any subjection towards the US govern-

ment, as well as towards the prime contractor Lockheed Martin. The strategic value of the F-35 programme, also considered as a binding factor in the context of transatlantic security, makes it a central element in the relationship with the American government. It is in such comprehensive perspective that this programme should be evaluated.

Vincenzo Camporini
Vice President of IAI

List of Acronyms

AAR	Air-to-Air Refuelling
ACE	Allied Command Europe
AI	Air Interdiction
APOD	Aerial Ports of Debarkation
ASUW	Anti-Surface Warfare
ASW	Anti-Submarine Warfare
ATO	Air Tasking Order
BLF	Banon Liberation Front
BNDF	Banon National Defence Force
BVR	Beyond Visual Range
C2	Command and Control
C4I	Command, Control, Communications, Computers and Intelligence
CAS	Close Air Support
CBG	Carrier Battle Group
CDP	Concept Demonstration Phase
CNO	Computer Network Operations
CoA	Course of Action
COAC	COmbined Air operation Centre
COMAO	COmbined Air Operations
CSAR	Combat Search and Rescue
CSDP	Common Security and Defence Policy
CTOL	Conventional Take-Off and Landing
DCA	Defensive Counter Air
ECM	Electronic Counter Measures
ECR	Electronic Combat Reconnaissance
EO	Earth Observation

EW	Electronic Warfare
F2T2EA	Find, Fix, Track, Target, Engage, Assess
FACO	Final Assembly and Check Out
FMS	Foreign Military Sales
GoB	Government of Banon
HARM	High Speed Anti-Radiation Missile
HN	Host Nation
IADS	Integrated Air Defence System
ICT	Information and Communication Technologies
IED	Improvised Explosive Device
IFOR	Implementation Force
IO	Information Operations
ISR	Intelligence, Surveillance and Reconnaissance
ISTAR	Intelligence, Surveillance, Target Acquisition, Reconnaissance
ITAR	International Traffic in Arms Regulation
JATF	Joint Air Task Force
JFACC	Joint Force Air Component Command
JFC	Joint Force Command
JPO	Joint Programme Office
KLA	Kosovo Liberation Army
LRIP	Low Rate Initial Production Phase
MANPADS	MAN-Portable Air-Defence Systems
MoU	Memorandum of Understanding
MRO&U	Maintenance Repair Overhaul and Upgrade
NAEW	NATO Airborne Early Warning
NEC	Network Enabled Capability
NFZ	No-Fly Zone
OCA	Offensive Counter Air
PGM	Precise Guided Munitions
PNT	Position Navigating and Timing
PSFD	Production, Sustainment, and Follow-on Development (Phase)
RoE	Rules of Engagement
RPAS	Remotely Pilot Aircraft System
RS	Republic of Sari

RSS	Reform of Security Sector
SA	Situational Awareness
SAM	Surface to Air Missile
SAR	Search And Rescue
SCAR	Strike Coordination And Reconnaissance
SDA	Sari Democratic Army
SDB	Small Diameter Bomb
SDD	System Design and Development (Phase)
SEAD	Suppression of Enemy Air Defenses
STOVL	Short Take-Off and Vertical Landing
TACP	Tactical Air Control Post
TAR	Tactical Air Reconnaissance
UNAMA	United Nation Assistance Mission in Afghanistan
UNFB	UN Force in Banon
UNSC	United Nations Security Council
WEU	Western European Union

1.

Italy's participation in crisis management operations: fighter aircraft's role

This chapter is aimed to outline the role of Italian fighter aircraft in crisis management operations which occurred in the last 24 years. Several missions abroad have been considered: the First Gulf War in Iraq (1990-1991); the North Atlantic Treaty Organization (NATO) operations in Bosnia-Herzegovina (1993-1998), Serbia and Kosovo (1999); the international missions in Afghanistan (2001-2014), and finally the 2011 multinational air campaign in Libya, which came under NATO command after the first phase of air operations.[1] The following paragraphs summarize for each mission the motivations and goals of the military intervention, and explain the role of Italy with respect to coalition allies.

1.1 IRAQ (1990-1991)

Iraq invaded Kuwait on 2 August 1990. This was the culmination of long standing tensions between the two states. In particular, Saddam Hussein

[1] In the post-Cold War period the Italian armed forces engaged in many other international missions, including three large-scale challenging ones in Somalia, Lebanon and Iraq. In some cases, i.e. in Iraq in 2003-2006, they envisaged also the utilization of air capabilities such as helicopters, Remotely Piloted Aerial Systems (RPAS), and airlift capabilities like C-130J. In particular, the AV-8B aircraft were used in Somalia in 1995 to support the redeployment Italian and coalition troops, and in 2006 operated in front of Lebanon coast to monitor naval commercial traffic. All these missions abroad have not been considered in this study, because it focuses on crisis management operations featuring a substantial use of fighter aircraft.

had accused some Gulf states of "stabbing Iraq in the back" by producing more oil than the quotas agreed with other states belonging to the Organization of the Petroleum Exporting Countries (OPEC) and thus decreasing world oil price.[2] After the invasion, international diplomacies began to work to find a political solution to the crisis. Despite the effort, no agreement was reached and the UN Security Council (UNSC) approved resolution 678/1990, authorizing UN member-states to "use all necessary means" if Iraq had not complied with previous UN resolutions – i.e. resolution 661/1990 – and withdrew its military forces from Kuwait by 16 January 1991. Saddam Hussein's regime disregarded the ultimatum and on 17 January a US-led coalition began to bomb Iraqi military installations in Iraq and Kuwait.[3] Operation Desert Storm had started.

The first goal of the US-led coalition was to restore international law that had been violated by Iraqi aggression of Kuwait. The intervention occurred in compliance with the United Nations Chart – in particular Chapter VII, art. 51 – which recognizes the right of individual and collective self-defence if an armed attack occurs against a UN member, as well as with UNSC resolutions 661/1990 and 678/1990, which provided an even broader mandate than self-defence. Furthermore, the military intervention was also meant to avoid the diffusion of political instability in the Persian Gulf, this region being extremely important for world economy as a major source of oil production. As stated by US Secretary of State James Baker in November 1990, "Iraq's invasion and occupation of Kuwait threatened the economic lifeline of the West and that US efforts to contain Saddam Hussein were to protect US jobs."[4] Likewise, a robust military response from the international community would have discouraged Iraq to carry on an expansionist and aggressive policy towards Saudi Arabia, one of the main US allies in the region together with Israel.[5]

Since the beginning of the intervention, 35 countries ("the Coalition of the Willing") were engaged in one form or another in Operation De-

[2] Clyde R. Mark, Renee Stasio, "Iraq-Kuwait Crisis: A Chronology of Events July 17, 1990 - May 6, 1991", in *CRS Report for Congress*, No. 91-14 F (May 1991).

[3] Ibid.

[4] Ibid.

[5] Ibid.

sert Storm,[6] although only US, UK, Saudi Arabia, France, Italy, Kuwait, and Bahrain contributed in terms of air assets to the operation. Contribution is intended as the number of air sorties flown by a certain country in relation to the total of the coalition (see table below). The North Atlantic Alliance Organization (NATO) was engaged within the coalition as well: on the request of the Turkish government the Allied Command Europe (ACE) Mobile Force (Air) was deployed to protect Turkey from possible Iraqi retaliations, and Italy provided a cell of 6 F104-G from the 28th squadron, which successfully completed their deterrence mission without any real engagement.

Since the US provided the overwhelming majority of military capabilities, the coalition strategy reflected American objectives and concerns. The US administration led by George Bush insisted that the coalition primary objective was to free Kuwait and not to pursue regime change in Iraq, as looking for this type of goal would have strained relationship with the Arab world and with Western states within the coalition.[7] In doing that, two important related objectives were made clear from the beginning: avoiding another Vietnam type of experience and minimizing as much as possible casualties among Western troops. The Vietnam War had had a strong impact on American approach, with President Bush promising the American public opinion that any military action would not have been "another Vietnam" and asking the military to defuse at any cost another similar quagmire scenario. Moreover, casualties should have been kept below a minimum threshold to ensure public opinion's support for the entire duration of the war, thus preventing any manifestation of public disapproval which could have played in favour of Saddam Hussein.

All this was translated into a military strategy aiming to the rapid

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[6] Albania, Australia, Bahrain, Bulgaria, Croatia, Czech Republic, Denmark, Egypt, Estonia, Ethiopia, Hungary, Iceland, Israel, Italy, Kuwait, Japan, Jordan, Latvia, Lithuania, Macedonia, Netherlands, Oman, Palau, Poland, Portugal, Oman, Palau, Poland, Portugal, Qatar, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, United Arab Emirates, Turkey, UK, USA. For a detailed description of their contribution see Jesse Lorenz, "The Coalition of the Willing", June 2003, http://www.stanford.edu/class/e297a/The%20Coalition%20of%20the%20Willing. htm.

[7] Lawrence Freedman and Efraim Karsh, "How Kuwait Was Won: Strategy in the Gulf War", in *International Security*, Vol. 16, No. 2 (Fall 1991), pp. 5-41.

achievement of air superiority, the interdiction of supply lines, and a final fast and mobile desert campaign based on manoeuvre rather than attrition.[8] After a five-weeks long intense bombing campaign, which deeply weakened Iraqi military forces, the land operation to liberate Kuwait city began on 23 February. Only three days later, Baghdad radio announced the withdrawal of all Iraqi forces from Kuwait in compliance with UNSC resolution 660/1990.[9]

In the context of Operation Desert Storm, Italy deployed 8 Tornado fighter of 6th, 36th and 50th Wings to the Persian Gulf since September 1990. Their first mission was to defend Italian Naval Forces that were operating in the region, enforcing the international embargo put in place by UN resolution 661/1990.[10] Operation Locusta started from Gioia del Colle military basis on 25 September and had its operational headquarter in Al Dhafra Air Base, in the United Arab Emirates. Italian military operations started on 17 January, when the Italian government, with the support of the Parliament, decided to upgrade missions and tasks of the Italian Autonomous Flight Department in the Persian Gulf, allowing its units to conduct war operations for the first time since World War II.

In the night between 17 and 18 January, Italian Tornado carried out their first mission ordered by the Inter-Allied Air Command. Due to the prohibitive meteorological conditions, the eight Tornado fighter-bomber, except for one, missed the window of the air-to-air refuelling. The only aircraft that was able to refuel decided to continue the mission alone. In the process of disengagement, after having successfully hit the target, a Tornado was shot down by the Iraqi air defence system and Pilot Major Gianmarco Bellini and his navigator Captain Maurizio Cocciolone had to eject from the aircraft. Later, they were captured by the Iraqi forces and were imprisoned until the end of the war. From then on, Ital-

[8] For an insider perspective on the air campaign, see Mario Arpino, *Il targeting in Desert Storm*, speech delivered at the conference on "L'Aerocooperazione nei teatri operativi", Rome, 27 June 2013.

[9] Clyde R. Mark, Renee Stasio, "Iraq-Kuwait Crisis…", cit.

[10] "I Tornado nel Golfo Persico: Operazione Locusta", in *Rivista Aeronautica*, n. 6/1990, pp. 26-29.

ian Air Force successfully completed 31 missions, including those between 24 and 27 February, when land forces began ground operations and freed Kuwait city from Iraqi occupation. When all UN resolutions were accepted by the Iraqi government on 28 February, war activities stopped. Three days later, Major Gianmarco Bellini and Captain Maurizio Cocciolone were released by the Iraqi government and flew back to Italy. By mid-March, the ten Tornados left the Gulf and went back to Gioia del Colle, where they were welcomed by the Minister of Defence and the highest military representatives.[11] Overall, the number of sorties flown by Italian fighter aircraft during Operazione Locusta – from 25 September 1990 to 16 March 1991 – was 2,326, with 4,503 flight hours.[12]

OPERATION DESERT STORM

General information (August 1990-February 1991)		
Coalition Forces (main contributors)[13]	**Chain of Command**	**UN Security Council Resolution**
US, UK, Saudi Arabia, Kuwait, France, Italy, Bahrain	United States	Yes

***Italian contribution* (*September 1990-March 1991*)**		
Aircraft	**Sorties**	**Flight Hours**
8 Tornado	2,326	4,503

1.2 BOSNIA-HERZEGOVINA (1993-1998)

In the early 1990s civil conflicts erupted in Slovenia, Croatia and Bosnia-Herzegovina, materializing the fears of the "Yugoslavia Break-up",

[11] Italian Air Force, *Operazioni Internazionali, Iraq (1990)*, http://www.aeronautica.difesa.it/Operazioni/Internazionali/Pagine/LaguerrainIraq.aspx.

[12] Data provided by the Italian Air Force's statistical division.

[13] Jesse Lorenz, *The Coalition of the Willing*, cit.

whose first symptoms should be traced back to the 1980s with the death of Yugoslavia's unifying leader Tito. His death marked the beginning of an intense economic decline and rising ethnic nationalism among the six republics composing Yugoslavia.[14] Furthermore, the end of the Cold War and the novelty of free multiparty elections opened up new possibilities for populist leaders in search for power, who exploited ethnic tensions to enhance their political role. After the Slovenian and Croatian declarations of independence (25 June 1991), Bosnia-Herzegovina, comprising mainly of Muslims (40%), Serbs (30%) and Croats (17%), decided to follow the same path and declared its own independence in March 1992. Because of the fear of being dominated by the Muslim majority in a unified country, Serbs did not endorse Bosnian declaration and heralded the creation of "the Serbian Republic of Bosnia and Herzegovina." The regularity of killings in Sarajevo and other provinces of Eastern Bosnia made violence escalating by mid-April and May 1992.

International community's efforts to manage the conflict started soon, with the EU and the UN imposing economic sanctions on the belligerents. In 1993, the UNSC declared some cities in Bosnia-Herzegovina to be "safe areas,"[15] allowing NATO to protect civilians with the use of force in these cities. Intense fighting continued throughout 1994, with the Bosnian Serb protagonist of shelling safe areas on repeated occasions and causing the deaths of thousands of civilians.[16] The turning points of the crisis occurred in July 1995, when 8,000 Bosnian Muslim were massacred by the Bosnian Serb troops in Srebrenica. In the presence of a UN ultimatum and previous UNSC resolutions, NATO started Operation Deliberate Force on 30 August 1995. This operation was conducted by 16 NATO allies and resulted in two weeks of intense bombing,

[14] For this paragraph see Uppsala Conflict Data Program, *Bosnia-Herzegovina*, http://www.ucdp.uu.se/gpdatabase/gpcountry.php?id=20.

[15] UN Security Council Resolution 816/1993, 31 March 1993, http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/816(1993).

[16] United Nations, *Past peacekeeping operations: United Nations Protection Force-Former Yugoslavia*, September 1996, http://www.un.org/en/peacekeeping/missions/past/unprof_b.htm.

mainly directed towards Bosnian Serb command and control installations and ammunition facilities,[17] involving a total of 3,515 air sorties.[18] According to the US Defense Department, Operation Deliberate Force proved to be effective in helping to lift the siege of Sarajevo, saving lives and contributing greatly to pave the way for a negotiated settlement.[19] The settlement, namely the General Framework Agreement for Peace, was signed on 21 November 1995 at the US Air Force base in Dayton, Ohio. NATO air operation and the following Dayton agreement can be considered "the result of a purposeful U.S. strategy of coercive diplomacy put into place from early 1994 onward."[20] This strategy comprised of several elements, including military, economic and diplomatic types of intervention: maintenance of economic sanctions against Serbian leader Slobodan Milosevic, covert arming of Bosnian Muslim and Croat troops, limited air strikes as a form of warning, and the application of decisive use of force through air power, finally paired with a ground offensive by Croat and Muslim forces. Hence, this coercive diplomacy was aimed "to break the Serb party's territorial dominance inside Bosnia-Herzegovina and create a balance on the ground propitious to a negotiated outcome."[21] In the implementation phase, a strong NATO Implementation Force (IFOR) replacing UN troops was deployed in Bosnia-Herzegovina to verify the execution of the agreement's military provisions, while the High Representative of the International Community in Bosnia and Herzegovina, namely Carl Bildt, was appointed to supervise the realization of the civilian elements of Dayton.[22] In 1996, the Stabilization Force

[17] NATO Allied Command Operation, *NATO's Operations 1949-Present*, http://www.aco.nato.int/resources/21/NATO%20Operations,%201949-Present.pdf.

[18] Ryan C. Hendrickson, "Crossing the Rubicon", in *NATO Review*, No. 3/2005 (Summer 2005), http://www.nato.int/docu/review/2005/Combating-Terrorism/Crossing-Rubicon/EN/index.htm.

[19] Global Security, *Military Operations*, *Operation Deliberate Force*, http://www.globalsecurity.org/military/ops/deliberate_force.htm.

[20] R. Craig Nation, *War in the Balkans (1991-2002)*, Carlisle, Strategic Studies Institute, August 2003, p. 193, http://www.strategicstudiesinstitute.army.mil/pubs/display.cfm?pubID=123.

[21] Ibid.

[22] Uppsala Conflict Data Program, *Bosnia-Herzegovina*, cit.

(SFOR) replaced IFOR, and later continued its peace-keeping mission under NATO command until 2004 and then under EU command (Operation Althea).

In this context, Italy contributed to all NATO missions conducted in Bosnia-Herzegovina utilizing a vast variety of platforms including fighter aircraft.

Operation Deny Flight, lasting from 12 April 1993 to 20 December 1995, was aimed at hindering any military operation in the skies over Bosnia-Herzegovina by enforcing a No-Fly Zone (NFZ), in compliance with UNSC resolution 816/1993. For the first time in NATO history, Operation Deny Flight featured a combat operation in which four Bosnian Serb fighter-bomber where shut down by Allied aircraft patrolling the NFZ.[23] For almost three years, Italy took part to Deny Flight missions with Tornado and AMX fighter aircraft, which collected 543 sorties and 1,288 flight hours.[24] In addition, Italy provided an extremely valuable logistical support to NATO units deployed on Italian military bases.

Likewise, Italian armed forces also contributed to NATO Operation Sharp Guard from 12 April 1993 to 20 December 1995, to support UN maritime embargo aiming to stop weapons' importation by the combatants. In the operation, 8 Tornado reinforced Italian Maritime Units' presence in the Adriatic Sea, racking up 230 sorties and 267 flight hours.[25]

From 30 August to 20 September 1995, the Italian Air Force was employed also in Operation Deliberate Force,[26] with 8 Tornado, 6 AMX, one Boeing 707 Tanker, one C-130 and four G-222.[27] As stated before, Oper-

[23] NATO Allied Command Operation, *NATO's Operations 1949-Present*, cit.

[24] Italian Air Force, *Operazioni Internazionali*, *Jugoslavia (1999)*, http://www.aeronautica.difesa.it/Operazioni/Internazionali/Pagine/Jugoslavia.aspx.

[25] Data provided by the Italian Air Force's statistical division.

[26] Bombings began between the 30 and the 31 August with Operation Deadeye. The operation paused between the 1 and the 5 September and then restarted again under the name of "Operation Deliberate Force", following the Bosnian Serb failed attempt to comply with UN resolutions.

[27] Hellenic Resources Network, *Operation Deliberate Force. Summary Data*, 15 November 1995, http://www.hri.org/docs/nato/summary.html.

ation Deliberate Force was initiated with the intent to protecting UN "safe areas," which came under attack by Bosnian Serbian militias despite UNSC resolutions. In particular, Allied aircraft were tasked to hit any artillery (i.e. tank, mortar, etc) entering a 40 km large circle around the cities.[28] Of the total of 3,515 sorties flown, 2,470 were penetrating sorties, including attacks on 48 Bosnian Serbian targets, whereas of the 1,026 bombs dropped, 708 were Precision Guided Munitions (PGM) and 318 non-precision munitions. Italian fighter conducted 26 sorties, amounting to 41 flying hours.[29]

From 6 December 1995 to 20 December 1996, Italy also participated in Operation Decisive Endeavour in support of NATO Operation Joint Endeavour. In this operation, Italy backed NATO's first peace-keeping mission, the Implementation Force (IFOR), which was to implement the military aspects of the Dayton Agreements. Italy contributed with 8 Tornado and 6 AMX. The fighter aircraft deployed amounted for 1,250 sorties and 3,150 flight hours.[30]

Finally, following the end of Operation Joint Endeavour, the Italian Air Force was involved in Operation Deliberate Guard in support of Operation Joint Guard (21 December 1996-11 June 1998). In this operation, Italian aircraft carried out 2,974 sorties and 7,227 hours of flight.[31]

Overall, Italy provided the indispensable logistical footprint for NATO operations in Bosnia-Herzegovina, with a peak of 350 allied aircraft hosted in the basis of Rimini, Piacenza, Ghedi, Brindisi and Villafranca.[32]

[28] Interview dated 11 December 2013.

[29] Data provided by the Italian Air Force's statistical division.

[30] Italian Air Force, *Operazioni Internazionali, Jugoslavia (1999)*, cit.

[31] Data provided by the Italian Air Force's statistical division.

[32] Interview dated 11 December 2013.

OPERATION DENY FLIGHT

General information (April 1993-December 1995)		
Coalition Forces[33]	**Chain of Command**	**UN Security Council Resolution**
Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Turkey, UK and the US	NATO	Yes

Italian contribution (*April 1993-December 1995*)[34]		
Aircraft	**Sorties**	**Flight Hours**
Tornado, AMX	543	1,288

OPERATION SHARP GUARD

General information (June 1993-October 1996)		
Coalition Forces[35]	**Chain of Command**	**UN Security Council Resolution**
Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, UK and the US	NATO	Yes

Italian contribution (*April 1993-December 1995*)[36]		
Aircraft	**Sorties**	**Flight Hours**
8 Tornado	230	267

[33] Hellenic Resources Network, *NATO Operation Deny Flight*, 15 September 1995, http://www.hri.org/news/misc/misc-news/1995/95-09-15.misc.html; Canadian Forces-Directorate of History and Heritage, *Operations Database: Deny Flight*, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/di-ri-eng.asp?IntlOpId=158.

[34] Italian Air Force, *Operazioni internazionali: Jugoslavia (1999)*, cit.

[35] NATO-IFOR, *NATO/WEU Operation Sharp Guard*, 2 October 1996, http://www.nato.int/ifor/general/shrp-grd.htm.

[36] Italian Air Force, *Operazioni internazionali: Jugoslavia (1999)*, cit.

