

SUMMARY

In the very first years after the World War II, the nations preparing to dominate the scene in competition were, without any doubt, the two major allies: the United States, able to win either in the European as in the Pacific front with plenty of resource still available, and the USSR, capable to control an extensive and potentially rich territory in Europe, still powerful despite the huge destructions suffered. For this reason both nations could allocate a budget definitely superior to other nations, allowing an early develop of a space policy. Between the other European nations, winner or loser badly hit by the war destructions, Italy had the great merit to believe in the potential gain and to grasp the advantages offered by the new field of develop: the space conquest.

At the beginning of the space adventure, the man who realized, better than other, the infinite possibilities that the space could offer was Luigi Broglio. Man of extraordinary intellect, he knew how to combine his background in the military and civilian fields. After earning a degree in Engineering he enlist to become official engineer of the Air Force. While engaged in his military commitments he started to create a network of contacts, even in the civilian world, especially within the University of Rome. Gaining dual confidence and thanks to the important contacts achieved, he was able to collect funds from the two organization and built the first tunnel at Mach 6 inside the new Research Centre in Rome, named "San Marco Project".

Soon the competition between the two blocks, later known as the Cold War, began to outline, with the Space Race as one of the major areas of confrontation. With the first Soviets successes in making possible to launch satellite in Earth orbit, soon followed by the Americans, The Broglio's team was able to start essential experiments in the new Research Centre, aimed to realize an Italian satellite family called San Marco. They were scientific satellites carrying revolutionary tools designed to measure the atmospheric density and the degree of

resistance for objects launched in space. These studies and realizations allowed Italy to enter in the space club as third power after USA and USSR.

Broglio's commitment did not stop with the realization satellites, in his vision he saw Italy becoming a real space power, able to regain that prestige in aeronautical field that the outcome of the Second World War seemed to have finally cancelled. In order to obtain this result three more elements were needed, together with the satellite: a launch site base for the necessary logistic support, a valid team able to manage the operations and, the most important, a capable rocket with enough power to bring the satellite beyond the atmosphere.

Broglio was fully aware that Italy alone would not have been able to accomplish all of these steps, so he started to seek partners for sharing funds and the essential know-how. In a Europe still divided by selfishness and suspicions, consequences of the fratricidal conflict, among the bloodiest that history remembers, partners certainly better to refer were definitely USSR and USA. The decision of which of the two superpowers had to become principal referent was not only dictated by political reasons but by personal relationships and experiences that Broglio had earned in his continuing search for contacts: United States. Broglio had several times the opportunity to visit the US, he was particularly impressed by the system used to conduct scientific experiment and operations and had no doubts about which agency inviting to a form of cooperation.

Once again the personal relationships that Broglio had with important members of the space world resulted precious, particularly important was the mutual understanding and respect between Broglio and Hugh Dryden, who later became NASA Administrator. First results of this relationship came evident with the joint experiments conducted simultaneously from the Italian launch site at Salto di Quirra in Sardinia and from the NASA launch site at Wallops Island in Virginia, at the beginning of 1959. The experiment was designed to study the destruction of the wind in the atmosphere by releasing colored clouds with the use of Nike

rockets, it had great success and convinced the Americans that Italy could be a serious partner, able share more ambitious experiments.

The visit of Vice President of the United States, Lyndon Johnson, in Rome was an example of how the Americans trusted in Broglio and considered Italy a growing reality in the space world. The memorandum signed by Johnson and the Italian Minister Piccioni was the first stone for the Italian access to space, allowing the realization of an high number of projects and making Italy a respectable nation in the field. The memorandum had ultimate goal of enabling the launch of the San Marco 1, the first Italian satellite. Finally the San Marco was launched from Wallops Island on 14 December 1964 by an Italian team from the dissolved 36th Air Interdiction Brigade, previously trained by the American to possibly launch the nuclear missiles Jupiter, then retrained by NASA.