OPERATION DELIBERATE FORCE

General information (August 1995-September 1995)		
Coalition Forces[37]	**Chain of Command**	**UN Security Council Resolution**
US (65.9%), UK (9.3%) France (8.1%), the Netherlands (5.6%), Spain (3.4%), NATO, NAEW (2.7%), Turkey (2.2%), Germany (1.7%), Italy (1%)	NATO	Yes

Italian contribution (*August 1995-September 1995*)		
Aircraft[38]	**Sorties**[39]	**Flight Hours**
8 Tornado, 6 AMX	26	41

OPERATION DECISIVE ENDEAVOR IN SUPPORT OF JOINT ENDEAVOR

General information (December 1995-December 1996)		
Coalition Forces[40]	**Chain of Command**	**UN Security Council Resolution**
Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Turkey, UK and the US	NATO	Yes

Italian contribution (*December 1995-December 1996*)		
Aircraft[41]	**Sorties**	**Flight Hours**
Tornado, AMX	1,250	3,150

[37] Global Security, *Military Operations: Operation Deliberate Force*, cit.; John A. Tirpak, "Deliberate Force", in *Air Force Magazine*, Vol. 80, No. 10 (October 1997), http://www.airforcemag.com/MagazineArchive/Pages/1997/October%201997/1097deliberate.aspx.

[38] Hellenic Resources Network, *Operation Deliberate Force. Summary Data*, cit.

[39] Data provided by the Italian Air Force's statistical division.

[40] Canadian Forces-Directorate of History and Heritage, *Operations Database: Decisive Endeavor*, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/di-ri-eng.asp?IntlOpId=154.

[41] Italian Air Force, *Operazioni internazionali: Jugoslavia (1999)*, cit.

OPERATION DELIBERATE GUARD IN SUPPORT OF JOINT GUARD

General information (December 1996-June 1998)		
Coalition Forces[42]	**Chain of Command**	**UN Security Council Resolution**
Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Turkey, UK and the US	NATO	Yes

Italian contribution (December 1996-June 1998)		
Aircraft	**Sorties**	**Flight Hours**
Tornado, AMX	2,974	7,227

1.3 KOSOVO (1999)

Another civil war erupted in Yugoslavia in June 1998 in Kosovo, a Southern province of Serbia. Several causes can be attributed to the initiation of hostilities. "The neighbour effect" played certainly a major role in the onset of violence, as the previous wars in the region spread regional instability, which increasingly fed the raising nationalisms of the Kosovar and the Serbian ethnicities in Kosovo. Moreover, since Serbian independence in 1878, tensions based on ethnic affiliation fuelled misperceptions and brutalities between the Albanians and the Serbs.[43] The latter also depicted the territory of Kosovo as "the holy land", where their ancestries had fought the renowned "Battle of Kosovo" and from where the Kosovar had to be expelled.[44] In this already troublesome context, political and economic grievances also triggered a strong sense

[42] Canadian Forces-Directorate of History and Heritage, *Operations Database: Deliberate Guard*, http://www.cmp-cpm.forces.gc.ca/dhh-dhp/od-bdo/di-ri-eng.asp?IntlOpId=159.

[43] Christopher Cviic, Review of "Kosovo 1945-2005", in *International Affairs*, Vol. 81, No. 4 (July 2005), pp. 851-860.

[44] Michael E. Salla, "Traveling the Full Circle: Serbia's 'Final Solution' to the Kosovo Problem", in *Journal of Muslim Minority Affairs*, Vol. 18, No. 2 (October 1998), pp. 229-240.

of resentment among the Kosovar population. In the end, Serbian President Slobodan Milosevic suspended in 1990 the constitutional amendment which had given Kosovo equal autonomy with the other republics in Yugoslavia.

Skirmishes between the Kosovo Liberation Army (KLA) and the Serbian troops began in 1996, although an open civil war erupted only in 1998, after the killing of 56 Albanians in the village of Prezak, in the Drenica region.[45] The violent escalation of the conflict mounted concern in the international community, which sought to regulate it by imposing sanctions and an arms embargo on Serbia.[46] The US made Milosevic agree on a ceasefire in October 1998, but the situation crashed soon and, after the massacre of 45 civilians in Racak, the ceasefire was dead and gone.[47] In January 1999, a conference was held at Château de Rambouillet (France) by the Contact Group (US, Russia, UK, France, Italy and Germany) with the purpose of sitting Kosovar and Serbs together at the same table to negotiate a solution to the dispute. After fifteen days of consultation, the Kosovar accepted the final settlement proposed by the Contact Group. However, since NATO would have enjoyed free access to the entire territory of Serbia during the implementation, the Serbian government decided not to sign the agreement.

After the failure of diplomatic talks, NATO decided to intervene militarily in the conflict, in spite of the absence of an ad hoc authorization by the UNSC. Kosovo's air campaign, namely Operation Allied Force, began on March 24 and consisted of 78 days of intense bombing. According to NATO, the air campaign was launched "to halt the humanitarian catastrophe that was then unfolding in Kosovo. The decision to intervene followed more than a year of fighting within the province and the failure of international efforts to resolve the conflict by diplomatic means."[48] In doing so, NATO meant also to avoid the destabilization of South Eastern

[45] Uppsala Conflict Data Program, *Serbia (Yugoslavia)*, http://www.ucdp.uu.se/gpdatabase/gpcountry.php?id=171.

[46] Ibid.

[47] Howard Clark, *Civil Resistance in Kosovo*, London and Sterling, Pluto Press, 2000.

[48] NATO, *The Kosovo Air Campaign*, 5 March 2012, http://www.nato.int/cps/el/natolive/topics_49602.htm.

Europe and stop the displacement of refugees in neighbouring countries. Finally, the credibility of the Alliance was at stake too, once the threat of the use of force had been waved during the entire negotiation process. These goals were developed into a military strategy which aimed to force the Serbian forces out of Kosovo, to stop the repression of the Kosovars and to minimize Western casualties and the loss of friendly aircraft.[49] In the first days of the war, NATO concentrated its effort in destroying Serbian air defense system. Nonetheless, after ten days of air campaign, results were far from being enthusiastic, as Serbian defences had not been seriously damaged by NATO's missiles and Milosevic did not appear to be more willing to negotiate.[50] At the beginning of April, NATO decided to modify its strategy and started to target Serbian economic and strategic lines of communication and to cut off its energy supplies. Furthermore, NATO began to cooperate with KLA troops on the ground to challenge the Serbs directly in Kosovo.[51] This change in strategy brought the expected results, as "costs associated with intense daily bombing efforts and the gradual accrual of costs over time"[52] forced Milosevic to accept the final settlement. Besides the air campaign, the mediation role by the international community was also essential to terminate the conflict,[53] as military action and diplomatic efforts were strictly intertwined. The civil war officially terminated in June 1999, following the Military Technical Agreement between NATO and Serbia (9 June 1999) and the UN Security Council resolution 1244/1999. Since 1999, the NATO Kosovo force (KFOR) has been deployed in Kosovo with peace-keeping and stabilization purposes, backed

[49] Daniel L. Byman and Matthew C. Waxman, "Kosovo and the Great Air Power Debate", in *International Security*, Vol. 24, No. 4 (Spring 2000), pp. 5-38, http://belfercenter.ksg.harvard.edu/publication/428; Susan H. Allen and Tiffany Vincent, "Bombing to Bargain? The Air War for Kosovo", in *Foreign Policy Analysis*, Vol. 7, No. 1 (January 2011), pp. 1-26.

[50] IISS, "NATO's campaign in Yugoslavia", in *Strategic Comments*, Vol. 5, No. 3 (April 1999), pp. 1-4.

[51] Ibid.

[52] Susan H. Allen and Tiffany Vincent, "Bombing to Bargain? …", cit.

[53] Ibid. See also Efird Brian et al., "Negotiating Peace in Kosovo", in *International Interactions*, Vol. 26, No. 2 (2000), pp. 153-178.

up by an EU operation – EULEX Kosovo – to support the development of the Kosovar State's new institutions.

In Operation Allied Force, from 24 March to 10 June 1999, Italy intervened with approximately 50 aircraft, including F-104, Tornado, AMX, and AV-8B. In particular, Tornado and AMX platforms achieved 1,022 sorties and 2,828 flight hours,[54] whereas 6 AV-8B deployed on the Cavour carrier realized 50 sorties for 75 flight hours.[55] Overall, the quantitative and qualitative effort of the Italian forces was highly regarded, as Italy was the third largest contributor of aircraft and the fourth largest for the number of air sorties, excluding the US.[56] Like their German counterparts, the Italian Tornados, in the Electronic Combat Reconnaissance (ECR) version, were "the shooters,"[57] generally deployed in Suppression of Enemy Air Defenses (SEAD) missions and employing AGM-88 High Speed Anti-Radiation Missile (HARM) missiles to target Serbian objectives. Usually, Italian aircraft had to penetrate enemy air space, locate radars and Surface-to-Air Missiles (SAM) systems and destroy them. These missions were conducted at night and during the day, in the hardest meteorological conditions, with the overall scope to achieve air superiority and allow bomber aircraft to hit strategic objectives afterwards.[58] The AMX aircraft also had an important role in tactical support and battlefield Air Interdiction (AI).[59] Although performing well also in the presence of possible attacks, AMX usually conducted missions with inconsistent Serb threat and above 15,000 feet of altitude. Departing from the Italian bases of Gioia del Colle and Amendola, Tornado and AMX did not participate in operations against Serbs economic and strategic targets, such as energy plants and the Belgrade television station, which raised criticisms about the use of force against non-

[54] Data provided by the Italian Air Force's statistical division.

[55] Interview dated 14 March 2014.

[56] John E. Peters et al., *European Contributions to Operation Allied Force. Implications for Transatlantic Cooperation*, Santa Monica, RAND Corporation, 2001, http://www.rand.org/pubs/monograph_reports/MR1391.html.

[57] Ibid.

[58] "50° stormo: Ghost Weasel", in *Rivista aeronautica*, n. 1/2000, pp. 35-47.

[59] Andrea Nativi, "Jugoslavia: una maratona militare per la NATO", in *RID: Rivista italiana Difesa*, n. 7/1999, pp. 26-33.

military targets. Italian fighter carried on missions mainly to obstruct Serbian military forces threatening the Albanian population in Kosovo. In relation to the Navy's aircraft, Italian AV-8B were initially exploited to protect national maritime units deployed in the Adriatic sea, even though they were later used in air-to-surface engagement operations, thanks to their infrared targeting technologies.[60] Finally, F-104 also gave a contribution to NATO mission, especially in some emergency situations when they had to substitute other countries' aircraft.[61]

Additionally, other Italian (and allies) air capabilities were employed to protect Italy's national territory from possible retaliation from the Serbian military, i.e. through missile or air attacks, by conducting Defensive Counter Air (DCA) sorties on the Italian eastern border. Actually, Italy has been one of the very few NATO members exposed to these risks in the post-Cold War period, because of its geographical proximity to the operational theatre – and particularly with the Serbian military capabilities.

OPERATION ALLIED FORCE

General information (March 1999-June 1999)		
Coalition Forces[62]	**Chain of Command**	**UN Security Council Resolution**
US (80%), France (6%), UK (5%), Italy (3%), the Netherlands (3%), Germany (2%)	NATO	No

Italian contribution (March 1999-June 1999)		
Aircraft[63]	**Sorties**	**Flight Hours**
22 Tornado, 6 AMX, 6 F-104 ASA, 6 Tornado IDS, 4 Tornado ECR/IDS, 4 F-104 ASA, 6 AV-8B	1,072	2,903

[60] Interview dated 14 March 2014.

[61] Ibid.

[62] John E. Peters et al., *European Contributions to Operation Allied Force*, cit.

[63] Ibid.

1.4 AFGHANISTAN (2001-2014)

The terrorist attacks in New York and Washington on 11 September 2001 caused a strong military response by the US administration headed by George W. Bush, appealing to the right of self-defence against the perpetrators. This right, acknowledged by Art. 51 of the UN Chart, was later recognized and reaffirmed by resolutions 1368/2001 and 1373/ 2001, which were issued by the UNSC following the massacre of the World Trade Center. In particular, resolution 1368/2001 called "on all states to States to work together urgently to bring to justice the perpetrators, organizers and sponsors of these terrorist attacks and stresses that those responsible for aiding, supporting or harbouring the perpetrators, organizers and sponsors of these acts will be held accountable."[64]

Operation Enduring Freedom begun on 7 October and took place primarily in Afghanistan, where the Taliban regime hosted and supported Al Qaeda, a terrorist organization led by Osama Bin Laden. According to US intentions, the operation was aimed to destroy Al Qaeda terrorist training camps and infrastructures, capture its leaders and ensure the cessation of terrorist activities in Afghanistan.[65] Seven countries actively contributed to the operation: Australia, Canada, France, Germany, Italy, Norway and the United Kingdom, while several other countries offered their military cooperation and support.[66] Through the use of Air Power and special forces in support of Afghan opposition, the US and its allies managed to overthrow the Taliban regime from Kabul and began a country-wide counter-terrorism campaign targeting Al Qaeda affiliated combatants. In February 2007, the commands of Operation Enduring

[64] UN Security Council Resolution 1368/2001, 12 September 2001, http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1368(2001).

[65] George W. Bush, *Address to a Joint Session of Congress and the American People*, 20 September 2001, http://georgewbush-whitehouse.archives.gov/news/releases/2001/09/20010920-8.html.

[66] Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Grecia, Japan, Jordan, New Zealand, Norway Pakistan, Poland, Portugal, Romania, Slovakia, Slovenia. US Dept of Defense-Office of Public Affairs, *International Contributions to the War against Terrorism*, 14 June 2002, http://2001-2009.state.gov/coalition/cr/fs/12753.htm.

Freedom and of International Security Assistance Force (ISAF) were united under the same US commander.

Following the UN Security Council Resolutions 1378/2001 and 1386/2001[67] of December 2001, ISAF was deployed in Kabul to assist the Afghan Transitional Authority in partnership with the United Nation Assistance Mission in Afghanistan (UNAMA). On August 2003, NATO took over ISAF's command, and gradually extended the area of operation to cover the entire country by the end of 2006. In doing so, for the first time in its history, NATO activated art. 5 of the Washington Treaty on collective defence to initiate a military intervention. Fifty countries have joined ISAF, including members and non-members of the Atlantic Alliance. Since 2007, the mission has been under American command,[68] with the US providing between two thirds and three quarters of ISAF troops.[69] The strategy and the characters of the mission, as well as the tasks fulfilled by ISAF, have changed in the last 13 years mainly according to US decisions. However, the ultimate goal of the mission has substantially remained the same: to actively support the establishment of a peaceful and stable Afghan state that will not provide any help to Al Qaeda or any other terrorist groups threatening NATO members.[70] Political, diplomatic, economic, military and intelligence efforts have been undertaken to achieve this goal. Concerning the military efforts, particularly from 2008 to 2013, ISAF has focused on two types of activities: on one hand, to counter any possible Taliban insurgency by undertaking combat operations and patrol activities; on the other hand, to build up Afghan national security forces by training and equipping them. ISAF's mandate is going to expire by the end of 2014, and NATO has already set the deployment of mission Resolute Support to continue training Afghan security forces (without combat tasks), which is however expected to rely on less units than ISAF.

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[67] Further UNSC Resolutions have renovated the ISAF mandate in Afghanistan over the years: 1413/2002, 1510/2003, 1563/2004, 1623/2005, 1659/2006, 1707/2006, 1444/2006, 1746/2007, 1817/2008, 1890/2009, 1917/2010, 2041/2012, 2069/2012.

[68] NATO-ISAF, *History*, http://www.isaf.nato.int/history.html.

[69] NATO-ISAF, *Troop numbers and contributions*, updated 1 April 2014, http://www.isaf.nato.int/troop-numbers-and-contributions/index.php.

[70] Ibid.

Italy contributed to Operation Enduring Freedom from 18 November 2001 to 3 December 2006.[71] The Italian Navy sent a task force in the Persian Gulf including the Garibaldi Carrier with three support frigates, from which 8 AV-8B and a dozen of combat helicopters operated, with a total of 1,400 military personnel in theatre.[72] In the first phase of the operation, the Alliance aircraft could not use any terrestrial airport to start or continue their missions. Indeed, in the meantime diplomatic agreements were being signed to allow Western aircraft to be deployed from the region, tactical aircraft deployed on carriers were the only feasible solution to keep executing missions and produced 75% of ground-attacks for a long time since the mission had started. In this first period, aircraft were asked to realize 6 to 8 hours long missions to reach objectives located up to 1,500 km from the carrier, at night and during the day. This has been made possible thanks to air-to-air refuelling from allied tankers.[73] In this phase, the Garibaldi carriers remained at sea for 87 days, without any technical layover, sailing more than 20,000 miles in the Indian Ocean and permitting AV-8B to operate in the Afghan theatre, given the absence of terrestrial support.[74] The Italian fighter aircraft fulfilled tasks such as air interdiction, suppression of enemy air defence, Close Air Support, air defence, interception of suspect aircraft, recognition, monitoring of sea traffic and communication lines, sea interdiction and fleet protection.[75] During this operation, 328 sorties have been completed, for a total of 860 flight hours.[76] The Italian Navy AV-8Bs showed a full interoperability with the rest of the coalition platforms and carried on missions in "combined packets" with American and Eng-

[71] Italian Chamber of Deputies-Research Service, "La missione ISAF in Afghanistan", in *Documentazione e ricerche*, No. 20 (28 May 2013), http://documenti.camera.it/leg17/dossier/Testi/DI0030.htm.

[72] Italian Senate, *Comunicazioni del Governo sull'impiego di contingenti militari italiani all'estero in relazione alla crisi internazionale in atto e conseguente discussione*, 7 November 2001, http://www.senato.it/leg/14/BGT/Schede/ProcANL/ProcANLscheda6814.htm.

[73] Interview dated 14 March 2014.

[74] Ibid.

[75] Italian Senate, *Comunicazioni del Governo sull'impiego di contingenti militari italiani all'estero*..., cit.

[76] Interview dated 14 March 2014.

lish similar vehicles. Later on, they have also operated autonomously in groups of 2/4 aircraft, performing CAS and recognition missions with infrared precision munitions systems.[77]

With respect to ISAF, Italy has been part of the mission since its inception and has increased its military contributions from a few hundred troops in 2002 to nearly 4,000 in 2009, in line with the rest of contributions from other NATO members. General Mauro Del Vecchio took command of the whole ISAF between 2005 and 2006, while Italy has led the Regional Command West since its establishment in 2006. As of February 2014, Italy had 2,165 units on the ground, ranking fourth among contributing nations.[78] Italian troops have been deployed mainly between Kabul and the western region, in the Herat and Farah provinces. Concerning air capabilities, in 2007 the Joint Air Task Force (JATF) was established in Kabul as part of the Regional Command West and the Air Component of ISAF. Comprised entirely of Italian personnel, the Task Force's first aim is to coordinate those Italian assets that are under the direct control of NATO operations. The importance of the presence of air capabilities in Afghanistan stems from the extension and geography of the territory, which NATO required to protect with a number of forces of all types.[79] As of 2013, JATF was articulated in three Task Groups, each of them having different platforms at their disposal: AMX ("Black Cats"), C-130J and C-27J JEDI ("Albatros") and Predator MQ1C ("Astore").[80]

In November 2008, following a NATO request to improve aerial surveillance of the Afghan territory, 4 Tornados left Italy to reach the German base of Mazar-e Sharif, establishing the "Task Group Devil." Tornados were deployed to run Intelligence, Surveillance and Reconnaissance

[77] In 2004 eight pilots from the Italian Navy have been awarded of the United States Air Medal for their valuable contribution to Operation Enduring Freedom.

[78] NATO-ISAF, *Troop numbers and contributions*, cit.

[79] Italian Air Force, *Operazioni internazionali: Afghanistan (2002) - Joint Air Task Force (JATF)*, http://www.aeronautica.difesa.it/Operazioni/Internazionali/afghanistan/Pagine/JointAirTaskForce(JATF)_ENG.aspx.

[80] Italian Air Force, *News: Herat: AMX conducono azioni di sicurezza*, 26 September 2013, http://www.aeronautica.difesa.it/News/Pagine/AfghanistangliAMXitalianiportanoaterminelOperazioneBallpark_260913.aspx.

(ISR) activities,[81] providing one third of all photographic material in the digital format among forces responsible for IRS missions and thus becoming the first supplier for the quantity and quality of the material delivered.[82] This result was possible thanks to a new reconnaissance system, namely the pod RecceLite, able to transfer in real time ISR information to stations on the ground, and to the support of Remotely Piloted Aerial Systems (RPAS),[83] such as the Predators MQ1C. By the end of December 2009, Tornados achieved more than 350 sorties, amounting to about 900 hours of flights and covering 800 targets.[84] AMX vehicles from the 52nd and 31st Wings of Amendola replaced Tornados in the same year, arriving in Herat in November to carry out similar ISR activities.[85]

Italian AMX aircraft were also involved in operations such as those named Shrimps Net in August 2012 and Ballpark in September 2013. During Operation Shrimps Net, Black Cats Task Group conducted 16 missions, either Tactical Air Reconnaissance (TAR) or Close Air Support (CAS), totalling more than 45 flight hours.[86] Operation Ballpark, coordinated and conducted entirely by JATF, aimed at ensuring optimal security conditions against Improvised Explosive Device (IED) or attacks by the insurgents along one of the main Afghan highways, the Highway One. In this context, AMX reacted against hostile forces operating along the highway, exploiting images from Predators and information from

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[81] Gregory Alegi, "Quattro Tornado italiani partiranno lunedì per l'Afghanistan", in *Dedalo News*, 19 November 2008, http://www.dedalonews.it/it/?p=16935.

[82] Italian Air Force, *Operazioni internazionali: Afghanistan (2002) - Joint Air Task Force (JATF)*, cit.

[83] RPAS platforms are also known as Unmanned Aerial Vehicles (UAV) or Unmanned Aerial Systems (UAS), and ultimately with the name "Drones".

[84] Italian Air Force, *News: Rientrata la bandiera di Guerra del 6° Stormo*, 15 December 2009, http://www.aeronautica.difesa.it/News/Pagine/Rientro_Bandiera_Guerra_Ghedi. aspx.

[85] Italian Air Force, *News: Quattro caccia AM-X giunti ad Herat*, 4 November 2009, http://www.aeronautica.difesa.it/News/Pagine/AM-X_Herat.aspx.

[86] Italian Air Force, *News: Conclusa l'operazione 'Shrimps Net'*, 20 August 2012, http://www.aeronautica.difesa.it/News/Pagine/Conclusal%E2%80%99operazioneShrimpsNet.aspx.

troops on the ground.[87] In addition to these operations, AMX were also employed in more "assertive" type of missions, for instance when they targeted and hit two communication systems used by insurgents in the district of Bakwa in December 2012,[88] or when they destroyed three antenna towers using GPS-guided missiles in the province of Farah in April 2013.[89] Until May 2013, AMX vehicles have been engaged in more than 2,400 sorties in day and night operations, covering 6,300 targets and photographing several kilometers of the Afghan territory.[90] On the whole, until December 2013, Italian fighter have contributed 3,031 sorties and 8,447 flight hours to ISAF mission.[91]

OPERATION ENDURING FREEDOM

General information (2001-2006)		
Coalition Forces	**Chain of Command**	**UN Security Council Resolution**
Italy, France, Netherlands, UK, US	United States	Yes

Italian contribution (November 2001-December 2006)		
Aircraft	**Sorties**	**Flight Hours**
AV-8B	328	860

[87] Italian Air Force, *News: Herat: AMX conducono azioni di sicurezza*, cit.

[88] Italian Air Force, *News: Afghanistan: AMX distruggono antenne dei ribelli*, 7 July 2012, http://www.aeronautica.difesa.it/News/Pagine/AMXdell%E2%80%99Aeronauticadistruggonodueantennedeiribelli.aspx.

[89] Italian Air Force, *News: Duro colpo alle comunicazioni degli insorti*, 30 April 2013, http://www.aeronautica.difesa.it/News/Pagine/Afghanistandurocolpoallecomunicazionidegliinsorti_300413.aspx.

[90] Italian Air Force, *News: Afghanistan: 7000 ore di volo per gli AMX*, 6 May 2013, http://www.aeronautica.difesa.it/News/Pagine/ContinualaserieditraguardioperativiRCW.aspx.

[91] Data provided by the Italian Air Force's statistical division.

OPERATION ISAF

General information (2001-ongoing)		
Coalition Forces	**Chain of Command**	**UN Security Council Resolution**
Italy, Germany, France, The Netherlands, UK, US[92]	NATO	Yes

Italian contribution (2002-ongoing)		
Aircraft	**Sorties**	**Flight Hours**
Tornado, AMX	3,031	8,477

1.5 LIBYA (2011)

The reasons that led some NATO countries to plan and conduct a prolonged air campaign in Libya in 2011 are still a contentious issue and an object of studies and analysis by experts and jurists.[93] France, the UK and the US had a leading political role to initiate the military operation, notwithstanding their different perspectives and political intents. The US military effort certainly was indispensable to launch the multinational operation and conduct the first phase of the campaign in Libya. In the warm up of the operations, 13 more nations decided to join the coalition, though some of them – including Italy[94] – were particularly sceptical about its long-term implications on Libya's stability.[95] Although the time is not yet sufficiently ripe to draw final considerations, it seems

[92] Since 2001 around 50 countries contributed to the mission. But only few countries provided air capabilities relevant for the focus of this study. For more information see NATO-ISAF, *Troop numbers and contributions*, cit.

[93] See, among others, Natalino Ronzitti, "NATO's Intervention in Libya: A Genuine Action to Protect a Civilian Population in Mortal Danger or an Intervention Aimed at Regime Change?", in *The Italian Yearbook of International Law*, Vol. 21, 2011, pp. 3-21.

[94] "Libia: il "Colle" sostiene i bombardamenti. Berlusconi: 'con la Lega è tutto a posto'", in *Corriere della Sera*, 26 November 2011, http://www.corriere.it/politica/11_aprile_26/napolitano-libia-frattini_a17bffc4-6fea-11e0-9dd7-595a41612a44.shtml.

[95] Ian Black, "Concerned neighbours warn against foreign intervention in Libya", in *The Guardian*, 2 March 2011, http://gu.com/p/2nfan/tw.

that the humanitarian rationale, which has characterized the initiative at the UN Security Council level, was an important factor, especially in terms of legitimacy in the eyes of the public opinion. However this was not the unique element, and maybe not even the most important one, explaining the military intervention.[96]

Officially, the military operations were undertaken in response to events occurred during the Libyan rebellion, which came in the context of a wider unrest in the Middle East and North Africa. The insurgency started after a series of protests and revolts against the regime of Muammar Gaddafi in February 2011, partly inspired by the uprisings that brought down the governments of Libya's neighbours, Egypt and Tunisia. The protests, particularly in the Benghazi area, escalated into an armed rebellion that spread across the country with the objective to overthrow the incumbent government.

This situation caused the reaction of the UN Security Council on 26 February, which passed an initial resolution establishing an arms embargo, asset freeze and travel ban against Gaddafi and other high-level members of the regime, while also referring the matter to the International Criminal Court for further investigation.[97] On 17 March 2011, the UNSC adopted resolution 1973, which authorized the use of force, including the establishment of a NFZ, to protect civilians and areas targeted by the Gaddafi loyalist forces.[98]

With respect to the military intervention, the UNSC Resolution 1973/2011:

- Authorized Member States, acting nationally or through regional organizations or arrangements, to take all necessary measures to protect civilians and related populated areas under attack, including Benghazi. The resolution specifically excluded the establishment of a foreign force or any other form in any part of the Libyan territory.

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[96] Mario Arpino, "L'Italia nelle operazioni in Libia", in *AffarInternazionali*, 6 December 2011, http://www.affarinternazionali.it/articolo.asp?ID=1925.

[97] Resolution 1970/2011, 26 February 2011, http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1970(2011).

[98] Resolution 1973/2011, 17 March 2011, http://www.un.org/en/ga/search/view_doc.asp?symbol=S/RES/1973(2011).

- Called Members States of the Arab League to cooperate in the implementation of the established measures.
- Authorized the establishment of a NFZ in Libyan airspace. That flight ban would not apply to flights that had as their sole purpose humanitarian aid, the evacuation of foreign nationals, to enforcing the ban or "other purposes deemed necessary for the benefit of the Libyan people."
- Authorized Member States to take all necessary measures to enforce compliance with the ban on flights imposed.

In order to implement the UNSC Resolution 1973, on 19 March a US-led operation, named Operation Odyssey Dawn, started with French and British support. The goal was twofold: 1) preventing further attacks by loyalist forces on Libyan citizens and opposition groups, especially in and around Benghazi; 2) degrading the loyalist forces' capability to resist the NFZ authorized by the UNSC resolution.[99] In the meanwhile, political negotiations started to shift the operation from a "Coalition of the Willing" to a NATO integrated military command. On 23 March, NATO assumed command of military operations to enforce the UN arms embargo. The transfer of command responsibility for the NFZ was agreed on 24 March, while the decision to transfer command and control for all military operations in Libya was taken on 27 March. As a result, NATO formally assumed the responsibility of the re-named Operation Unified Protector on 31 March 2011. Operation Unified Protector ended on 31 October 2011, after the collapse of the loyalist forces and Libyan incumbent government.[100] As of 2013, neither NATO, nor EU stabilization mission on the ground has followed the air campaign.

Italy's contribution to operations in Libya has been three-fold. First, in a chronological order, the Italian Navy, including the Navy Aviation, led NATO naval operation to enforce the UN arms embargo, including

[99] US Dept of Defense, *DoD News Briefing by Vice Adm. Gortney from the Pentagon on Lybia Operation Odyssey Dawn*, 19 March 2011, http://www.defense.gov/transcripts/transcript.aspx?transcriptid=4786.

[100] Italian Air Force, *News: Task Group Air di Trapani Birgi*, 31 August 2011, http://www.aeronautica.difesa.it/News/Pagine/RaggiuntidueimportantitraguardiperilTaskGroupAirBirgi_310811.aspx.

operations in Libyan coastal waters subject to military threats from loyalist forces.

Second, the use of military bases on the Italian territory was crucial to carry on the air operation, which could not have been possible without such large footprint close to the operational theatre. As it happened during NATO missions in the Western Balkans, this implied the risk of retaliation by the Libyan loyalist forces against Italy, as it was again one of the few NATO members geographically close to the operational theatre. It also implied a significant Italian effort in terms of manpower and economic resources. The Italian air bases involved in military operations were Aviano, Amendola, Decimomannu, Gioia del Colle, Pantelleria, Sigonella, and Trapani. Overall, 4,800 military personnel have been committed to provide a set of activities and services, from air traffic's control to technical assistance on the ground. In particular, Trapani military basis hosted 14% of the total coalition sorties. Italy's also provided the operation with "operational planners," as they contributed to NATO command and control structure at all levels. Moreover, Italy hosted the Joint Force Command (JFC) in Naples, while contributing at the tactical level with the Combined Air Operation Centre 5 (COAC) in Poggio Renatico.

Third, given the focus of this study, it is particularly important to look after the active participation of Italian air capabilities to both Operation Odyssey Dawn and then Operation Unified Protector. Overall, Italian aircraft conducted about 7% of the total Allied missions in Libyan skies, accounting for the largest Italian Air Force operation after World War II.[101] The bulk of committed Italian air capabilities were fighter aircraft including F-16, Eurofighter, Tornado and AMX based in Trapani under the Birgi Air Task Group, as well as AV-8B deployed on the Italian carrier Garibaldi. Tankers such as KC-130J and KC-767A as well as Predators B contributed to the air packages.[102]

Italian fighter aircraft executed different types of missions, including:

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[101] Italian Air Force, *Operazioni Internazionali*, *Libia (2011)*, http://www.aeronautica.difesa.it/Operazioni/Internazionali/Pagine/Libia(2011)_eng.aspx.

[102] Ibid.

a) Suppression of Enemy Air Defenses (SEAD). The Italian Air Force was the only air force (together with the American one) to carry out this type of mission, employing Tornados ECR from Piacenza Airbase's 50th Wing. These aircraft are equipped with particular systems able to locate air defence radar emissions and to neutralize them by delivering air-to-surface AGM-88 HARM missiles. These activities coerce opponents to deactivate their systems and allow friendly forces to enter the zone of the operations to conduct their own mission without the possibility of being hit by the enemy.[103] During SEAD operations, Tornados operate as "First In Last Out," as they must be the first aircraft to reach the centre of gravity and the last to leave in order to protect friendly forces from the beginning until the end of the mission.[104]
b) Defensive Counter Air (DCA). DCA activities consist of patrol and air defence operations, which were performed by F-16 fighter aircraft from the 37th Wing and Eurofighters from the 4th and 36th Wings. In particular, F-16 and Eurofighters were deployed in support of NFZ over Libya to defend Allied aircraft from air and ground attacks, as well as to maintain air superiority.[105] Moreover, Eurofighters were employed to safeguard "High Value Airborne Assets," hence to escort tactical aircraft deployed in particular missions.[106]
c) Offensive Counter Air (OCA) and Strike Coordination And Reconnaissance (SCAR). The OCA envisaged air-to-surface attacks on prearranged ground targets, while SCAR aimed at "dynamic" targets in areas with high concentration of enemy

[103] Ibid.

[104] Italian Air Force, *News: Unified protector: le capacità di attacco dell'AM*, 6 June 2011, http://www.aeronautica.difesa.it/News/Pagine/UnifiedProtectorlecapacit%C3%A0diattaccodell%E2%80%99AeronauticaMilitare_060611.aspx.

[105] Ibid.

[106] Italian Air Force, *News: Unified Protector: 1000 ore di volo per l'Eurofighter*, 15 June 2011, http://www.aeronautica.difesa.it/News/Pagine/operazioneunifiedprotectorl%E2%80%99f2000%E2%80%9Ctyphoon%E2%80%9Draggiungele1000oredivolo.aspx.

assets. These type of missions, with a substantial contribution of AV-8B, were led both by Tornado IDS from the 6th Wing and AMX from the 32nd and 51st Wings. All targets were assigned by NATO, after verification of compliance to the guidelines established by the political authority. Italian fighter launched more than 550 GPS and laser guided missiles, including GBU-12, 16, 24, 32, 38, 48, EGBU-24, and long range Storm Shadow cruise missile, having a 96% strike accuracy.[107]

d) Intelligence Surveillance Reconnaissance (ISR). These missions were conducted by Tornado IDS initially, then by AMX fighter and AV-8B with the support of RPAS such as Predators B. During these missions, Italian aircraft were tasked to acquire the necessary information on the ground to be used during air operations. In particular, Italian forces exploited the RecceLite electronic pods technology employed on Tornado and AMX to realize more than 340,000 high-resolution pictures, which were crucial for intelligence activities.[108]

Italian Air force fighter conducted overall 1,695 sorties and 6,254 flight hours.[109] Missions were distributed according to the following percentages: DCA 38%, ISR 23%, OCA 14%, SEAD 8%, SCAR 5%.[110] The 8 AV-8B of the Navy carried out first DCA missions and OCA later, resulting in 418 sorties and 1,001 flight hours.[111] Operating from the Garibaldi carrier, AV-8B were based at a safety distance of 100 miles from the Libyan shores, but closer to aircraft operating from Italian land bases and thus working also without air-to-air refuelling. Overall, fighter aircraft of the Italian Army performed 2,113 sorties for 7,255 flight hours.[112]

[107] Ibid.

[108] Ibid.

[109] Data provided by the Italian Air Force's statistical division.

[110] Italian Air Force, *Operazioni internazionali: Libia (2011)*, cit.

[111] Interview dated 14 March 2014.

[112] Data provided by the Italian Air Force's statistical division.

OPERATION UNIFIED PROTECTOR

General information (March 2011-October 2011)		
Coalition Forces[113]	**Chain of Command**	**UN Security Council Resolution**
US (27%), France (21%), UK (11%), Italy (7%), Canada, Denmark, United Arab Emirates, Turkey, Qatar, Sweden, Belgium, Spain, The Netherlands, Norway, Jordan, Greece	NATO	Yes

Italian contribution (March 2011-October 2011)		
Aircraft	**Sorties**	**Flight Hours**
F-16, Eurofighter, AV-8B, Tornado, AMX	2,113	7,255

1.6 THE ROLE OF ITALIAN FIGHTER AIRCRAFT IN CRISIS MANAGEMENT OPERATIONS

In the last 24 years, Italian fighter have been deployed in different circumstances: in an interstate war like in the Gulf war, in civil conflicts like in Bosnia-Herzegovina, Kosovo and Libya and in a failed state with some typical connotations of insurgency and civil war like in Afghanistan.

Considering the aforementioned 10 air operations,[114] Italy has deployed its aircraft 90% following a UN Security Council resolution and 80% under NATO framework. This insight shows not only Italy's deep integration and commitment to those organizations, but also the strong influence of a globalized international system which requires the management of international crisis by the whole international community.

[113] Italian Air Force, *Operazioni internazionali: Libia (2011)*, cit.; Mario Arpino, "L'Italia nelle operazioni in Libia", cit.

[114] Desert Storm, Deny Flight, Sharp Guard, Deliberate Force, Decisive Endeavour, Deliberate Guard, Allied Force, Enduring Freedom, Unified Protector, and International Security Assistance Force (ISAF).

Indeed, Italy has devoted to international missions approximately 100 fighter aircraft, performed more than 13,000 sorties and flied around 36,000 hours in operations.

Italy's operational participation in missions abroad has grown in qualitative and quantitative terms over the last 24 years. Starting from a minor although important contribution to Operation Desert Storm, Italy's posture was raised in Bosnia-Herzegovina, Kosovo and Afghanistan later. Finally, it increased substantially in the latest operation in Libya, where it conducted 7% of NATO air sorties and provided the Alliance with crucial command and control activities, as well as logistic footprint. Hence, and despite an economic situation which has left little room of manoeuvring for foreign policy considerations, Italy has not renounced to deal with important security issues – although events and international constraints seem to have shaped Italian interventions more than a clear national strategy.

In the end, Italian fighter aircraft have proved their great versatility, performing a wide variety of tasks in different conditions and regions of the world. The First Gulf War epitomized several shortfalls and gaps, for example in terms of technologies, which have been successfully addressed in the following two decades. In particular, Italian Air Force pursued an improvement of Precision Guided Munitions (PGM), Electronic Warfare Systems (EWS), Air-to-Air Refuelling (AAR), infrared sensors, weapons systems like AARM missiles, night vision, radio and communication systems up to Link 16.[115] In Kosovo, and then in Libya even more, the progress achieved by Italian air capabilities have been proven by the increased quality and quantity of its allocated contributions to crisis management operations. This has been epitomized by the fact that Italian Air Force has been the only European power, aside from the Americans, to have conducted SEAD missions in Libya,[116] and that it has been one of the most effective suppliers of photographic material provided in ISR activities in Afghanistan.[117] The Italian Navy has also

[115] Interview dated 11 December 2013.

[116] Italian Air Force, *Operazioni internazionali: Libia (2011)*, cit.

[117] Italian Air Force, *Operazioni internazionali: Afghanistan (2002) - Joint Air Task Force (JATF)*, cit.

sought to improve and upgrade its aero-tactical component, for instance thanks to the acquisition of the POD Litening II, in order to acquire an autonomous targeting capacity, whose benefits have been evident to Italy and its allies in the context of Operation Enduring Freedom.[118]

Table 1. International Missions (1990-2013): an overview

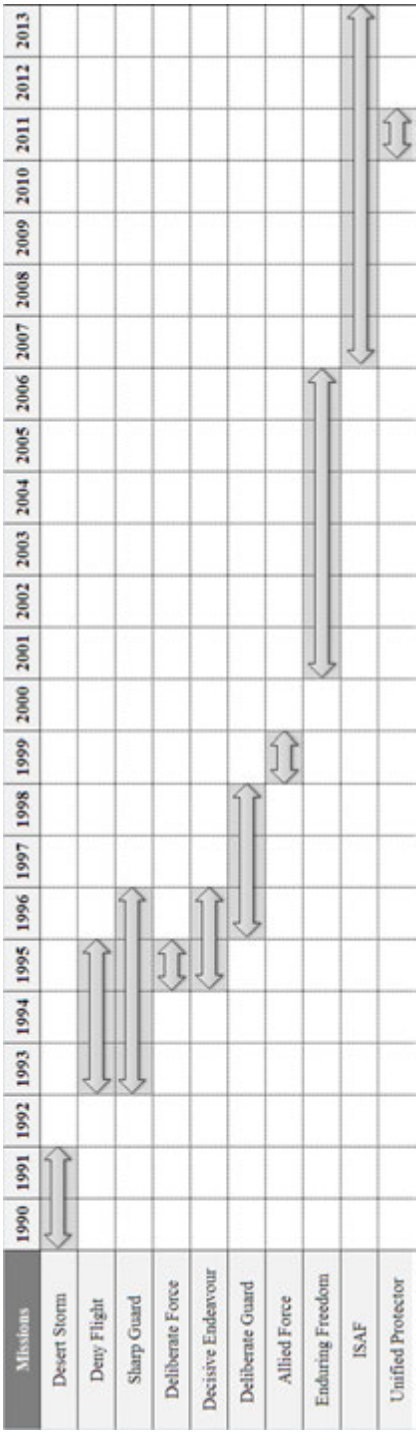
Operation	Coalition Forces	Chain of Command	UN Security Council Resolution
Desert Storm (1990-1991)	US, UK, Saudi Arabia, Kuwait, France, Italy, Bahrain	United States	Yes
Deny Flight (1993-1995)	Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Turkey, UK, US	NATO	Yes
Sharp Guard (1993-1996)	Belgium, Canada, Denmark, France, Germany, Greece, Italy, the Netherlands, Norway, Portugal, Spain, Turkey, UK, US	NATO	Yes
Deliberate Force (1995)	US (65.9%), UK (9.3%) France (8.1%), the Netherlands (5.6%), Spain (3.4%), NATO, NAEW (2.7%), Turkey (2.2%), Germany (1.7%), Italy (1%)	NATO	Yes
Decisive Endeavour (1995-1996)	Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Turkey, UK, US	NATO	Yes
Deliberate Guard (1996-1998)	Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Turkey, UK, US	NATO	Yes
Allied Force (1999)	US (80%), France (6%), UK (5%), Italy (3%), Netherlands (3%), Germany (2%)	NATO	No
Enduring Freedom (2001-2006)	US, UK, Italy, France, the Netherlands	United States	Yes
ISAF (2001-2014)	US, UK, Italy, Germany, France, the Netherlands, Canada	NATO	Yes
Unified Protector (2011)	US (27%), France (21%), UK (11%), Italy (7%), Canada, Denmark, United Arab Emirates, Turkey, Qatar, Sweden, Belgium, Spain, the Netherlands, Norway, Jordan, Greece	NATO	Yes

[118] Interview dated 14 March 2014.

Table 2. Italian contribution to international missions (1990-2013)

Operations	Aircraft	Sorties	Flying hours
Desert Storm	8 Tornado	2,326	4,503
Deny Flight	4 Tornado, 4 AMX	543	1,288
Sharp Guard	8 Tornado	230	267
Deliberate Force	8 Tornado, 6 AMX, AV-8B	26	41
Decisive Endeavour	Tornado, AMX	1,250	3,150
Deliberate Guard	Tornado, AMX	2,974	7,227
Allied Force	22 Tornados ECR/IDS, 6 AMX, 6 F-104 ASA, 6 Tornado IDS, 4 Tornado ECR/IDS, 4 F-104 ASA	1,072	2,903
Enduring Freedom	AV-8B	328	860
ISAF	4 Tornado, 4 AMX, AV-8B	3,031	8,477
Unified Protector	F-16, Eurofighter, Tornado, AMX, AV-8B	2,113	7,255
Total	64 Tornado, 20 AMX, 6 F-104, F-16, AV-8B, Eurofighter	**13,893**	**35,971**

Figure 2. Participation of Italian fighter aircraft in international missions: a chronology



2.

Current and future air operations: doctrine and trends

Italy's use of fighter aircraft in the post-Cold War period has gone hand in hand with developments in Air Power doctrine. This chapter outlines doctrine's fundamentals and trends stemming from the recent operational experience,[1] in order to understand current and possible future ways to utilize air capabilities including fighter aircraft.

2.1 AIR POWER: DOCTRINE'S FUNDAMENTALS

In theory, Air Power doctrine evolves by considering best practices resulting from operational experiences, as well as innovations in technical and conceptual terms, and by radical changes occurring in the international system.[2]

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[1] This chapter partly draws from the extensive work conducted by IAI, Fondation pour la Recherche Stratégique (FRS) and Royal Aeronautical Society (RAeS), in 2012 within the IAI-led research project "Landscaping – Identifying the mismatch between requirements and planned capabilities: Air Operations".

[2] For more detailed information see also: NATO Allied Joint Publication, *Joint Air and Space Operations Doctrine*, 2002; NATO Allied Joint Publication, *Joint Operations Doctrine*, 2010; Christopher Harper, "Challenges for NATO Air & Space Power", in *JAPCC Journal*, No. 14 (Autumn 2011), pp. 33-37, http://www.japcc.org/publications/journal/Journal/20111014_-_Journal_Ed-14_web.pdf; EU Military Staff, Draft concept for Air Operations in support of the EU CSDP, 2011; US Air Force, *Air Force Basic Doctrine, Organization and Command. Air Force Doctrine Document 1*, 14 October 2011, http://www.au.af.mil/au/cadre/aspc/l002/pubs/afdd1.pdf; Denis Mercier, "Thinking about Air and Space Power in 2025: Five Guiding Principles", in *Air & Space Power Journal*, Vol. 26, No. 3 (May-June 2012), pp. 16-30; John D. Jogerst, "Airpower Trends 2010: The Future is

Air Power is defined as the capacity to project power from the air to influence the behaviour of people or the course of events. It is an essential element in almost all military operations, which exploits all aspects of the Earth's atmosphere such as height and reach over both land and sea. These key characteristics, coupled with increasingly capable technology, makes Air Power a flexible, rapid, 24/7 available tool to influence the operating environment – thus ensuring Air Power's "virtual presence" throughout the entire operation, thanks to its extreme deployability. As a result, Air Power can be considered as a multiplier force for deployed land and maritime military forces.

Furthermore, the utilization of air capabilities is not limited to any particular kind of operation, as Air Power's key characteristics permit to achieve strategic, operational or tactical results, in a joint or separate fashion, ranging from diplomatic warnings to the actual use of force. The flexibility, reach and ability to concentrate force make Air Power able to concurrently conduct or support different lines of operation against different targets. Moreover, Air Power can be switched from one role or objective to another, within or between operational theatres. Consequently, it can be rapidly adapted to meet evolving operational requirements. In addition, Air Power provides the means to take advantage of both friendly strengths and opponent weaknesses. In fact, it may direct symmetrical actions where the opposing forces and friendly forces are similar, i.e. air defence versus air attack, or it may utilize its strengths against the opponent's vulnerabilities, for example by attacking Command and Control (C2) architecture and/or critical infrastructures such as energy grids.

Although being predominantly delivered by Air Force, Air Power also includes aerial capabilities provided by other services, even by civilian aviation. At the same time, Air Power is made not only by platforms and weapon systems, but it crucially relies on trained personnel, as well as

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Closer Than You Think", in *Air & Space Power Journal*, Vol. 23, No. 2 (Summer 2009), pp. 101-102, http://faculty.nps.edu/nlmiller/docs/sum09.pdf; Basilio Di Martino, "Air Power and Technology: A Tentative Approach to the Year 2025 and Beyond", in *RUSI Defence Systems*, 23 June 2010, pp. 56-60, https://www.rusi.org/publications/defence-systems/ref:A4C221670ABFA3.

on infrastructures to operate from, and spare parts vital to maintain its use effectively and efficiently.

Overall, it is possible to identify four main roles in which Air Power finds its concrete application: Control of the Air; Intelligence, Surveillance, Target Acquisition, Reconnaissance (ISTAR); Engagement; Air Mobility. The first three roles are particularly relevant in relation to fighter aircraft.

Achieving Control of the Air means having the freedom to use a specific volume of airspace within a given period of time for its own purposes, while, if necessary, denying its use to others.[3] This control is absolute in case of Air Supremacy. In the case of Air Superiority, it rather implies the degree of dominance in the air battle-space that permits to conduct military operations at any given time, without prohibitive interference by opposing air forces. Air Parity is the lowest level of control, meaning control of the skies only in the air space above friendly troop positions. Vice-versa, Air Denial is maintaining a level of operations that, although conceding Air Superiority to the opponent, prevents the enemy to achieve Air Supremacy. Operations to achieve Control of the Air may be offensive (Offensive Counter-Air) and/or defensive (Defensive Counter-Air, which includes air and missile defence). Offensive Counter Air Operations aim to obtain Control of the Air by destroying, degrading or disrupting the air capabilities of the adversary that is Suppression of Enemy Air Defenses (SEAD). Defensive Counter-Air (DCA) consists of active and passive actions aimed to protect friendly forces and non-combatant personnel in theatre.

ISTAR missions contribute to all intelligence products by supporting planning activities and decision making of all air operations' phases. They improve the ability to gain and maintain information superiority, and aim to achieve Situational Awareness (SA) that is having a full comprehension of the operational situation in theatre. For example, ISTAR air capabilities are, together with space Earth Observation (EO) systems, the main imagery intelligence provider. By combining high sensor

[3] One of the first and most important authors theorizing the importance of the Control of the Air doctrine has been the Italian Giulio Douhet in his study *Il dominio dell'aria* (*The Air Supremacy*), published in 1921.

imagery, hype-spectral sensors and all-weather radar sensors, air capabilities overcome the lack of persistence experienced for example by observation satellites. Air capabilities also complement naval and land fixed and mobile sensors by providing stand-off interception of high-frequency signals either for communication intelligence or for electronic intelligence.

In terms of Engagement, Air Power role includes: deep attack, ground attack, and information operations.[4] Deep attack is aimed at disrupting or destroying vital targets such as C2 infrastructures, industries of defence, command and control elements, war production resources, deployed forces or key supporting infrastructures. In particular, a deep attack seeks to disrupt an enemy's strategy and ability or will to wage war. Ground attacks operations intend to achieve and maintain a specific degree of control of the battlefield by targeting enemy ground forces and/or infrastructures supporting them, or by using air psychological effects. These operations are subdivided in Air Interdiction (AI) and Close Air Support (CAS). AI encompasses air operations which affect enemy potential before it can retaliate against friendly surface forces, while CAS implies Engagement in support of land forces already facing their opponents. Similarly, with counter-sea operations, such as for example Anti-Surface Warfare (ASUW), Anti-Submarine Warfare (ASW) and Aerial Mining, the objective is to attain and maintain the desired degree of maritime superiority by the destruction, disruption, delay, diversion, or other neutralization of threats in the maritime environment.[5] Finally, Information Operations are non-kinetic measures,[6] taken to influence, affect or defend information, systems and decision-making process. Among the so-called Information Operations, Electronic Warfare is one of the most extensively carried out and it seeks to control the elec-

[4] UK Ministry of Defence, *British Air and Space Power Doctrine* (AP 3000), 4th ed., 2009, http://www.raf.mod.uk/rafcms/mediafiles/9E435312_5056_A318_A88F14CF6F4FC6CE.pdf.

[5] US Air Force, *Countersea Operations. Air Force Doctrine Document 3-04*, 26 October 2010, https://www.fas.org/irp/doddir/usaf/afdd3-04.pdf.

[6] In general, the term "non-kinetic" refers to the ability to create effects that do not rely on explosives or physical momentum (e.g., directed energy, computer viruses/hacking, etc).

tromagnetic spectrum, both to enable friendly-force operations and to deny an enemy the same degree of freedom. Electronic Warfare is also conducted as a part of SEAD kinetic operations aiming to achieve Control of the Air.

Finally, the provision of Air Mobility permits global, regional and local deployment of military and civilian personnel and materiel. Air mobility acts as a fundamental enabler to move and sustain forces in several operations and it can be realized through Air-to-Air Refuelling (AAR), Airlift, Aero-medical Evacuation, Airborne Operations, Aerial Delivery and Special Air Operations. In the end, it should be reminded that Airlift and AAR – necessary to ensure Air Mobility – require the achievement of the Control of the Air by friendly forces.

2.2 TRENDS FROM THE RECENT OPERATIONAL EXPERIENCE

As mentioned before, Air Power's doctrine also tends to evolve following practices resulting from operational experience. In this perspective, some trends seem to emerge from air operations conducted in the post-Cold War period.

First of all, recent missions abroad have raised awareness at the political-strategic level that complex air operations require the availability of all air capabilities necessary to perform the four Air Power roles, and that air capabilities are more and more interlinked among each other. For example, the precise Engagement of a selected target on the ground is the last step in a chain of actions, which includes the preliminary Control of the Air, ISTAR findings and the related Air Mobility.

Second, ISTAR importance has increased ever more and it now represents an essential factor in all military operations. An emerged first key trend is that ISTAR is not provided only by dedicated platforms, such as RPAS, but by a number of sensors and systems embedded in a wide and complementary range of air platforms – obviously including fighter aircraft – as well as satellites. Another trend is that the process of collection, analysis and dissemination is increasingly important. On the one hand, augmented dataflow needs greater capabilities of data man-

agement, processing, storage and sharing. On the other hand, human analysis is vital: it is worthless to increase the number of sensors and to make dissemination more rapidly if this is not made compatible with human processing capacity.

Third, Control of the Air should not be taken for granted. Air operations in Afghanistan have shown poorly organized or totally absent air defence systems, but in both Libya (2011) and Kosovo (1999) cases the priority of the first days of operations was still to ensure coalition's Control of the Air by destroying opponent command and control (C2) structures, most of its air defence fixed systems and combat aircraft. Therefore, SEAD capability and other survivability issues will demand attention and substantial investments. The alternative is to accept a situation of Air Superiority or even Air Parity implying significant risk for allied aircrews. This is particularly true as non-European powers, including China and Russia, are investing in air capabilities, and even opponents lacking advanced capabilities will have the ability to imperil Control of the Air through the use of short range air defence – including MAN Portable Air-Defence Systems (MANPADS), which can contest Control of the Air below 10,000 feet.[7]

As far as the Engagement is concerned, a trend worth to mention is related to the use of Precision Guided Munitions (PGM). Their use has exponentially grown since the first Gulf War, when they had been introduced as a small percentage of the overall set of ammunition, to air operations in Libya, where they has been extensively used during the air campaign (roughly 7,600 PGM were fired in seven months). This also reflects a change in the political and ethical milieu, which influences the planning and conduct of air operations: those kinds of engagement that could be effective, but might involve a certain number of civilian casualties – not necessarily a high number in absolute terms – are not politically acceptable anymore by European governments and public opinion. In the future, the need to attack individual targets accurately will continue to be paramount.

[7] US Dept of State, *Addressing the Challenge of MANPADS Proliferation*, 2 February 2012, http://www.state.gov/t/pm/rls/rm/183097.htm.

This issue applies also to CAS. In this context, Air Power represents a strategic advantage but it can become a strategic vulnerability if not employed with restraint and precision in operations where the support of local population is crucial to succeed, as an opponent could easily exploit collateral damages caused by the use of Air Power. CAS requires close air-land integration, clearly defined procedures and detailed integration of Air Power actions with firing and movement by friendly forces, for targeting guidance and to avoid fratricide. Procedures are particularly important, but there is also an interoperability issue with regard to digital CAS: different national procedures and technologies may hamper this role – as well as others. In this context, Air Power contribution, often in joint missions and to support relatively small and mobile ground units, will continue to require even greater all-weather capacity, precision, range, and rapidity with regard to the sensor-to-shooter cycle.

Finally, in relation to Air Mobility, a decisive trend regards the issue of operating at a strategic distance, in particular for European armed forces. There is a lack of air capabilities able to project Air Power, as demonstrated by European countries during the operation in Libya, where the operational theatre was relatively close to the Italian bases. Each option which has been designed to solve the issue, like more advanced fighter aircraft, forward bases, carriers, AAR and strategic airlift has revealed its own limitations so far. As a result, only a balanced mix of these options can mitigate such a deficiency.

3.

Scenarios of possible future air operations

The future is not predictable and this chapter does not aim to do so. It rather presents two scenarios in order to point out how air capabilities, in particular fighter aircraft, may be used in crisis management operations in the 2015-2025 timeframe. The two scenarios are: first, air operations to establish and enforce a NFZ; second, air support to land-based crisis management operations. Each scenario has been built according to the same structure, which includes the following elements: Strategic Context; Mission Objectives; Critical Factors of the Operational Environment; Adversary Capabilities and Course of Actions; Air Component Course of Actions and Associated Capabilities.

The likelihood of these scenarios is not addressed, but it is assumed they are at least possible examples of future joined air operations by European countries, including Italy. The starting point is that Italian fighter have been deployed in different crisis management operations in the last two decades, and armed conflicts will still be a feature of international security until 2050 (and probably beyond), with conflict countries concentrated in Africa, Middle East and East and South Asia. Also, the phenomenon of failed states will probably remain on the international scene for a long time, especially if political violence in Africa and the Middle East is not likely to decrease.[1]

Against this backdrop, it is possible to imagine a future employment of fighter in those regions, either for combat and/or stabilization purposes. As one might argue that NATO will never go "that out of area,"

[1] Fund for Peace, *The Failed States Index*, http://ffp.statesindex.org/rankings-2013-sortable.

one might reply that probably at the end of the Cold War none would have expected to see NATO running peace-keeping operations in Kosovo first and in Afghanistan later. Additionally, while a NATO naval operation is already fully operational in the Horn of Africa, if the threat of terrorism raises in the next years, careful analysts would not be completely surprised to notice a further engagement of the allies in the area. Moreover, as the recent cases of France interventions in Mali[2] and the Central African Republic[3] demonstrate, NATO is not the only framework under which operations requiring the use of fighter aircraft may be managed. In addition, UN-sponsored missions in the short term, or EU ones in the long run, might request the level of Air Power necessary to deal with complex (in)security issues.

3.1 ESTABLISHING AND ENFORCING A NO-FLY ZONE: "PROTECT TURIANS" SCENARIO

The following scenario is only a hypothetical contingency, yet sufficiently realistic to draw implications for the kind of air capabilities that might be required in the future.

3.1.1 Strategic context

Turia is country in the North African littoral inhabited by 30 million people over a large territory of more than 2 million squared kilometers. The population is largely concentrated in the coastal areas. The government of Turia has begun to use Air Power as a mean to oppressing a segment of its own population, the Regtura. This minority has a distinct ethnic background and has become increasingly strident in its demands of self-determination. The area in which the majority of Regtura is based is relatively rich in minerals and is regarded as an inalienable portion of

[2] "France confirms Mali military intervention", in *BBC News*, 11 January 2013, http://www.bbc.co.uk/news/world-africa-20991719.

[3] "French troops in Central African Republic to "avoid carnage", in *BBC News*, 11 December 2013 http://www.bbc.co.uk/news/world-europe-25327976.

the national territory by the Turian State. The ruling government therefore cannot afford to relinquish the territory and has instituted a harsh police crackdown, escalating into wide spread human rights abuses. Action against the minority grouping is believed to include the use of air assets for a variety of purposes including police deployments, reconnaissance, crowd suppression and targeted assassinations.

The international community deems necessary to intervene for a variety of reasons – including but not limited to the fact that a humanitarian disaster is taking place with thousands of people killed or injured and dozens of thousands of refugees directed towards both neighbour and European countries. Peace-keeping ground forces cannot be deployed for legal and political motivation, but action is considered essential. Therefore, the UN Security Council adopts a resolution to establish a No-Fly Zone (NFZ) in order to protect Turians from air threats, and calls the international community to act. The US had deployed part of their air capabilities in the Pacific area, where the American administration believe more compelling security interests are at stake. As a result, the US has acquiesced to provide platforms and highly technological assets to begin the operation (the so-called "enablers") and the rest of the significant air capabilities required for the operation in Turia, but European countries will make a substantial and prolonged contribution to establish and enforce a No-Fly Zone. The operation will take place through NATO integrated military command.

The scenario takes place roughly 2,500 km far from European air bases, that means within range of forces that could be based and supported from bases located in Europe, with supplementing carrier forces.

3.1.2 Mission objectives

According to UN mandate issued by the Security Council, in this scenario the Mission Statement for the Joint Force Air Component Command (JFACC) is to establish and enforce a NFZ over the entire Turia territory in order to the protect civilian population from government's use of Air Power.

Accordingly, Joint Force Commander's intent is to disrupt the air capability of the Turia regime, its capacity to ill people, and then to act

firmly and decisively to effect the levels of protection envisaged by the international community and the UNSC Resolution.

As a result, the two main objectives are: first, to achieve Control of the Air by suppressing Turia government's air capabilities, Integrated Air Defence Systems (IADS), Command and Control (C2) structures; second, to enforce a 24-hours NFZ for a period of several months.

3.1.3 Critical factors of the operational environment

For this scenario, two critical factors have to be considered. On the one hand, the large size of Turian territory, which makes particularly expensive and difficult to effectively enforce the NFZ all over the country. On the other hand, the necessity to keep air operations within the strict limits envisaged by UN mandate and according to its legal basis, in order to maintain legitimacy in the eyes of domestic public opinion and Allied political cohesion.

3.1.4 Adversary's capabilities and Course of Action

The military capabilities of Turian government will be largely composed by antiquated legacy platforms, with some modern equipment including rotary-wings platforms. Air-defence systems will be relatively effective, including a number of SAM. The armed forces will be primarily constituted by conscript and paramilitary forces, although a core of relatively trained professionals will be in place and the command and control network will work quite comprehensively across all service branches.

Given the gap with Allied air capabilities, the Turian government's Course of Action (CoA) will rely on an asymmetric strategy aimed at weakening the political cohesion of the Allied coalition – considered its center of gravity. Such strategy will see, for example, civilians forced to be present nearby likely military targets for NATO air operations. This will be done in order either to prevent the engagement of such targets because of strict rules of engagement (RoE), or to blame collateral damages possibly caused by the occurred Engagement in the eyes of European and North America public opinion.

3.1.5 Air component's Course of Action and required capabilities

Although this has been conceived predominantly as an air operation, the international community has set up a joint headquarter in case the situation develops to the point that wider military operations are necessary. Given the often indecisive nature of NFZ, the coalition must be willing to consider it as an enduring operation carried out 24/7. Rules of Engagement will be paramount on this operation, including air-to-air engagements along with key air-to-ground precision attacks.

Phase 1

The first phase will involve the setup of mission's headquarter and the coalition order of battle, along with an assessment of the threat posed to the Regtura ethnic minority. Since Phase 1, the headquarters will need to have timely and accurate intelligence assessments based on openly shared material. The JFC needs to have clearly agreed Rules of Engagement and must be aware of the scope of national caveat.

It will be set up a command, control, communication, computing and intelligence (C4I) architecture relying on robust network enabled capabilities to integrate all air and joint operation elements. Space assets will also be integrated in the C4I in order to support planning and conduct of operations through Earth Observation (EO), Positioning Navigation and Timing (PNT) and satellite communications. Coincident with this, the air planners will need to establish the likely challenge in gaining Control of the Air to enable their own air operations. This is likely to involve the full panoply of intelligence gathering, dissemination and pooling capabilities.

Phase 2

This phase will first involve the establishment of Control of the Air against potential air and ground threats. It will include EW and SEAD tasks, as well as air-to-air engagement. The command and control capabilities required in Phase 1 will be utilized also in Phase 2. It will be vital to ensure suitable communications, especially from the joint and combined headquarter to air assets.

Required capabilities for ISTAR purposes include:

- ISTAR capability to provide wide area coverage on a continual basis through a mix of space assets, fighter aircraft and Class III RPAS, supplemented by further RPAS to pin point specific targets as required;
- ISTAR capability to support Find, Fix, Track, Target, Engage, Assess (F2T2EA) dynamic targeting cycle in the theatre;
- Intelligence gathering, dissemination and pooling capabilities will be heavily used also during this phase, particularly for data management, processing, storage and sharing;
- Responsive and robust Space collection capabilities for real time surveillance and targeting.

Regarding Engagement, it will be necessary:

- Capability to conduct a variety of Computer Network Operations (CNO) against Adversary air capabilities and C2 networks;
- RPAS capability to be used separately and/or jointly with fighter aircraft for EW;
- Fighter aircraft and combat RPAS capability to perform SEAD and ensure Control of the Air against potential air and ground threats;
- Capability for Beyond-Visual-Range (BVR) air-to-air fighting;
- Air surveillance capability.

Considering UNSC mandate, Allied public opinion's concerns and adversary's CoA relying on asymmetric tactics, precision attacks will be vital capabilities throughout the entire operation. This will include both the use of a range of all-weather Precision Guided Munitions (PGM), encompassing Small Diameter Bombs (SDB) and small blast radius weapons to limit collateral damages, and the capability for assessing battle damage also through RPAS and Space assets. They will be used through the air campaign to eliminate adversary ground based facilities such as radars, missile sites and C2 centers with minimum collateral damage.

In order to protect air capabilities, space assets providing SA will be necessary. Given the cost and complexity of enforcing a NFZ in the region, ideally the Allied force will require a carrier group, from where air assets will be deployed, available for the entire duration of the mission.

Phase 3

This phase will mainly consist of enforcing the NFZ over the entire Turian territory. It will be enduring and will involve countering air threats against the ethnic minority on the ground. This may be supplemented by attacks on key enemy C2 nodes.

Air operations might vary from mounting non-kinetic interdiction and deterrence operations on a 24/7 basis to short periods of intense kinetic activity. Rapid and flexible response will be a key requirement, based on sound and accurate intelligence and rapid decision making to allow engagement with adversarial forces where necessary.

A central minimum requirement will be the ability to operate sustained 24/7 operations to prevent or to deter adversarial fixed wing activity. In principle, NATO European members will have sufficient aircraft to mount a NFZ mission, albeit some of the platforms have limited or no all-weather 24-hours capability: the issue will be rather their readiness. This need to be an enduring operation and the participating nations must assure their presence for the long haul. This has implications for sustainability and for the "roulement" of forces.

The same C2 and ISTAR capabilities needed for Phase 2 will be utilized also for Phase 3, although the number of sorties will be likely lower than in the previous phase because the Adversary military capabilities, and particularly air capabilities and C2 networks, will be severely disrupted. Required capabilities for engagement will include a sufficient combat aircraft capability to ensure more than 100 daily sorties. AAR capability will be vital to enable NFZ policing over a wide area. The capability to limit collateral damages as much as possible will continue to be required, inter alia through the use of SDB and small blast radius bombs, as well as the ability to assess battle damages.

European countries will struggle to support such an operation on a long duration, namely more than six months. Enforcing a NFZ would inevitably imply ability and a willingness to escalate to a more active kinetic engagement scenario. Its absence could seriously undermine the credibility of the NFZ, encouraging the adversary to simply wait for Allied determination and resources to wane.

3.2 AIR SUPPORT TO LAND-BASED OPERATION: "STABILITY IN BANON" SCENARIO

Again, the following scenario is only an hypothetical contingency, yet sufficiently realistic to draw implications for the kind of air capabilities required.

3.2.1 Strategic context

A country called Banon in the East Mediterranean sea is a victim of an ethnic and religious internal conflict supported by a Northern neighbouring state, the Republic of Sari. The framework of the air campaign is typically tailored to match a counterinsurgency environment in support of an incumbent government. In this scenario, European air component is deployed to support a multinational ground force committed to implement a UN Resolution. A substantial number of European countries contribute to a UN-mandated multinational force. The UN back the intervention and provide legitimacy through a mandate based on the "Responsibility to Protect" the civilian population, while the Arab League also supports and contributes to the multinational force. There is US direct support to the air campaign, but for a variety of political reasons large part of the burden has to be shouldered by Europeans. The NATO command and control architecture and procedures are in use to manage the military operations. An EU civilian mission is tasked for Security Sector Reform (SSR) of Banon.

The Banon Liberation Front (BLF) backed by RS government is increasing its influence in Banon. BLF is a non-state actor which relies on roughly 9,000 combatants, operating along the border deep into Banon territory from Sari sanctuaries. They practice paramilitary and terrorist activities. Their planned campaign consists of raiding villages and small towns and to clean other ethnic or religious groups from "liberated territories." In government controlled areas, the BLF performs terrorist activities such as assassination of Banon citizens, random bombings, attacks on official buildings or governmental representatives. There are dozens of thousands of displaced people, and a massive flow of refugees towards both neighbour countries and Europe.

The Banon National Defense Force (BNDF) is a very weak regular force of 35,000 men showing no ability to stop the guerrilla and the ethnic cleansing in the Northern region of Banon. Except two elite battalions, most part of the troops are ill trained, poorly equipped and underpaid.

The Sari Democratic Army (SDA) is 45,000 men strong. Almost entirely operational, the regular forces can deploy two brigades supported by field artillery and Special Forces. The Sari Air Force is air capable with around 25 fighter/bomber jets, 10 training/bomber jets, 3 cargo planes and 12 helicopters, including 6 attack and 6 transport. An effective air defense system provides protection of the Sari Republic through missiles and heavy artillery, while Dozens of MAN-Portable Air-Defence Systems (MANPADS) are available to regular and irregular forces.

The UN Force in Banon (UNFB) is 8,000 men strong and is ready to be deployed on short notice to protect the sovereignty of Banon, assist the Government of Banon in restoring a safe and secure environment and provide support to NGOs and international organizations managing humanitarian activities. The air operations take place at about 3,500 km from European air bases.

3.2.2 Mission objectives

The Joint Force Air Component Command (JFACC) is deployed in the East Mediterranean on a projection and command ship nearby the Republic of Banon's coasts. According to the UN mandate issued by the Security Council, JFACC mission statement is: to assist the GoB to defend the territorial integrity of Banon; to support the deployment of the UNFB, to restore a safe and secure environment and to execute a non-combatant evacuation on short notice (72 hours), if necessary.

The operation may be divided in two phases. In the first one, the Commander's intent is to rapidly deploy a capable, credible, visible and sustainable air component in order to: demonstrate the UNFB resolve to enforce the UN Resolution; assist to set conditions to deter any foreign aggression; prevent deterioration of the humanitarian crisis. The main effort at this early stage will be establishment of the NFZ in the area of operations; support to UNFB until the achievement of a full operational capability; evacuation of non-combatant foreign citizens if required.

This implies to:

1. Secure airbases and Aerial Ports of Debarkation (APOD) in the Republic of Banon;
2. Combat Search and Rescue (CASR) activities;
3. Establish a NFZ along the international border with RS with associated surveillance capabilities;
4. Establish air defence in area of operations.

Then, in the second phase, the main effort will be expanding the enforcement of the UN Resolution and countering hostile forces throughout the Republic of Banon, giving to Banon Government the necessary time and support to achieve internal stability. Developing a self-sustained Banon National Defence Force will be the key to ensure that this stability will be remnant: the Commander will try to achieve it by a strong partnership and combined planning and operations with UNFB, the EU RSS Mission and the Government of Banon. The second Phase will focus on supporting the UNFB and has the objectives to:

1. Assure full mobility of UNFB and BNDF;
2. Protect and support directly UNFB and BNDF on request;
3. Assist the civilian deployment of Banon and international organizations' representatives;
4. Oppose infiltration and freedom of maneuver of hostile elements in Banon territory;
5. Deter further aggressions.

3.2.3 Critical factors of the operational environment

At political level, it has to be considered a weak legitimacy of the Government of Banon in the Northern region and a poor Banon state agencies' capability. Arab League diplomatic efforts focus on a peace process between the Republic of Sari and Banon, therefore no military retaliation is allowed in the Sari territory.

In the theatre, in the short term the military balance of force favours the BLF and its supporter from the Republic of Sari, because of an accurate knowledge of the region, a favourable support of indigenous popu-

lation and a porous border. Military operations will have significant negative impact on economic growth and activities. Likewise, evacuation of foreign personnel could deprive the country of invaluable competences. Besides, destruction or seizure of critical assets including oil rigs and key industrial facilities could hit the Banon social stability. Moreover, economic and industrial facilities are not adequately linked by roads and railways, thus maintaining operational ground lines of communication is difficult. Therefore, air mobility is of critical importance.

Finally, international public opinion is not concerned with the evolution in the field, except in case of media coverage of a humanitarian disaster or operational casualties. The support will be hard to maintain in the mid-term.

3.2.4 Adversary's capabilities and course of action

The Republic of Sari, aware of the political risk of an invasion of Banon, would opt for an attrition strategy to delaying the political peace process and upholding the "Liberation Campaign" led by BLF.

The initial deployment of UNFB is unopposed, whereas all initiatives to restoring a safe and secure environment are strongly denied. A double line of operations is developed: a paramilitary/terrorist campaign in the Northern region; a terrorist campaign in the big cities of Banon to destabilize the Government and create conditions for a coup. The high value target of hostile forces should then be: UNFB units in place; innocent people harassed in targeted areas to create conditions for mass-migration; sabotage of infrastructures in key economic facilities; Banon NDF outposts and police stations; official buildings and/or representatives.

3.2.5 Air component Course of Action and required capabilities

Phase 1

The JFACC is included in a layer of multinational C2 structures and is sufficient to provide C2 framework for a non-combatant evacuation. Furthermore, it has an Air Tasking Order (ATO) of 100 sorties per day to establish and enforce a NFZ and the projection of a composite squad-

ron for a month. At this stage, signal intelligence and electronic intelligence capabilities are required to monitor the disposition and the status of air defence systems along the border with the Republic of Sari. Imagery intelligence assets provided by satellites and recce-pods make additional data available for surveillance of BLF movements within Banon. The core of the mission is the activation of a NFZ along the international border, whose activation encompasses:

- Early warning and permanent surveillance of airspace provided by AWACS for long range monitoring of Republic of Sari air bases;
- Fighter Combat Air Patrol;
- Defensive Electronic Warfare.

The NFZ layout should demonstrate a strong commitment. Regarding the protection of the headquarter, two options are available. A Carrier Battle Group (CBG) is probably the less risky option considering the low level of threat in blue water. However, the CBG availability could not be assured, at least permanently. The second option relies on a hardened air base in Banon, close to the capital city Rutbei. The needed capabilities include Air engineers and Air Special Forces capabilities, defensive EW. Deployability and Air Mobility are key issues, since the joint operations area is 3,500 km far from European air bases. The non-combatant evacuation is a priority. Critical capabilities include long range airlift and related air tankers for insertion of air engineers elements, special forces, few support helicopters for Combat SAR and platforms for air-to-air refuelling. The quality of Banon infrastructures is low. Consequently, the bulk of logistics, in terms of modern air navigation and adaptation to military standards will be charged on the multinational force.

Phase 2

In this phase, the mission's tasks consist of:

- establishing a coherent C2 architecture with UNFB and Host Nation (HN);
- providing intelligence;
- assuring increased mobility in theatre, including medical evacuation;

- delivering fire support – i.e. CAS – on request;
- assisting the RSS of the HN, for instance by training and equipping a new Banon Air Force.

Three chains of command have to be intermingled: NATO, UNFB and HN. The purpose is to get a common picture and planning process into the Combined Air Operation Centre (CAOC). Command and control architecture must be flexible enough to provide a quick response at tactical level. The apportionment of assets and mission assignments must be precisely coordinated with ground forces and, in order to follow the fluid evolution of the tactical situation, must be organized to allow an easy and rapid en-route re-tasking of the aircraft. Required capabilities include Tactical Air Control Post (TACP) network in ground units, rapid engagement with swift chain of F2T2EA.

It is also required a permanent ISR function: combination of fighter aircraft and both Class III and Class II RPAS monitoring remote terrain, key areas and friendly forces all across the area of operations. Support to the ground manoeuvres will vary according to the phase of the stability campaign led by the HN and UNFB. However, air component will play a direct action role through anti-surface actions including CAS with discriminate strikes, interdiction and psychological operations and info operations in support to ground forces.

Thus, some specific capabilities will be required:

- Precision strike should be assured by PGMs and a combination of low cost weapons provided by attack helicopters. Visual identification of target is the key condition to reduce risks of collateral damages to an acceptable level.
- AAR capacity is critical to maintain a significant fighter aircraft and helicopters loitering capacity for a prolonged period of time.

The best contribution of Air Power to the joint force protection relies on a flexible and responsive system of mission tasking: reconnaissance, mobility, direct support, increase the confidence of friendly forces and cripple the morale of insurgents. Re-establishing a safe and secure environment implies a dual role for Air Power: firstly, providing security to friendly forces and HN Authorities; secondly, limiting insurgents' military options.

Required capabilities also include airmobile units (Army Aviation), with heavy medium helicopters and tactical airlifts to support Banon Government's stability operations by providing transport to police forces, national and international agencies' personnel for election programme, humanitarian assistance and medical evacuation missions.

Finally, the air component will contribute to the SSR's efforts of the HN through training and the provision of new equipment to the Banon Air force, whose creation is envisaged to assuring the Control of the Air also in the aftermath of the peacekeeping mission.

4.

The military needs of Italian Armed Forces and the F-35 programme

As it has emerged in the first chapter, Italy has deployed more than 100 fighter aircraft in 10 international crisis operations in the last 24 years, flying more than 13,000 sorties and totalling 36,000 flight hours.

The use of air capabilities for missions abroad is likely to continue in the next future, although it is not possible to exactly foresee where, when, and how many fighter aircraft will be used by Italy. The second chapter summarizes doctrine's fundamentals and trends stemming from operational experience in order to shed some light on possible ways to use Air Power.

In this regard, the third chapter provides possible scenarios, whereby fighter aircraft may be used for different tasks, ranging from those necessary to establish and enforce a NFZ to others in support of ground operations. These scenarios may well take place in regions surrounding Europe, such as North Africa, Middle East and the "enlarged Mediterranean,"[1] where Italian national interests are mostly at stake.

Such analysis poses a number of key questions for Italian policy-makers, including civilian authorities – in primis the Parliament and the Government – and the armed forces. This chapter aims to address such questions and the related procurement needs of Italian military, as well as to assess whether and how the F-35 procurement programme satisfies the aforementioned needs.

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[1] For a definition of "Enlarged Mediterranean" see for example: Italian Ministry of Foreign Affairs, *Rapporto 2020: le scelte di politica estera*, April 2008, p. 57, http://www.esteri.it/mae/doc/Rapporto2020_SceltePoliticaEstera_090408.pdf; Italian Ministry of Defence-Defence General Staff, *Il concetto strategico del Capo di Stato Maggiore della Difesa*, March 2005, http://www.difesa.it/SMD_/CASMD/CONCETTOSTRATEGICO/Pagine/default.aspx.

4.1 FIRST KEY QUESTION: DOES ITALIAN PARTICIPATION IN CRISIS MANAGEMENT OPERATIONS SERVE NATIONAL INTERESTS?

The first key question is whether Italian participation in crisis management operations together with European and North American allies does serve national interests. This is primarily a political question that deserves a preliminary clarification on the international security environment.

In the post-Cold War period the direct threat of military invasion of Italian territory has greatly decreased in comparison with previous decades. Even if this threat has become highly unlikely, it would be extremely dangerous to rule it out as a possible contingency in the long-term: at the end of the day, in the early 20th century, European countries did not expect World War I to occur, and this has paradoxically been one of the reasons why it did. In contrast, during the Cold War, NATO countries and the Soviet bloc did expect another conflict to erupt in Europe, and this is one of the reasons why it did not. In other words, in the second half of 20th century deterrence prevented armed conflicts in Europe. Therefore, it is worthy for NATO members to maintain the necessary military capabilities – including air capabilities – in order to deter that an eventual escalation of political clashes in the international arena would revert into an open military confrontation. The crisis occurred in Ukraine between 2013 and 2014 has been a strong reminder that the use of military force in Europe is still an option for some regional actors in order to pursue their political goals. Something similar occurred in the First Gulf War, when Italy joined the war coalition led by the US to put an end to the Iraq invasion of Kuwait. It is not by accident that the first NATO "core task", reaffirmed in the 2010 Strategic Concept, is the collective defence of member states against any threat of aggression.[2]

[2] The 2010 Strategic Concept has established three core tasks for NATO: collective defence according to Art. 5, crisis management operations beyond Allied territories, and cooperative security through inter alia partnerships. NATO, *New Strategic Concept*, November 2010, http://www.nato.int/strategic-concept/Index.html.

Having said that, after the end of the Cold War, the main activity of Italian military has not been territorial defence. It has rather been the participation in crisis management operations beyond national borders. One of the main reasons of this shift were the changes occurred in the international security environment, which make security interests – and generally speaking national interests – affected by events, crises, risks and threats occurring well beyond country's borders. Globalization and economic interdependence have obviously played a fundamental role in this regard. The analysis of such changes is beyond the scope of this study. The bottom line is that in the last 24 years military capabilities have been used in missions abroad to defend Italian security interests and national interests in a new and unexpected way. As mentioned before, nobody in 1989 was expecting NATO to intervene in Yugoslavia to halt a civil war, although the Alliance did it with air and ground operations few years later. Similarly, it was not expected that 2001 terrorist attacks – and later on terrorist bombings in Madrid and London – would have prompt an international effort to fight terrorism, including through military means such as those employed by NATO for one decade in Afghanistan. Finally, still in early 2000s, it was not expected that European Navies would have countered piracy in the Red Sea and Indian Ocean through NATO and EU missions Ocean Shield[3] and Atalanta.[4] Recent security strategies adopted by international organizations – such as 2010 NATO Strategic Concept or 2003 European Security Strategy[5] – as well as those by the US, France and the UK, do task armed forces to perform a broad spectrum of missions, predominantly within a coalition rather than alone, against a variety of threats and in a wide range of crises. This international security environment explains the importance of missions abroad for European countries such as Italy.

[3] NATO Maritime Command, *Operation Ocean Shield*, http://www.mc.nato.int/ops/Pages/OOS.aspx.

[4] EU Naval Force Somalia, http://eunavfor.eu.

[5] Already in 2003, the *European Security Strategy* focused on security threats different from territorial defence, such as terrorism, state failure, proliferation of weapons of mass destruction, regional instability and organized crime, and set as priority for EU member states the capacity to act trough civilian and military missions.

In this context, Italian participation in crisis management operations in the last 24 years has contributed directly or indirectly to protect and promote national interests. For example, the stabilization of Bosnia-Herzegovina, Kosovo and generally speaking the Western Balkans was a clear, direct national interest, because, since the early 1990s, Italy had suffered from both the flow of illegal immigrants coming from these regions and the creation of a favourable environment for international organized crime and illicit traffics. Crisis management operations, including those conducted through Air Power, have been instrumental to pacify and stabilize an area extremely close to Italian national territory. Once stabilized, countries in this region became (or rather are becoming) part of both EU and NATO[6] and have provided economic opportunities for Italian economy in terms of export and investments.

Italian participation in other missions abroad has served national interests in an indirect way.[7] For instance, the active participation in NATO operations, particularly the eleven-year long ISAF operation in Afghanistan, has been an investment in a kind of Allied "insurance policy" for Italy's national security. During the Cold War, the Atlantic Alliance, and the US in particular, has been the only security guarantee Italy had, this being a sort of invisible "shield" or "umbrella" vis-à-vis the Soviet threat. Since the end of the Cold War, this "shield role" has evolved into an "insurance policy" in case the international security context would deteriorate again. The current transition of the international system from a US hegemony towards an uncertain and unstable multi-polar equilibrium, with emerging or re-emerging powers that do not necessarily share Western interests and values, pushes Italy to consider maintaining this "insurance policy" even more worthy. Participation in NATO most important missions, such as those in Afghanistan and Kosovo, is a way to maintain a solid, cohesive and credible military Alliance and to keep the investment made in the "insurance policy" for national security.

[6] Slovenia and Croatia have already become members of NATO and EU. Albania has joined NATO too. Other Western Balkan countries are either candidate to join both NATO and EU or they are expected to become candidate in the next years.

[7] This applies also to other important missions abroad such as those in Lebanon or Somalia, which are beyond the scope of this study since they did not envisaged a substantial use of fighter aircraft.

This is particularly true for Italy, a "middle power"[8] which does not have sufficient capabilities to protect its security interests alone – with the only relevant exception of Alba's crisis management operation, led by Italy in 1996 with the endorsement of UNSC, to restore security and stability in Albania. In fact, Italy has national interests well beyond its borders: safe trade routes in the "Enlarged Mediterranean," stretching to the Red Sea and the Indian Ocean; energy supplies from North Africa, the Middle East and Central Asia; maritime security and border control in the Mediterranean in relation to illegal immigration; a general interest in international free trade and openness of foreign markets for Italian export. Yet, such interests cannot be protected by Italy alone – neither by any other European country acting on its own. As a result, Italian active participation in international organizations such as NATO, the EU and the UN, as well as in informal fora such as G8 and G20, is a way to press its allies and the international community to deal with security challenges that are intertwined with Italian national interests.[9] In particular, an active, reliable and stable Italian participation in all NATO missions, including those less directly connected with national interests such as ISAF, is instrumental to gain the necessary credibility to push the Alliance to deal with key Italian security priorities. Moreover, being crisis management operations set up and organized under international organizations' framework allows Italy to share their risks and costs, to extend the intervention range to protect its national interests and to enhance inter-allies solidarity.[10] Vice-versa, a "free rider" approach with regard to operational burden sharing would inevitably weaken Italy's position within NATO and other international organizations and its ability to influence the allies with respect to Italian defence and foreign policy goals. This applies also, to a certain extent, to Italy's role in the UN. In

[8] On the Italy's structural condition as "middle power" in the post-Cold War period see, among others, Giampiero Giacomello and Bertjan Verbeek (eds), *Italy's Foreign Policy in the Twenty-First Century. The New Assertiveness of an Aspiring Middle Power*, Lanham, Lexington Books, 2011.

[9] See, among others, Stefania Forte and Alessandro Marrone (eds.), "L'Italia e le missioni internazionali", in *Documenti IAI*, No. 12|05 (September 2012), pp. 27-28, http://www.iai.it/pdf/DocIAI/iai1205.pdf.

[10] Ibid., p. 44.

fact, Italian participation in UN-mandated missions, including for example those in Iraq and Bosnia-Herzegovina, has been one of the main arguments used to foster Italian position within the negotiation on the UN Security Council's reform, in order to prevent a different settlement that would have included new permanent members, but left Italy out of UN's apical body.

This approach is linked to Italian traditional effort to be part of the core groups of countries dealing with security issues affecting Italy's national interests. The condition of "middle power" makes it difficult for Italy to maintain its status vis-à-vis more powerful countries. This is one of the main reasons why, since the end of World War II, Italian governments have constantly sought to join any form of enhanced security-related cooperation: European Defence Community, Western European Union, NATO, EU institutions and missions dealing with Common Security and Defence Policy (CSDP), up to the various "contact groups" established during Yugoslavia's break up in the 1990s. The ratio is that if Italy is part of the core group, Italian chances to influence the goals pursued by such group in crisis affecting national interests are greater than if Italy operates out of it. This has been one of the reasons Italy has chosen to join operations Odyssey Dawn and Unified Protector in 2011, despite of Italian scepticism on their effects on Libyan security and stability – scepticism which has proved to be right in the following years. Whether 2011 air operations in Libya have contributed to uphold Italy's national interests remains an open question. However, since the military intervention by other Western countries became inevitable at that time, Italian participation in the multinational and then NATO air campaign has at least benefited Italy's position with respect to the newly established Libyan leadership. This, in turn, has provided with the basis for a renewed bilateral cooperation on important Italian priorities such as border control and maritime security, immigration management and energy supplies.

Finally, participation in crisis management operations is also a way to maintain strong relations with Italy's main security ally, the US, considered since the end of World War II the bedrock of European and Italian security. Being surrounded by unstable regions – from the Western Balkans to the Southern Mediterranean shores – and not able as a "middle power" to shape events in these regions on its own, Italy has tradi-

tionally relied on "asymmetric alliances" with stronger partners (such as the US) to address common security concerns.[11] Moreover, the bilateral relation with Washington has been deliberately pursued by Rome as a leverage to enhance Italy's status vis-à-vis stronger European countries such as France and Germany. Despite the disappearance of the Soviet threat, this two-fold approach in the relations with the US has continued in the 1990s because of international crises in the Balkans and the Mediterranean, as well as because of the kind of relationships with other EU members.[12] Furthermore, the 2001 terrorist attacks shifted US national security priorities from Europe to the Greater Middle East and made European allies increasingly valued by Washington in terms of their political and military contribution to US-led crisis management operations,[13] such as those in Afghanistan. As a result, the Italian participation in missions abroad has become a fundamental tool for Italian defence and foreign policy with respect to the US ally.[14]

Obviously, the military participation in crisis management operations envisaging the use of Air Power does not guarantee per sé the direct protection of Italy's national interests. Neither it ensures direct and positive effects on Italian credibility vis-à-vis important allies, Italy's role within multilateral organizations such as NATO, UN or EU, or bilateral relations with the US. Indeed, such protection of national interests and positive effect on Italian credibility depend, among other things, on the capacity of Italian governments – and of the country as a whole – to make the best of the military contribution provided by Italy.[15] In this re-

[11] See, among others, "L'Italia e la trasformazione dello scenario internazionale", in Alessandro Colombo and Gianni Bonvicini (eds.), *La politica estera dell'Italia. Edizione 2012*, Bologna, Il Mulino, 2012, pp. 9-25.

[12] Leopoldo Nuti, "The Richest and Farthest Master is Always Best: US-Italian Relations in Historical Perspective", in David M. Andrews (ed.), *The Atlantic Alliance Under Stress*, Cambridge, Cambridge University Press, 2005, p. 189.

[13] CeMiSS and RAND, *Changing U.S. Defense Policy and the War on Terrorism: Implications for Italy and for US-Italian Relations*, Gaeta, Artistic & Publishing, 2002, p. 46.

[14] For a detailed comparison of Italian, French and British contribution to US-led military operations see Jason W. Davidson, *America's Allies and War. Kosovo, Afghanistan, and Iraq*, New York, Palgrave Macmillan, 2011.

[15] Interview dated 11 December 2013.

gard, participation in missions abroad is a fundamental enabler for Italian defence and foreign policy, despite being not sufficient without a full and stable diplomatic and political commitment. In the future, the effects of this contribution will depend on circumstances, as well as on the ability of Italian governments to exploit this valuable tool. For sure, giving up the ability to participate in missions abroad through Air Power would hamper this possibility, having a negative impact on Italian defence and foreign policy, and thus on Italy's ability to protect and promote national interests in the international arena.

In order to maintain such a tool, a certain level of defence spending is necessary. Since the early 2000s, Italy has allocated an average of 0.9% of GDP per year to the defence function,[16] roughly half of what has been spent in the same period – in absolute terms – by European countries such as France, Germany and the UK. The Italian debate on defence matters includes critics of military spending, particularly in times of economic crisis. For example, in February 2013, left-wing political parties and pacifist groups have put forward the "Agenda for Peace and Disarmament."[17] The initiative proposed to dismantle large defence procurement programmes and re-allocate the related funds to social policies to support employment and protect the environment. This decision would imply a negative cascade effect which is often under-evaluated by the Italian debate on defence matters. In fact, the first effect would be the reduction of Italy's ability to protect national interests through defence and foreign policy, which in turn would have a significant and negative impact on Italian society and economy.

[16] The term "defence function" includes all expenditures necessary to perform the specific set of tasks assigned to Army, Navy, Air, Force and joint component, as well as technical and administrative personnel of Defence Ministry. See Alessandro Marrone, Elena Cesca, Alessandro R. Ungaro, *Defence Budgets and Industry: Tables and Graphs*, July 2013, http://www.iai.it/pdf/Economia_difesa/Tabelle-grafici-EN.pdf.

[17] SEL, *Agenda per la pace e il disarmo per la prossima legislatura*, February 2013, http://www.sinistraecologialiberta.it/wp-content/uploads/2013/02/SELDisarmoPAce12Feb.pdf.

4.2 SECOND KEY QUESTION: WHAT KIND OF AIR CAPABILITIES DOES ITALY NEED TO PARTICIPATE IN CRISIS MANAGEMENT OPERATIONS?

If it is assumed that maintaining the capacity to project Air Power in crisis management operations does serve Italian defence and foreign policy, the second key question is what air capabilities are needed in this regard. Particularly, Air Mobility is a crucial role to be performed by air capabilities. Nonetheless, Air Mobility is not the focus of this study, which is rather on Engagement, ISTAR and Control of the Air roles.

In the last 24 years, the Engagement role has been performed by Italian military through fighter aircraft such as Tornado, AMX, F-16, F-104 and AV-8B. Some of them, mainly Tornado, have been used together with Eurofighter to gain and maintain Control of the Air in Libya (2011) and Kosovo (1999). As a matter of fact, the fighter aircraft fleet used so far by Italy in missions abroad is being phased out or will be phased out in the next decade. As stated in 2012 by the Italian National Armament Director, there is an "unavoidable requirement for the replacement of 253 aircraft belonging to three different lineups: 18 vertical take-off aircraft AV-8B of the Navy, 136 AMX and 99 Tornado of the Air Force."[18] The main reason is that many of them have been built in the 1980s or even in the 1970s, and, as far as their life-cycle reaches thirty or forty years, they cannot assure high security standards for the aircrew. Their effectiveness also decreases, as they are neither designed to reach certain performances, nor adaptable to incorporate new technologies. Moreover, maintaining an ageing aircraft in service beyond a certain timeline becomes more and more inefficient and expensive because of two main reasons. First, when a kind of aircraft is not produced anymore worldwide the availability of spare parts to maintain and fix the

[18] Italian Chamber of Deputies-Defence Committee, *Audizione del Segretario generale della Difesa e Direttore nazionale degli armamenti, generale di squadra aerea Claudio Debertolis sullo stato di avanzamento del programma d'armamento Joint Strike Fighter*, 5 December 2012, p. 4, http://documenti.camera.it/_dati/leg16/lavori/stencomm/04/audiz2/2012/1205/pdf001.pdf.

fleet in serve decreases and their cost increases. To make just all but one comparison, it is like what happens with the spare parts of a vintage car ("auto d'epoca"). This is particularly the case of Tornado, AMX and AV-8B. This is one of the main reasons the UK is planning to anticipate the acquisition of F-35 and the phasing out of its ageing fighter aircraft: maintaining old platforms soon will cost to the British military more pounds than the acquisition of new ones.[19] In addition, the more an aircraft becomes old and obsolete the more efforts are required to realize a possible upgrade, both in terms of time and economic investments. To sum up, if Italy wants to maintain its ability to participate in crisis management operations involving the use of Air Power, it would be necessary to procure new fighter aircraft to replace the current ageing platforms – which will be inevitably phased out in any case.

In this context, a clarification is needed with regard to RPAS. Their use has exponentially increased in the last decade, mainly for ISTAR purposes, but also for Engagement, including Close Air Support for example in Afghanistan. Military operations in Libya have proved the potentiality of combined use of RPAS and fighter aircraft. In the 2015-2025 timeframe, RPAS contribution to air operations is expected to grow in quantitative and qualitative terms because these platforms provide a valuable combination of endurance, connectivity, flexibility, autonomy and efficiency.[20] Particularly, endurance is increased as human limitations do not apply: for example, the maximum number of hours a pilot can fly per mission through a manned aircraft is extended by aircrew turnover in the control room piloting the RPAS. Moreover, the fact that RPAS do not put aircrews' life at risk does ease some political concerns increasingly diffused in Western countries regarding the use of Air Power. However, RPAS are likely to complement but not to replace manned fighter aircraft because of a number of reasons. In fact, from a political point of view, European authorities and public opinion – including Ital-

[19] Interview dated 13 December 2013.

[20] Alessandro Marrone, Alessandro R. Ungaro, "The Evolution of AGC: Power and Technology", in Claudio Catalano (ed.), *Global commons: threat or opportunity?*, Roma, Finmeccanica Research Department, October 2013, pp. 19-26, http://www.finmeccanica.com/documents/10437/7958427/body_FIN_OP_Global_Commons_V2.pdf.

ian ones – are much less at ease than Americans to have combat RPAS operating without a man in the cockpit, even if they are remotely piloted from the control room and are not fully autonomous. Furthermore, Europeans have issued strict rules of engagement concerning military operations, and are likely to establish comparably severe limits to the weapons carried on by RPAS and their release, particularly with regard to automated weapons' release.[21] From a military point of view, RPAS will not be able to reach the performances of a 5th generation fighter aircraft in terms of speed, manoeuvrability and survivability. Therefore, they will not be capable to replace fighter aircraft in the most demanding tasks concerning Control of the Air and Engagement roles. It is not by accident that the major producers worldwide of RPAS, the US and Israel, have decided to procure on a large scale a 5th generation fighter aircraft such as F-35: they plan to have a balanced fleet of manned and remotely piloted aircraft. The future of Air Power, at least until the 2030-2040 timeframe, will likely see a complementary utilization of 5th generation aircraft and RPAS, with almost no possibility of a complete replacement of manned platforms by remotely piloted ones.[22] The requirement to maintain fighter aircraft capability regards all major European countries. Without the availability of strategic bomber – which the US have maintained – the only way for Europeans to continue performing air-to-ground attacks is through this kind of aircraft, whose range can be extended by air-to-air refuelling, long-range weapons systems[23] and/or forward basing – also through carriers if the aircraft are able to land on these ships.

Having said that, it is worth considering Italian needs derived from the considered international missions in terms of air capabilities, particularly fighter aircraft. First of all, interoperability is crucial since Italian air capabilities have always operated within coalition predominantly composed by NATO members. Most of the time the US had a leading role, although in Bosnia-Herzegovina and Libya American role was not as dominant as in Afghanistan, Kosovo and Iraq. While in most cases UK

[21] Ibid.

[22] Interviews dated 10 December 2013 and 21 January 2014.

[23] Interview dated 21 January 2014.

and France have been major contributors, countries like Germany, the Netherlands, Canada, Denmark and Norway have assumed relevant roles in some operations. Also from a US perspective, operating within a coalition results way more convenient and efficient than operating on its own because it allows to share an operation's military, economic and political costs.[24] According to NATO official definition, interoperability is "the ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives."[25] In other words, it refers to the ability to jointly operate with allies in terms of platforms, systems, technologies, communications, tactics, procedures, training and logistics. There are various aspects and levels of interoperability. Obviously, having the same aircraft with the same systems, technologies and communications, including the same cockpit and display, allows reaching the highest level of interoperability in crisis management operations, but also in terms of training and logistics. The more the aircraft are interoperable, the more effective is their joint deployment in the operational theatre.

Second, it is fundamental the capacity to connect aircraft to other platforms such as fighter or RPAS, as well as to units operating on the ground, and to command and control centres wherever they are located – i.e. in the operational theatre or in the homeland. The exponential innovation experienced in the last two decades in the Information Communication Technology (ICT) field has radically changed the ways economies and societies work. Obviously, the military has been invested by this change too, forcing NATO armed forces to exploit new potentialities to connect through the cyberspace single elements in the air, land, sea and space domains. In 2002, at the NATO Summit in Prague, some important steps were taken in this direction, such as the allies' commitment to acquire a set of core capabilities including a Network Enabled Capability (NEC) to implement such a transformation progress. Through NEC, NATO planned to combine diverse traditional, procedural, technical, organizational and human elements from different

[24] Interview dated 10 December 2013.

[25] NATO Standardization Agency, *NATO Glossary of Terms and Definitions*, Edition 2013, http://nsa.nato.int/nsa/zPublic/ap/aap6/AAP-6.pdf.

agencies into a single network, with the objective of enabling interaction to achieve and maintain significant strategic superiority.[26] A platform is considered "netcentric" when it is fully able to gather and disseminate information – and orders – from and to the other nodes of the net. This is crucial in order to let the aircraft exploiting not only the data gathered from its own sensors, but also the huge amount of data made available by a variety of sensors managed by a number of interconnected nodes. This include satellite imagery, information gathered by Special Forces on the ground or other manned aircraft, intelligence provided by RPAS, and so far and so on.

This in turn creates a much better SA, that according to NATO official definition is the "the knowledge of the elements in the battle-space necessary to make well-informed decisions."[27] This means a complete, accurate and real-time knowledge of the operational theatre including friendly, opponent and other elements present both in the airspace and on the surface (on the ground or at sea). An efficient SA is the necessary pre-condition to achieve a number of goals. First, it allows a precise engagement of targets, which reduces the risk of collateral damages at the lowest possible level, which means a more limited number of victims among non-combatants in the operational theatre. This is becoming a more and more important political caveat posed by civilian authorities to military operations, because of a number of reasons including the ability of old and new media to spread immediately worldwide images and videos of collateral damages and the sensitivity of Western public opinion in this regard. Moreover, such SA greatly increases the aircrew capacity to detect, pre-empt and counter threats, thus augmenting the survivability of the aircraft and its chances to come back home from each mission. Already during Kosovo air campaign in 1999 this has been a strict requisite imposed by the political authorities to the military operation, and this will likely be a binding condition also in the planning and conduct of future crisis management operations.

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[26] Michele Nones and Alessandro Marrone (eds.), "The transformation of the Armed Forces: the Forza NEC Programme", in *IAI Research Papers*, No. 6 (October 2012), http://www.iai.it/content.asp?langid=2&contentid=804.

[27] NATO Standardization Agency, *NATO Glossary of Terms and Definitions*, cit.

A third crucial need is the radar low-observability of the platform. The aircraft survivability depends on a number of elements, including speed, manoeuvrability and SA. In this context, the radar low-observability – the so-called "stealthness" – assumes a particular importance, as it greatly decreases the chances of an aircraft to be shut down by opponent's air defence systems, and its aircrew to be killed or imprisoned.[28] Specifically, Air Observability depends on a number of factors: the airframe's design, which may reduce the radar signature; specific paintings applicable to the aircraft's surface; the fact that aircraft relies on net-centric communication to exchange data and does not require pilots to fly close to each other, or to communicate via radio which could be detected by opponent's systems.[29]

Finally, the fact that all considered crisis management operations have taken place beyond national territory, and even at strategic distance like in Iraq and Afghanistan, makes deployability another fundamental need for Italian air capabilities. The deployability of air capabilities can increase proportionally to a number of elements, including: range of the platform, capacity to carry on more fuel, ability to utilize air-to-air refuelling, and the capacity to take off and land on carriers, as well as on basis with limited infrastructures and/or airways. Deployability also depends on the support package required by the aircraft, for example in terms of logistics: the more logistic support is needed, the less the platform is deployable. With regard to carriers, it has to be noticed that the Italian Navy has to replace the ageing AV-8B currently operating from the carrier Cavour, which are expected to be phased out by 2020. Without aircraft able to land vertically the very same utility of the Cavour as a carrier would be questioned, and the deployability of Italian Air Power would be reduced.

[28] On 18 January 1991, one of the Italian Tornado participating to First Gulf War was shut down by an Iraqi air defence system, and the aircrew – the Major Gianmarco Bellini and the Captain Maurizio Cocciolone – had to eject from the aircraft while it was crashing. They have been captured by Iraqi armed forces, tortured, and kept prisoners for 44 days. They were released on March 3rd, after Iraq was defeated and accepted the ceasefire.

[29] Interview dated 11 December 2013.

The importance of interoperability, net-centric or network enabled capabilities, deployability or "expeditionary" character of military capabilities, has been recognized by a number of official documents issued by the Italian Ministry of Defence and/or by single services, such as: Concetto Strategico del Capo di Stato Maggiore della Difesa (2005),[30] Dottrina Militare Italiana (2011),[31] Documento Programmatico Pluriennale per la Difesa per il triennio 2013-2015 (2013),[32] Verso il 2018 – Linee guida e di indirizzo strategico (2013). In fact, the need of interoperable, net-centric, expeditionary armed forces, including air capabilities, is part of the transformation the Italian military experienced in the last two decades, as a result of the changes in the international security context, as well as of the operational experience in missions abroad. Although the requirements for the fighter aircraft scheduled to replace Tornado, AMX and AV-8B have been developed in the 1990s, the following operational experience in Kosovo, Afghanistan and Libya has further confirmed the characters of such requirements.[33]

4.3 THIRD KEY QUESTION: WHAT PROCUREMENT OPTIONS ARE AVAILABLE TO ACQUIRE THIS KIND OF AIR CAPABILITIES?

If it is assumed that keeping the capacity to project Air Power through crisis management operations does serve Italian defence and foreign policy, and ultimately Italy's national interests; if it is assumed that current Italian fighter aircraft fleet needs to be replaced in the next decade

[30] Italian Ministry of Defence-Defence General Staff, *Il concetto strategico del Capo di Stato Maggiore della Difesa*, cit.

[31] Italian Ministry of Defence-Defence General Staff, *La dottrina militare italiana*, 2011, http://www.difesa.it/SMD_/Staff/Reparti/III/CID/Dottrina/Pagine/Dottrina_Militare_Italiana.aspx.

[32] Italian Ministry of Defence, *Documento Programmatico Pluriennale per la Difesa per il triennio 2013-2015*, April 2013, http://www.difesa.it/Content/Documents/DPP_2013_2015.pdf.

[33] Interview dated 21 January 2014.

by manned aircraft which should be interoperable, net-centric, low-observable and deployable; then the next key question for civilian and military policy-makers is what procurement options are available to acquire the kind of air capabilities needed by Italy.

In theory, a first option is to develop a European procurement programme bringing together Italy and other main European countries in the field of defence – namely France, Germany and the United Kingdom – to develop and produce a 5th generation fighter aircraft. On the one hand, if this had been done, it would have provided the highest level of operational sovereignty[34] and produced concrete positive consequences, such as access to new technologies, updates or upgrades, and better security of supply, as well as the greatest technological and industrial return on European industries.[35] On the other hand, this option would have implied higher costs, because European governments should have borne on their own all the research and development costs without relying on US investments, and without enjoying the decrease of unitary costs brought by the large number of aircraft produced by a transatlantic programme. In any case, such an investment should have been done in the mid-1990s through an immediate and significant European funding of research and development activities, in order to deliver a fighter capability by 2020-2025. In fact, twenty/twenty-five years have been the time-span needed by other large-scale and high-tech European pro-

[34] The definitions of "operational sovereignty" vary according to the subject analyzed. For example, from an industrial/technological perspective, the term indicates the ability to use the respective armed forces' capabilities with appropriate government control and without third party constraints. It is understood to rely on access to technology and definition (for development, configuration management, and upgrade) and security of supply (for availability assurance), dealing with globalization of the supply chain. Similarly, a further definition more close to a platform perspective can be deducted by quoting the UK General Sir Kevin O'Donoghue: "operational sovereignty is the ability to use the platform and its weapons system and its ISTAR systems in the way we, the UK, wish to at the time and place of our choosing". House of Commons-Defence Committee, *Defence Equipment 2009*, Third Report of Session 2008-09 (HC 107), http://www.publications.parliament.uk/pa/cm200809/cmselect/cmdfence/107/8112501.htm.

[35] Michele Nones, Giovanni Gasparini and Alessandro Marrone, "Europe and the F-35 Joint Strike Fighter (JSF) Program", in IAI Quaderni. English Series, No. 16 (July 2009), p. 8, http://www.iai.it/content.asp?langid=2&contentid=143.

curement programmes, such as Eurofighter, from the beginning of research activities to the delivery of the first operational aircraft. Europeans countries decided not to make such an investment, either because they preferred to allocate resources in a national procurement programme, like France, or because they opted to cut defence budget to harvest the so-called "peace dividend," like Germany and others. Today there is no political will in Europe to undertake this path, and even if European countries will decide to reinvest in this kind of programme, the first aircraft would not be available before 2035. In sum, this option is off the table because of the choices made by major European countries back in the 1990s. Military procurement is a long-term process, therefore certain choices have to be made well before capability gaps arises.

Theoretically, a second option to obtain the air capabilities needed by Italy to replace the old ones would be to develop and build a 5th generation, ground-attack version of Eurofighter, the 4th generation air-to-air fighter aircraft developed by Germany, Italy, Spain and the UK in the 1980s and acquired in the 2000s. This would have had positive benefits in terms of operational sovereignty, industrial and technological return. Moreover, if the Eurofighter fleet currently used for air-to-air superiority would have been coupled with a ground-attack version of the same aircraft, interoperability within Italian air capabilities would have been even greater. This option has been subject of debate in Italy in January 2014, when a group of progressive law-makers of the Italian Parliament put forward the idea to reduce the number of F-35 to be procured and increase the number of Eurofighter as a possible way to realize budgetary savings and to support European and Italian defence industry.[36] Previously, the Italian participation to the F-35 programme has been criticised by other columnists supporting the continuation of the Eurofighter programme.[37] However, the choice to make Eurofighter a fully-

[36] Alberto Custodero, "Costano troppo, meglio gli Eurofighter: il Pd vuol dimezzare l'acquisto degli F35", in *Repubblica*, 1 February 2014, http://www.repubblica.it/politica/2014/02/01/news/f35_pd_dimezza_acquisto-77429492.

[37] Gianandrea Gaiani, "F-35: Chi ha paura di metterci la faccia?", in *Analisi di Difesa*, 15 July 2013, http://www.analisidifesa.it/?p=4374.

fledged ground attack aircraft should have been taken in the early 2000s, through significant European joint investments in research and development activities, aiming to modify an aircraft which was not originally designed to fulfil such a role. Again, this has not been done by Europeans, while the aforementioned absence of political will in Europe has been epitomized by the reduction and delays affecting the purchase of Eurofighter's 3rd tranche. Even if such a political will materialize, the results would not be available before 2025. Besides, in recent years the UK has made an investment to develop a ground-attack version of part of its Eurofighter fleet, mainly in order to fill the existing gap until the F-35 will be procured, albeit with contested results. In fact, it is unlikely that a modified version of a 4th generation aircraft could reach the same advanced technological level ensured by a 5th generation aircraft, for instance in terms of low-observability, network enabled capabilities and data fusion.[38] The Eurofighter was designed in the 1980s to perform a certain role and without the "open architecture" indispensable to proceed to a further transformation or to plug new systems in – which would have implied significant investments and uncertain results in regard to the attainable technological level.[39] A high technological level will be required in future air operations in order to ensure the survivability of the aircraft.[40] As such, Air Forces that will operate under a certain technological threshold are likely to be excluded by the core group of countries running missions abroad. The reason is that the presence in theatre of aircraft without low observability features could endanger the rest of low observable platforms by signalling to enemy radars the air sortie.[41] In any case, as a matter of fact, also this option is off the table because of the decisions made by European countries in the last two decades.[42]

The third and last option to satisfy Italian military needs in terms of

[38] Interviews dated 10 November 2013, 10 December 2013, 11 December 2013, 23 January 2014.

[39] Interview 21 January 2014.

[40] Interview dated 10 December 2013.

[41] Interviews dated 10 November 2013 and 11 December 2013.

[42] Interview dated 10 November 2013.

fighter aircraft is to acquire F-35. The F-35 is a supersonic, single-seat, single-engine, fighter bomber. Three different variants are being produced: a Conventional Take-Off and Landing version (CTOL, F-35A); a Short Take-Off and Vertical Landing version (STOVL F-35B), fitted with a unique propulsion system that allows it to operate from medium-sized ships and limited airstrips, drawing upon the experience gathered with the AV-8B; a Carrier Version (CV, F-35C), deemed to take off from conventional aircraft carriers equipped with Catapult Assisted Take Off But Arrested Recovery (CATOBAR). It is estimated that more than 3,100 F-35 aircraft will be procured, 2,443[43] of which for the US Air Force, Navy and Marine Corps, and the rest for other 12 countries: Australia, Canada, Denmark, Japan, Israel, Italy, the Netherlands, Norway, Singapore, South Korea, Turkey and the United Kingdom. That means that the F-35 will become in the next decade the fighter aircraft most used worldwide, and the "backbone of next generation NATO operations."[44] From a US perspective, the F-35 as multirole aircraft will replace F-16, F-18 and other ageing fighter aircraft to carry on tasks including: deep attack; Close Air Support with great accuracy; the whole range of ISTAR tasks; jamming and electronic warfare tasks; complementing F-22 fighter, which is produced in limited numbers, to ensure air superiority.[45]

The F-35 presents the advanced features typical of 5th generation fighter aircraft. First, it is a platform equipped with sensors and computing capacity for data fusion in a net-centric perspective. That means the pilot does not receive separate data from different sources, which he has to mentally combine into a coherent picture: he rather directly receives a single, integrated and accurate picture with all data already verified, correlated and fused.[46] According to testing pilots, this data fusion is a

[43] US Government Accountability Office, *F-35 Joint Strike Fighter: Program has improved in some areas but affordability challenges and other risks remain*, 17 April 2013, http://www.gao.gov/assets/660/653857.pdf.

[44] JAPCC, "F-35, The Backbone of Next Generation NATO Operations", in *JAPCC Journal*, No. 18 (Autumn-Winter 2013), pp. 74-78, http://www.japcc.org/publications/journal/Journal/2013-09-23-JAPCC_Journal_Ed-18_web.pdf.

[45] Interview dated 10 December 2013.

[46] Ibid.

leap forward in terms of Situational Awareness.[47] Because of F-35's net-centric character, information can be immediately shared with other F-35 through Link 16 data-link. This means that every aircraft provides the pilot a greater Situational Awareness thanks to both its sensor suite - which includes radar, infrared sensors, electro-optical camera, electronic warfare systems - and those of other aircraft flying in different parts of the battle-space. Data fusion from different sensors also increases cyber-security of air operations, because if one sensor is disrupted, jammed or spoofed, reliable data can be provided by other sensors.[48] The increased range of sensors, their net-centric character, data fusion and the fact that the same picture is provided to all pilots flying F-35 increase both the survivability of the aircraft and the precision of engagement (thanks also to Precision Guided Munitions) thus reducing the risk of collateral damages. The second character of a 5th generation aircraft like the F-35 is its low observability. This is ensured by a number of elements, for example, the design of the airframe and the fact that weapons are stored in internal bays, which reduce aircraft's radar signature. A specific painting also reduces aircraft's observability, while the fact that information can be shared without radio communication prevents communications to be captured by enemy radars. The low observability has the potentiality to radically change tactics and ways to conduct air operations, as demonstrated by the first pilots' training.[49]

Moreover, F-35's internal bays – where weapons are located – allow greater speed and manoeuvrability during missions when the aircraft is loaded up of missiles and other weapons, because the platform's aerodynamics is not affected by additional external volumes. This, in turn, reduces the fuel consumption, while increasing aircraft range and persistence. That means also the F-35 needs less air-to-air refuelling than 4th generation aircraft, thus ensuring greater deployability in crisis management operations. Deployability is also improved by the fact that the F-35 requires less support packages than 4th generation aircraft, since it is a multirole platform able to perform simultaneously ISTAR,

[47] Interview dated 19 November 2013 (a).

[48] Interview dated 19 November 2013 (b).

[49] Interviews dated 19 November 2013 (b) and 10 December 2013.

electronic warfare and Engagement, with high survivability.[50] At the same time, interoperability among the three F-35 variants is ensured by the high degree of commonalities, in particular regarding cockpit, missions systems, engine, communication systems and pilot's helmets.[51] The maintenance and repair activities also benefit from this high degree of commonalities, because in most cases the same spare parts can be used for all three variants of the F-35. The very same fact the F-35 will replace three different aircraft of the Italian Navy and Air Forces (Tornado, AMX and AV-8B) with three different maintenance and logistics requirements will reduce the cost to operate and maintain them through their life-cycle. Thanks to the significant commonalities among the different versions of the F-35, the presence of both F-35A and F-35B within the Italian fleet should not represent a problem, also because the Air Force is already used to different versions for example of Tornados – namely ECR and IDS versions.[52] Interoperability among US and NATO allies will be greater for those countries acquiring F-35 because the aircraft are the same, produced by the same assembly lines. The only main difference will regard the software, as single nations require different software, for example, to fit diverse weapons systems produced by national industries. Yet, this does not create a problem in terms of interoperability or maintenance because the software' upgrade is more economic and affordable than changes in the hardware[53] – as it happens for civilian information and communication technology.

Net-centric and low observability features make the F-35 different from advanced 4th generation aircraft such as Eurofighter and Rafale. The F-35 is in fact a 5th generation multirole aircraft, whose high survivability and interoperability make it suitable to be deployed for tasks in distant theatres.[54]

In conclusion, among the three theoretical possibilities, the F-35 is

[50] Interview 19 November 2013 (a), 10 December 2013, 11 December 2013.

[51] Interview dated 19 November 2013 (a).

[52] Interview dated 6 December 2013.

[53] Interview dated 19 November 2013 (b).

[54] Michele Nones, Giovanni Gasparini and Alessandro Marrone, "Europe and the F-35 Joint Strike Fighter (JSF) Program", cit., pp. 9-10.

the only available option for Italy to procure an interoperable, net-centric, low-observable and highly deployable fighter aircraft.

This option has been debated in Italy, particularly since 2012, and different critics have been raised by those opposing the procurement of this aircraft.[55] A first critic regards the high cost of the F-35 in comparison with other fighter aircraft, with different estimates aired by different sources, such as the news circulated on June 2013 that each F-35 to be acquired by Italy will cost 155 million.[56] Some of these critics are based on in-correct, partial or old data. In fact, as explained in the next chapter on the F-35 programme and Italy, the unitary cost of each aircraft decreases over time, because the overall non-recurrent costs are subdivided into greater number of produced units – as it happens to other large-scale civilian productions. While the first F-35 A procured by the US did cost 215 million dollar, the first F-35 to be acquired by Italy will cost around 130 million dollar and the price will further decrease down to 85 million in the next phase of full rate production.

A second kind of objection affirms that such an "enormous and prolonged procurement programme is unable to guarantee peace and security because it is designed for a global context (the Cold War) different from today's one."[57] However, this programme begun several years after the collapse of the Soviet Union, taking into account the uncertainties and changing character of the current international system. Indeed, the F-35 is not designed with the primary purpose to perform air-to-air combat, like previous US platforms such as the F-22. The F-35 is rather designed to be a multi-role fighter, with primary air-to-ground capacity and the ability to contribute to air-to-air combat.[58] That means it is built

[55] For an analysis of the critics on F-35 procurement programme see Michele Nones, "Il capro espiatorio F-35", presentation hold at the conference organized by the Italian Centre for Aeronautical Military Studies "Giulio Dohuet" on 14 May 2013, http://www.aeronautica.difesa.it/News/Pagine/IlCaproEspiatorioF-35.aspx.

[56] Luigi Grassia, "F35, pieno di guai ma difficile da eliminare", in *La Stampa*, 27 June 2013, http://www.lastampa.it/2013/06/27/italia/cronache/f-pieno-di-guai-ma-difficile-da-eliminare-2tnKEoVCydUAtDlmwAKoaK/pagina.html.

[57] Campagna Taglia le ali alle armi, *Caccia F-35 La verità oltre l'opacità*, 18 February 2014, http://www.disarmo.org/nof35/docs/4642.pdf.

[58] Indeed, Canada, the Netherlands and Norway will use F-35 aircraft also for air-to-

to fulfil the kinds of tasks experienced in international missions in the last 24 years, such as suppression of enemy air defence and/or precise strike to establish and enforce a no-fly zone, Close Air Support to ground troops deployed in the operational theatre subject to ground-based threats, and ISTAR.

A third group of critics denounces the technical problems occurred during the F-35 procurement programme, for example regarding the aircraft's software, engine and helmets. Again, some of the critics are based on in-correct or partial data. For example, the fact that the aircraft's design makes it more difficult for the pilot to see directly backwards by moving his head[59] is not a real issue because, as mentioned before, the pilot receives straight in the helmet an integrated picture of both images and data coming from the six cameras mounted in different parts of the aircraft, as well as from other sensors positioned not only on his aircraft, but also on other F-35 or different platforms part of the military net. In contrast, other critics are well-grounded and based upon real technical problems occurred during the programme. The key issue is whether these real problems are a normal part of the research, development and testing activities, as for any technologically advanced procurement programme, or they are so exceptional to make the aircraft not worthy to be procured. At the end of the day, three of the most high-tech armed forces in the world – American, British and Israeli ones – have chosen to buy an overall number of 2,600 F-35, while other 556 aircraft are set to be procured by technologically advanced militaries such those of Australia, Canada, Denmark, Japan, Netherlands, Norway and South Korea. This demonstrates that, despite its technical problems, the F-35 represents the next Air Power's military and technological frontier, a frontier which NATO members and partners seem determined to explore.

air operations.

[59] Gianluca Di Feo, "F-35: tutta la verità", in *L'Espresso*, 26 June 2013, http:// espresso.repubblica.it/attualita/cronaca/2013/06/26/news/f35-tutta-la-verita-1.55939.

4.4 FORTH KEY QUESTION: IT IS BETTER TO BUY F-35 "OFF-THE-SHELF" OR TO PARTICIPATE IN THE MULTINATIONAL PROCUREMENT PROGRAMME?

If it is assumed that the F-35 is the only available option to procure an interoperable, net-centric, low-observable and highly deployable fighter aircraft to satisfy Italy's military needs to participate in crisis management operations, the last key question for policy-makers regards how to procure it. In principle, two options are available. On the one hand, one might buy it "off-the-shelf," that means to buy the aircraft in the marketplace when it is already developed and produced on a large scale – in Italian it would be said "chiavi in mano." On the other hand, one might participate in its development and production, investing in the research and development phases and involving national industries.

From a military point of view, participating from the beginning in the procurement programme brings three main positive effects. First, it allows to receive the first aircraft already in 2016 and to proceed with the replacement of the ageing fleet – Tornado, AMX, AV-8B – without experiencing capabilities gap. This ensures to keep the ability to participate in missions abroad in the 2015-2025 timeframe, and to not spend further funds to lease aircraft to fill eventual gaps, as happened with the F-16 in the recent past. Second, participation in the development and production of the aircraft increases the operational sovereignty,[60] which is near-zero in case of the "off-the-shelf" acquisition. That means inter alia being more able to operate, modify and upgrade the aircraft according to national needs and timeline. Third, being a fully-fledged part of the programme allows Italian pilots to start sooner rather than later their training with American and other aircrews, with obvious benefits in terms of interoperability with US and major NATO partners.

On the other hand, participation in the procurement programme brings two more additional costs. First, Italy also contributed to the F-35 research and development activities by investing 1,028 million euro in

[60] Interview dated 10 December 2013.

2002.[61] Second, the built up of the Final Assembly and Check Out (FACO) of Cameri costed 775 million euro.[62] Both funds could have been saved by acquiring F-35 "off-the-shelf." However, the Italian military would have needed to build a proper capacity for maintenance, upgrade and logistics to operate the fleet of 90 F-35 – both CTOL and STOVL versions – for the next three or four decades in any case. The creation of Cameri FACO as part of the procurement programme means that Italian Ministry of Defence will not spend further budget to build a redundant facility, as the FACO is already set to become the Maintenance Repair Overhaul and Upgrade (MRO&U) centre for Italian F-35. This prevents the expensive duplication experienced in past procurement programmes, when there were both an industrial facility for the FACO and a military facility for the MRO&U. Hence, this ensures a more effective and efficient management of the aircraft through its entire life-cycle.[63] By using the same facility for the entire Italian fleet of F-35, significant savings can be made, while a more rapid replacement of spare parts can also be favoured.[64] Since the F-35 is expected to remain in service for 35-40 years, this would be a significant improvement in the way funds are spent in defence procurements, something which could not happen if Italy had bought F-35 "off-the-shelf." Moreover, having the FACO within the Cameri military multi-functional center for aero-tactical aircraft does allow the armed forces to better know the platform already during the assembly phases, thus increasing operational sovereignty.[65]

A third issue concerning whether participating in the procurement programme or buying F-35 "off-the-shelf" regards the timeline of aircraft's acquisition and its related cost. As in any procurement programme, the F-35's cost curve decreases over time and then stabilizes itself. The very first aircraft are more expensive because they bear the

[61] Nothwithstanding the rising costs of the research and development activities, Italian contribution did not increase as the United States took charge of these extra costs.

[62] Italian Chamber of Deputies-Defence Committee, *Programma pluriennale di A/R n. SMD 02/2009…*, 25 March 2009, http://documenti.camera.it/leg16/resoconti/commissioni/bollettini/pdf/2009/03/25/leg.16.bol0157.data20090325.com04.pdf.

[63] Interview dated 6 December 2013.

[64] Interview dated 21 January 2014.

[65] Interview dated 6 December 2013.

cost, delays and problems occurred in the development and production phases of a new platform. Then, the so-called "learning curve" makes production more efficient, and the increase number of aircraft produced per year brings unitary costs down – as it happens in civilian production too. This is one of the reasons F-35 production is structured according to several Low Rate Initial Production Phases (LRIP), before moving to the full rate production. The bill of the first aircraft produced by the first LRIP (LRIP1) and acquired by the US was around 215 million dollar. In contrast, the cost of the aircraft being produced by the sixth LRIP (LRIP6), which is going to be acquired by the US, the UK and Italy, shrinks to around 130 million dollar – a similar cost to a less advanced 4th generation fighter aircraft. According to Lockheed Martin's official estimates, the F-35 aircraft produced by the full rate production will cost about 85 million dollar. This is important because each country pays the aircraft procured the exact cost of every different LRIP, which means different costs over time. Italy has chosen to start buying F-35 at LRIP6 in order to balance, on the one hand, the need to avoid capability gaps since ageing aircraft will inevitably phased out, and on the other hand, the goal to save money by paying a lower price in comparison with the first five LRIPs. If Italy had procured F-35 "off-the-shelf," it may have entered LRIP8 or LRIP9 thus saving few dozens of millions of euro. However, in this case, it should also be considered the costs to maintain in use the ageing Tornado and AMX fleet for more years, and/or costs associated with leasing other platforms to fill eventual capability gaps. In the past, Italy faced a similar choice after deciding to extend the life of the ageing Starfighter: the delays of the Eurofighter programme required gap fillers identified initially in the Tornado ADV's leased from UK (which was by far more expensive than envisaged) and later in F-16 leased from the US. The expenditures made to lease these aircraft did not entail any benefit in terms of industrial and technological returns for Italian defence industry.

From a defence industrial policy's point of view,[66] the main difference

[66] For a detailed history of Italian aeronautic industry see Gregory Alegi, *In volo da 100 anni. La storia dell'industria aeronautica italiana dal 1913 ad Alenia Aermacchi*, Novara, De Agostini, 2013.

between participating in the procurement programme and acquiring aircraft "off-the-shelf" is that industrial return, technology transfer and creation of qualified jobs is much lower in the second case than in the first one. In Italy, the National Armaments Director (Segretariato Generale Difesa/Direzione Nazionale Armamenti SGD/DNA) has the mandate to safeguard and support Italian defence industry by Law.[67] The National Armaments Director, in liaison with single technical services armament offices, under the political authority of the Ministry of Defence, has traditionally worked to conduct a defence industrial policy coherent with the operational needs of the armed forces.

As mentioned before, Europeans did not invest in a follow-up of the Eurofighter in the 1990s and 2000s. At the same time, the US offered to major European allies the possibility to join the F-35 procurement programme. From a defence industrial policy's point of view, the Italian decision to join this multinational, US-led programme made sense because of two main reasons. First, it allowed enjoying a positive industrial return in terms of production and maintenance, in line with previous experiences. This return also involves advanced technologies, for example with regard to the machinery necessary to work on the aircraft and the related know-how.[68] Above all, it provided the opportunity to participate in the development activities, as well as in the production and assembly phases. This was a unique opportunity to let the Italian industry work not only on 4th generation aircraft but also on 5th generation ones, which is a technological leap forward with significant and positive industrial effects.[69]

Besides the primary military rationale to replace ageing and obsolete aircraft with new ones, and the secondary industrial rationale, two other reasons motivate the choice to join the F-35 procurement programme.[70]

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[67] Art. 41 of the Legislative Decree No. 66 of 15 March 2010: *Codice dell'ordinamento militare* (G.U. No. 106 of 8 May 2010), p. 66, http://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto-legislativo:2010-03-15;66.

[68] Interview dated 23 January 2014.

[69] Interviews dated 21 January 2014 and 23 January 2014.

[70] Alessandro Marrone, "Italy and the F-35: Rationales and costs", in *International Journal*, Vol. 68, No. 1 (Winter 2012-13), pp. 31-48.

First, it is a multinational programme envisaging the participation of eight Allied countries, including seven NATO members and three EU members. The multinational rationale is important as far as joint procurements not only ensures greater interoperability, but also contributes to share the costs of programmes which are simply un-affordable on a national basis. Finally, it enhances defence and political ties with partner countries. The forth rationale is transatlantic. As mentioned before, the US is still Italy's main ally in the defence field. In fact, while during the Cold War it represented the bedrock of European and Italian security, also in the post-Cold War period the US has led the majority of crisis management operations in which Italy was involved, from Iraq and Bosnia-Herzegovina to Kosovo and Afghanistan. In this context, the defence procurement cooperation is part of a wider transatlantic relation, which over the years has been considered by different Italian government one of the priorities of Italy's defence and foreign policy.[71]

[71] On the link between political, diplomatic and defence cooperation between Italy and the US in the post-Cold War period see, among others, Alessandro Marrone and Alessandro R. Ungaro, "The relations between United States of America and Italy in the post-Cold War period: a defense industrial perspective", in *Cahiers de la Méditerranée*, 2014, (forthcoming).

5.

The F-35 programme and Italy: the industrial perspective

This chapter discusses the industrial aspects of the F-35 multinational programme and Italian participation in it.

5.1 THE BEST VALUE FOR MONEY APPROACH

The F-35 is a multinational procurement programme led by the US with eight participating countries: Australia, Canada, Denmark, United Kingdom, Italy, the Netherlands, Norway and Turkey. Moreover, Israel and Japan have selected the F-35A through the Foreign Military Sales (FMS) process as they are not fully F-35 partners. South Korea has also decided to purchase 40 F-35, with deliveries scheduled from 2018 to 2021 in the context of the F-X III competition.[1] Finally, Singapore is considering to purchase the F-35 in the near future to replace the F-16 fighter fleet.[2] Overall, the JSF procurement volume is currently estimated to be more than 3,000 F-35 aircraft, 2,443[3] for the US Air Force, Navy and Marine Corps and the rest distributed according to partner's procurement plans.[4]

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[1] Andrea Shalal-Esa, "S.Korea order would drive F-35 per-plane cost lower", in *Reuters*, 26 November 2013, http://www.reuters.com/article/2013/11/26/lockheed-fighter-korea-idUSL2N0JB24120131126.

[2] "Singapore says in 'no particular hurry' to buy Lockheed F-35 jets", in *Reuters*, 12 December 2013, http://www.reuters.com/article/2013/12/13/us-lockheed-fighter-id USBRE9BC02J20131213.

[3] US Government Accountability Office, *F-35 Joint Strike Fighter*..., cit.

[4] Lockheed Martin, *F35 Fast-Facts*, February 2014, https://www.f35.com/assets/

Table 3. F-35's acquisition plans

Customer	Planned Aircraft
US Air Force	**1,763** F-35A
US Navy	**260** F-35C
US Marine Corps	**340** F-35B/**80** F-35C
UK Royal Air Force / Royal Navy	**138** F-35B
Turkey	**100** F-35A
Australia	**100** F-35A
Italy	**60** F-35A/**30** F-35B
Canada	**65** F-35A
Norway	**52** F-35A
Japan	**42** F-35A (20 optional)
South Korea	**40 F-35A**
Netherlands	**37** F-35A
Denmark	**30** F-35A
Israel	**19** F-35A
Total	**3,156**

Within this procurement volume, 416 F-35 are expected to be delivered to NATO countries, with an estimated 49 aircraft operating in Europe by 2018.[5] The fact that several new countries, besides the nine members of the procurement programme, have decided to acquire the F-35 in last years confirms the appeal of the aircraft to the global marketplace.

In addition, the overall volume of F-35 is likely to increase in the 2020-2030 timeframe through FMS process, outside the perimeter of procurement's partner countries. In fact, since a significant share of worldwide fighter fleets has to be replaced in the next future, it can be assumed that the F-35 will likely be one of the preferred choices made by governments to modernize their air fleet – as it is already happening in some Asia-Pacific countries. The F-35 is indeed likely to repeat in the

uploads/downloads/13567/f-35fast_factsjfebruary2014.pdf; Anthony Deutsch and Andrea Shalal-Esa, "Dutch to purchase 37 F-35 fighter planes-sources", 17 September 2013, in *Reuters*, http://www.reuters.com/article/2013/09/17/us-dutch-fighter-f-idUSBRE98G09I20130917.

[5] "F-35, The Backbone of the Next Generation NATO Operations", cit.

next decades the worldwide diffusion experienced by the F-16, particularly – but not only – in those US allied countries already familiar with the F-16. The more governments purchase F-35, the more benefits receive partner countries like Italy: production unitary costs decrease thanks to larger procurement volumes; sustainment costs are expected to shrink since there will be more spare parts produced and distributed worldwide;[6] upgrading costs can be shared by more countries and thus becoming less expensive;[7] the components produced by national industries involved in the programme, such as Alenia Aermacchi, will increase in order to supply F-35 orders by new customers.

The F-35 programme entails a radical change of the mindset and way to envisage a multinational procurement programme in the defence field. In fact, compared to other major international collaborations (such as Tornado, Eurofighter, A400M and Meteor), it is based on the principle of the best value for money and not on the principle of juste retour. The procurement procedure is indeed quite different from the past. First, a participating country formulates its national requests in terms of aircraft requirements, volume and variant to the F-35 Joint Programme Office (JPO). Then, the JPO formulates an overall request to the prime contractor Lockheed Martin. Such a request indicates the number of aircraft to build for each variant, the basic aircraft requirements and the specific integrations to the basic configuration requested by individual countries. Lockheed Martin manages independently the subcontracts with American and European suppliers, which provide their products or services to the prime contractor responsible for delivering the aircraft under the terms provided by the JPO contract. Similarly, Pratt & Whitney is the prime contractor for F-35's engine and the integration of its related systems. The team is also composed by Rolls-Royce, who is responsible for the vertical lift system for the STOVL aircraft, and Hamilton Sundstrand, in charge of the electronic engine control system, actuation system, gearbox and health monitoring systems. Other companies in partner countries participate on an equal access basis in the supplies'

[6] Interview dated 6 December 2013.

[7] Interview dated 10 December 2013.

competitions managed by the US prime contractors; bids are selected according to their best price/quality ratio. Therefore, in order to be engaged in the F-35 programme the Italian defence industrial base has had to accept the challenge of the best value for money approach. This is quite new with respect to Italian industry's past experience in multinational programme based on juste retour principle, whereby cost-share divided among participating governments must equal the work-share among national industries composing the industrial consortium.

Although assessing international collaborations in defence procurement projects is not an easy task, economic theory might offer some guidelines. First, an international programme has to offer cost-savings with respect to an equivalent national programme, and ideally also in comparison with the least expensive alternative, that is buying "off-the-shelf." Such collaborations have to ensure that club membership benefits are at least equal to the costs of membership. Second, an efficient international programme should allocate work on the basis of comparative advantage determined by competition. In theory, no single country has the right to a share of the development and production work based on the amount of its financial contribution to the programme – which is rather the key assumption of the juste retour principle. Finally, according to the economic theory, in order to be more efficient and effective, the multinational programme has to be managed and monitored by a unique prime contractor. The prime contractor should be bound by an incentive-contract with the public authority establishing rewards and penalties in case of good or poor performances by the company.[8]

The F-35 programme seems to substantially reflect this approach, as opposed to past and traditional collaborations in defence projects.[9] Even at the beginning of the programme, during the design and development phases of the F-35, two companies – Lockheed Martin and Boeing – were in competition to acquire the contract. The two competitors had selected partner companies and suppliers on the basis of their technical

[8] Keith Hartley, "Offsets and the Joint Strike Fighter in the UK and the Netherlands", in Jurgen Brauer and J. Paul Dunne (eds.), *Arms Trade and Economic Development. Theory, Policy, and Cases in Arms Trade Offsets*, London and New York, Routledge, 2004, p. 134.

[9] Ibid.

expertise and competitiveness rather than on geographical criteria. Then, the contract has been awarded to Lockheed Martin on a "winner takes all" basis, thus without compensating Boeing with any additional or extra procurements.

Participating countries benefit from the investment made through their financial contribution to F-35 in a different way rather than automatic work-share/cost-share principle. First, their industries are allowed to bid for work on the programme. Moreover, partner governments have priority in F-35 deliveries and access to technical and performance data related to the aircraft, and their representatives are posted in the JPO alongside with Americans. Additionally, they are exempted from paying a Research & Development tax on any purchase. These benefits are greater than the alternative option of buying "off-the-shelf," that is directly buying the aircraft in the commercial marketplace.

However, it is necessary to specify some elements in order to provide a picture as complete as possible of the F-35 project. On the one hand, adopting an approach based on competition and on the best value for money is, undoubtedly, an innovative aspect. From a management perspective, these two innovative pillars intended to make the programme more efficient by a continuous and detailed monitoring of costs, and by avoiding duplication and unnecessary expenditures during the entire lifecycle of the product. Nevertheless, costs are subject to increase not least because developing and testing cutting-edge technologies may present unexpected costs, and/or unexpected delays, which turn into further costs.[10] For sure, containing costs is in the interest of all partners, in primis the US, which bears the overwhelming burden of research, development, design and production expenditures.

On the other hand, it seems necessary to apply these two concepts – competition and best value for money – with a certain flexibility to avoid to "overstress" the supply chain. In order to correctly understand this point, some preliminary clarifications are needed. In general, the prime contractor handles contractual relationships with American and European suppliers through one of the following three procedures:

[10] Interview dated 23 January 2014.

1. Lockheed Martin can set a maximum level of expenditure for a given component, system or service, and the supplier initially selected maintains the contract as long as its price remains under that ceiling.
2. Lockheed Martin can open to all industry players the bidding for a certain supply, and assign the contract to the company providing the best value in terms of cost and quality.
3. Lockheed Martin can sign agreements with two different suppliers of a given product as it deems strategic having more than a single supply source to provide it - the so-called "strategic second sources" method.

The latter is the case of Alenia Aermacchi, a Finmeccanica company, that has "strategic second source" status for F-35's wings after Lockheed Martin. The Italian industry will continue to provide wings as long as it can keep their price lower or equal to that of the units produced by Lockheed Martin. If the "second source" price increases compared to the one provided by the first source, Lockheed Martin could re-open the competition to seek another supplier offering best value for that specific product. This approach may lead the "second source" company to produce for a while with negative margins in order to remain competitive and maintain the contract, while the "learning curve" makes the production progressively more profitable.

The majority of supplier agreements with Lockheed Martin have a one-year term, because the US government decides the number of F-35 to be purchased year by year. These contracts are expected to shift to five-year term with the start of the full rate production. In any case, Lockheed Martin will check from time to time whether its supplier continues to offer the best value available on the market for that specific product or service. A system based on one-year contracts seems to overstress the supply chain and does not encourage the supplier to elaborate and adopt long-term investments plan, because the contractor has to bear the risk of making investments completely on its own – i.e. in machineries or human resources – without any assurance that the volume of supplies will continue beyond the next year.

Another critical issue concerns the lack of Italian industries' participation in the development and integration activities, which entail the

most significant and sensitive technologies. This issue has also applied to other European industrial partners of the F-35 programme, being the "transatlantic technology transfer" of defence procurements one of the most contested issue at governmental and industrial levels.[11] Demands from European suppliers face obstacles mainly, but not only, due to US regulations such as the International Traffic in Arms Regulation (ITAR) and the National Disclosure Policy. Therefore, more work needs to be done within the F-35 cooperation to address this issue.[12]

5.2 THE ITALIAN PARTICIPATION IN THE PROCUREMENT PROGRAMME

There are three levels of international participation in the F-35 procurement, which reflect each country's financial stake in the programme. Ranking in one of these levels influences the amount of technology transfer and subcontracts open for bid to national companies, the number and importance of positions hold by national representatives in the JPO, as well as the order in which countries receive produced aircraft. Since Italy is involved in the F-35 programme as Level 2 partner – the same level of Netherlands – with roughly 4% sharing of the total cost, it has limited opportunities to influence aircraft's requirements. The United Kingdom is a Level 1 partner with 10% of cost-share, while Australia, Canada, Denmark, Norway, and Turkey are Level 3 partners, each having one to two percent of cost-share.

Italy's participation in the F-35 programme begun in 1998 when the left-wing government decided to invest 10 million dollar in the Concept Demonstration Phase (CDP). In 2002, the Italian right-wing government

[11] Alessandro Marrone, "Cooperazione transatlantica nella difesa e trasferimento di tecnologie sensibili", in *IAI Quaderni*, No. 30 (June 2008), http://www.iai.it/content.asp?langid=1&contentid=122.

[12] For the sake of completeness, it should be noticed that the issue of tech transfer affects also European procurement programmes, whereby different industries part of the consortium struggle to not release all high-tech information to governments of other countries where their industrial competitor are based. Interview dated 21 January 2014.

confirmed the choice taken in 1998 by committing 1,028 billion dollar in the System Design and Development (SDD) Phase and by signing the US-Italy related Memorandum of Understanding (MoU). In 2007, the left-wing government signed the bilateral MoU for the Production, Sustainment, and Follow-on Development (PSFD) Phase, with an investment of 904 million dollar. Two years later, in 2009 the Italian Parliament approved the acquisition of 131 F-35, including 69 F-35A variants and 62 F-35B variants. At that time, Italy also decided to build the Final Assembly and Check Out (FACO) and Maintenance, Repair, Overhaul and Upgrade (MRO&U) facility at Cameri, with an investment of 775 million dollar. In 2012, due to the decision to adopt wide-ranging austerity measures, the Italian government has reduced the overall fleet of F-35 from 131 to 90 (60 F-35A and 30 F-35B).

The delivery of Italian aircraft will be completed by 2027, with the first 34 F-35 acquired by 2020. This delivery schedule has been tailored expressly by taking into account the replacement of Tornado and AMX. The latter will be replaced before 2020, while Tornado will continue to operate until 2027. Therefore, some Tornado will be maintained and progressively phased out until the last F-35 will come into service.[13]

According to the most recent figures about Italy's engagement in the F-35 programme, 90 Italian companies are involved and the contracts awarded to the Italian industries have an overall value of 715 million dollar.[14] Within this volume, 565 million dollar are related to the Finmeccanica group,[15] mainly through Alenia Aermacchi, which is responsible for the construction of more than 1,200 F-35 wings, not only for the Italian fleet, but also for the nine partners of the programme.[16]

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[13] Italian Chamber of Deputies-Research Service, "Il programma Joint Strike Fighter (F 35)", in *Documentazione e ricerche*, No. 22 (31 May 2013), http://documenti.camera.it/leg17/dossier/Testi/DI0011.htm.

[14] Italian Chamber of Deputies-Defence Committee, *Audizione dell'Amministratore Delegato e Direttore Generale di Finmeccanica*, 16 October 2013, http://documenti.camera.it/Leg17/resoconti/commissioni/stenografici/xhtml/04/indag/c04_arma/2013/10/16/resoconto.0008.html.

[15] Ibid.

[16] Alenia Aermacchi, *Lockheed Martin and Alenia Aeronautica sign contract for initial production of F-35 wings*, 25 September 2008, http://www.aleniana.com/node/80.

The term "wings" includes both the two semi-wings and the central cell of the aircraft holding them together, that is 30% of the entire airframe, presenting significant engineering challenges. The programme has potential revenues for 10 billion dollar,[17] but this will depend on the capacity to exploit and use the infrastructures created – first and foremost the Cameri FACO/MRO&U – to build components and to provide maintenance, support and upgrade, in particular for avionics and electronics – for both the European F-35 and the US aircraft based in Europe. Because of these reasons, and the very same nature of the procurement programme based on best value for money principle, providing definitive figures and numbers about the industrial returns of the F-35 programme is quite complicated and to a certain extent incomplete. Having said that, a recent report carried out by the advisory branch of Pricewaterhouse Coopers (PwC) estimates that the Italian participation in the F-35 procurement programme will generate an added value of 15,8 billion dollar for the Italian economy during the entire 2007-2035 time frame and it will support the creation of more than 6,300 jobs.[18]

Concerning Small and Medium Enterprises (SMEs) in the defence and aerospace sector, they proved to be flexible and adaptable in offering the best value for money within the F-35 programme.[19] However, they suffer more than larger suppliers the fact that contracts are granted only on one-year basis and they are thus discouraged to make long-term investments in machineries, technology and human resources, which would greatly benefit their competitiveness. Moreover, Italian SMEs sometimes lack the necessary information and technical/legal assistance to be competitive in the F-35 procurement bidding process.[20] Fur-

[17] Ibid.

[18] "F-35, per l'Italia benefici da 15 miliardi", in *Il Sole 24 Ore*, 19 February 2014, http://www.banchedati.ilsole24ore.com/doc.get?uid=finanza-FM20140219024EAA.

[19] Interview dated 23 January 2014.

[20] In addition, SMEs in the aerospace and defence sector do suffer common problems of Italian economy: delays in the payment by public authorities and private Italian prime contractors, low levels of public funding for research and development activities, inadequate government's export support, high taxation and a number of bureaucratic obstacles. For more details see, among others, Alessandro Marrone, "Piccole e medie imprese nel mercato della difesa", in *AffarInternazionali*, 16 April 2013, http://www.affarinterna

thermore, the participation of SMEs to such a complex programme should be facilitated through a system of global authorizations allowing the transfer of parts and components directed to the American and European companies participating in the F-35 procurement.

A distinguishing feature of Italian participation in the F-35 programme is the aforementioned FACO/MRO&U Cameri facility. Cameri facility is an Italian Air Force base that has served as logistics hub in the last decades, where Tornados and then Eurofighters have been (and continue to be) maintained and repaired, ensuring a sound background of technical skills among military and industrial teams. Within the perimeter of the base, under the direction of Alenia Aermacchi, 22 new buildings have been constructed with the aim to support the F-35 programme,[21] covering around 140,000 square meters.[22] Thanks to the utilization of a military airfield and to the good coordination among different bureaucracies and with the private sector, it took only four years between the decisions to build the FACO and its industrial use – which is a relatively short period for Italian standards in terms of major public works. Alenia Aermacchi has begun to build wings components for US F-35 already in 2011, notwithstanding the Cameri facility was still partly under construction, thanks also to additional buildings made available by the Italian military.[23]

In particular, Cameri facility is composed by different and complementary elements:

1. A FACO facility to assemble the Italian F-35A and F-35B variants, the F-35A procured by Netherlands, and potentially the aircraft to be procured by other European partners such as Denmark and Norway; as of December 2013, two Italian F-35A are being

zionali.it/ articolo.asp?ID=2291.

[21] Robbin Laird, "The Italian Way of Procuring the F-35: Shaping a European Base for the Global Fleet", in *Second Line of Defense*, 1 November 2013, http://www.sldinfo.com/?p=58473.

[22] Interview dated 6 December 2013.

[23] The industrial park is owned by the armed forces, which rent it to Alenia Aermacchi to a fixed price accorded by the State Property Agency. Interview dated 6 November 2013.

assembled in the FACO assembly line, which can reach a maximum of two F-35 assembled per month.

2. A wing construction facility serving the entire procurement programme and not only Italian and Dutch customers. It can build a maximum of six wings per month.
3. The aircraft test facility aimed at testing low-observable performances, and the related final painting facility.
4. Other buildings aimed to support F-35 operating in Europe by the US and allies. Since the Mediterranean and the Middle East continue to be a fundamental operational area for US and NATO members, the Cameri facility can provide an essential support to the F-35 fleet operating there.

In other words, the Cameri facility is already set to host both FACO and MROU activities, because in the long term – that is 2025-2045 period – maintenance activities will likely bring significant volume of contracts. Maintenance is also planned to involve significant technologies because it is linked with upgrade. For example, at the time when the software will need to be upgraded regularly, the F-35 open architecture will also allow to plug new sensors, systems or weapons in. The expected long life-cycle of the platforms and the pace of technological innovation mean that maintenance will be a regular and substantial activity, in order to preserve the platform technologically advanced in comparison with opponents' air defence systems.[24] The challenge for Italy is to involve the Italian military and industry in the most technologically advanced aspects of F-35 platform, that is software, electronics and avionics, in which the US have been more cautious to transfer technology and open bids to European partners. The integration of the Meteor missiles will be an opportunity in this regard.

Being the only current FACO facility outside US territory, Cameri represents a fundamental asset of the F-35 global production and maintenance system. Considering the time and funding necessary to set up such a facility, plus the difficulty to get the American endorsement to its construction, Italy has achieved a valuable asset and a competitive ad-

[24] Interview dated 6 November 2013.

vantage with respect to other partners of the F-35 procurement, as well as to current and future customers. In fact, if they are located in Europe or in its neighbourhood – i.e. the Middle East – they are likely to find more convenient, effective and efficient, to utilize the Italian facility rather than seeking to build a new one on their national territory.[25] Unsurprisingly, already in 2006 Italy and the Netherlands signed an agreement that identifies two important areas of cooperation. On the one hand, to build and test the F-35 aircraft acquired by Italy and the Netherlands in an Italian facility – the Cameri facility – as a starting point for a future high-level maintenance and repair capability for the fighter.[26] On the other, a MRO&U facility for the engine and some aircraft equipment, to be established in the Netherlands, which will maintain, repair, overhaul and modify such parts for the platforms acquired by the two countries.[27] Against this backdrop, contacts have already been established with the Norwegian Ministry of Defence.[28] The Cameri FACO represents a long-term investment made by the Italian military, and generally speaking by the whole government, in order to ensure a certain amount of work-share for Italian companies within the new and uncertain framework of the best value for money principle. It implied difficult negotiations with the American counterparts, which were successfully completed.[29] Today Cameri represents a unique asset owned by Italian armed forces, managed by Alenia Aermacchi in close cooperation with the military counterpart.

As a whole, the Italian participation to the F-35 procurement programme presents pros and cons, opportunities and challenges. From a military point of view, the procurement of F-35 is following a timeline which does not seem to create capability gaps, it keeps costs at sustainable level and it dilutes them over more than a decade. Moreover, as mentioned before, the Cameri facility is set to ensure efficiency and cost

[25] Interviews dated 6 December 2013 and 10 December 2013.

[26] Michele Nones, Giovanni Gasparini and Alessandro Marrone, "Europe and the F-35 Joint Strike Fighter (JSF) Program", cit.

[27] Ibid., p. 74.

[28] Interview dated 6 December 2013.

[29] Interview dated 21 January 2014.

savings in the maintenance, repair and upgrade activities, which will repay the investment made by the Ministry of Defence.

From an industrial point of view, part of the expectations of large companies and SMEs with regards to the work-share of the F-35 procurement have been disappointed. The most contested issues have been (and continue to be) technology transfer from American counterparts, involvement in the industrial activities with greater engineering and technological added value (like electronics and avionics), short duration of contracts and uncertainty about their annual renewal. At the same time, the participation to the F-35 programme is providing contracts and opportunities in terms of technological progress, which cannot be offered by any other available procurement option able to meet Italian military requirements.

The new procurement approach based on the best value for money principle has imposed to the Italian industry to become more competitive and to take more risks in relation to its own investments. It also requires the Italian military and government to assist the industry in this regard, by making an additional and constant effort in negotiating with US counterparts on technology transfer and other aspects of the procurement programme. In other past programmes, based on the juste retour principle, negotiations largely ended when the agreement on cost-share and work-share was reached. This is not the case of the F-35. The Cameri facility represents a key opportunity in terms of both quality and quantity of the work-share in order to ensure valuable and technologically advanced supplies to Italian companies and SMEs. This should apply to the production, maintenance, repair and upgrade of the whole F-35 fleet based in Europe. The very same nature of this innovative procurement programme does not allow anyone either to be satisfied with the good investments made in the past – such as the build up of the Cameri FACO/MROU – or to wait for some positive developments to occur on their own. Results need to be achieved by a joint effort by the military, the government and the industry – each one within its respective role and competencies – step by step, negotiation by negotiation, bid by bid, contract by contract.

Conclusions

This study tried to fulfil a difficult task: to link the operational and political elements of Italian defence policy, by taking into account also its industrial aspects.

The comprehension of the operational level by the political authority is crucial. This should include the understanding of what tasks have been performed by Italian air capabilities during missions abroad in the last two decades, the requirements for the next fighter aircraft determined by the current international security context, the recent operational experience and the relevant technological innovation. Such understanding is important per sé, but it is even more important to inform decision-makers who are responsible of taking decisions such as those necessary to maintain Italy's ability to join international missions to protect and promote national interests at stake.

These decisions have operational effects, because they are about which fighter aircraft has to be procured, how many and through which timeline. But they are neither only operational nor only technical. They are primarily political, because they are about spending the limited budget allocated to defence policy in order to achieve certain results. The main result at stake is to maintain Italy's capability to act through military power, particularly Air Power. These are not abstract decisions, because since the First Gulf War Italy has utilized its fighter aircraft for 22 out of the last 24 years – meaning that Italian military pilots have been flying for 22 years over operational theatres in Iraq, Western Balkans, Afghanistan or Libya. Therefore, the decision on which fighter aircraft will be used by Italian armed forces in the next thirty-forty years is rather a concrete one.

These decisions do not influence only the current and future effectiveness and efficiency of Italian military. They also influence the relations with other major European countries, as well as with the US. They

affect the position of Italy within NATO and, to a lesser extent, within the EU and UN, as far as these international organizations will continue to deal with crisis management operations. Ultimately, these decisions influence Italian defence and foreign policies, and thus the national interests that such policies are supposed to protect and promote.

Whatever it will be decided in this regard, it is important that these decisions are taken by understanding the operational level, including the military requirements that procurement's programme are meant to satisfy. It is also paramount to take them by assessing their significant and lasting impact on the relations with Italy's main allies, and on the Italian defence and foreign policy. Finally, it is fundamental that decisions are taken by having a full understanding of the industrial aspects connected to the programme: in major European countries such as France, Germany or the UK, let aside the US, the defence and foreign policy is linked with the economic, industrial and commercial interests of French, German or British societies. This is not to say defence industrial policy is the main goal of defence policy. This is rather to say that since a military need is defined, to make the best of it in terms of national industrial return is a common praxis – or even a duty – in major European countries. That is one of the reasons this study on Italian fighter aircraft's role in crisis management operations has devoted one chapter to the industrial aspects of Italy's participation to the F-35 procurement programme.

In conclusion, by bridging the gap between the operational and political levels, and by taking into account the industrial aspects of the defence procurement, this study aimed to stimulate a more constructive, in-depth, and systematic debate in Italy on defence matters. A debate not limited only to the replacement of fighter aircraft, but including also purposes, role and requirements of the Italian armed forces.

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Annex I – List of interviews

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CLAUDIO DEBERTOLIS served as Vice Chief of the Cabinet of the Ministry of Defence in 2006, and has been Secretary General of Defence and National Armaments Director (2011-2013).

DOMENICO ESPOSITO has been the General Director of the General Directorate for Air Armaments (ARMAEREO) within the Italian Air Force since 2009.

BILLIE FLYNN served in the Canadian armed forces for 23 years in a variety of positions, has worked as project pilot for Airbus EADS and currently holds the same position at Lockheed Martin. He has accumulated over 4,700 flight hours in more than 70 types of aircraft.

CRAIG A. FRANKLIN is Commander of the US 3rd Air Force and 17th Expeditionary Air Force, at Ramstein Air Base, Germany, where he is responsible for planning, deployment, employment, supporting and redeployment of USAF assets.

GIORGIO GOMMA, Rear Admiral, since September 2013 he is Commander of Italian Navy Aviation.

GIUSEPPE LUPOLI, former Director of the 1st "Aircraft Maintenance" Unit in Cameri (Novara), he is now working at the Directorate for Air Armaments (ARMAEREO), in particular on the F-35 programme with a specific focus on the FACO activity.

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