After completing one of the steps needed to give Italy an independent access to space, another step was completed with the construction of the equatorial launch site *Santa Rita* ready to launch the first Nike rocket by 25 March 1964. The location and the geographical position chosen gave to the polygon a unique and revolutionary launch solution for its time. It was, in fact, the first launch site positioned perpendicularly below the equator, on an offshore platform as never built before. The maritime position avoided waste of resources, allowing safe and easy transportation by ship of all the parts needed to assemble and enable the infrastructure first, and the rockets and satellite after, without passing for other countries.

Another precious Broglio's contact facilitated the construction of the site: the platform, a dismissed oil rig anchored off Egypt, was a gift by the ENI leader Enrico Mattei. After a refurbishment it was secured offshore Kenia in 2 December 1962.

From Santa Rita launc site four launches with San Marco satellites were performed, from 26 April 1967 until 25 May 1988, when it was launched the fifth

and satellite, last in the series. As evidence of the strategic importance of the launch site, those satellites Italians were not the only one to be launched, the US in fact, launched a total of four satellites as well, to be added to the one launched by the British.

Unfortunately, the Broglio's vision with its ultimate aim to offer Italy's independent access to space came to an end before the completion of the last needed step: the realization of a launcher. Although Broglio had already reached agreements with the US to receive patents and projects to rebuild it, and he had already studied the possible improvements to increase the payload capacity in line with the needs of new generation of satellites, his effort was rendered useless by the refusal of the major Italian industries in the sector to implement the project, already well advanced, aimed to realize the new launcher San Marco Scout. The reasons for this refusal are still shrouded in the mystery, over him an alleged accusation of boycott hovers, with action carried in collaboration by the Italian industry representative and the French Space Agency, CNES. The last had just started the project for launcher in common with all the European states, thus having interest to block initiatives able to realize a dangerous competitor. It is certain that the event caused a fracture, still not sewn up to date, between the academic world headed by Broglio and the industrial representatives, already engaged to ensure commitments for the projects to be implemented with the nascent European space agencies.

The decisive push for the realization of a common organization, able to gather funds, intentions and projects coming from all the European nations, interested or even ready to enter the space segment, was given by Edoardo Amaldi. The Italian physicist, along with the French colleague French Pierre Auger, strengthened by his positive experience at the European Organization for Nuclear Research (CERN), proposed the creation of a single agency, free of any military influence, devoted to the sharing of space projects between all European nations. The need to create a single agency grew also for the consideration that the single European nations, entering the space segment, were lagging behind compared with the

superpowers already engaged in the final sprint for the Space Race. Among the European countries interested to the space segment was certainly West Germany which, however, without full sovereignty, was non authorized to sign treaties until 1955, then unable to develop projects in solitary. France and UK, from their hand, not neglecting the development of scientific satellites, were strongly committed to the realization of a launcher out of the still operative military rockets. France was mainly concentrated for the modification on the military missiles for military of the "Pierre Precieuses" family. UK instead focused on the development of its military launchers Black Knight and Blue Streak.

Very soon a different vision of intent started to develop among the European nations. The strong will of France and UK to develop a launcher as first priority collided with the will to entrust to Europe only programs whose goal was creation of scientific satellites, as advocated by Amaldi This division of views led to the formation of two distinct and separate European entities. With the agreement signed on 30 April 1962 was born the European Launcher Development Organization (ELDO) that immediately began to study construction projects for a European carrier called "Project Europe", which provided a unity of purpose between England France and Germany. England offered to build the first stage of the rocket using its Blue Streak, France built the second starting from the rocket Diamant and Germany the third. For the segment of science was signed, on June 1962, the agreement for the European Space Research Organization (ESRO). The production of scientific satellites, especially in the field of earth observation and experiments of frequencies propagation in the middle space, were launched as first projects.

Italy started with fatigue its route toward a full European integration, also because weakened by the internal divisions between Broglio and the academic world from one side and the industrial representatives from the other. Soon the industrialists joined in an space consortium for the industrial policies named CIA in a first moment, then renamed in CNA to remedy the homonymy with the most popular American Intelligence Agency. The rigid positions of Italy against ELDO were

softened by the French who tried to find a point of contact between Broglio and industries proposing the CIA/CNA to build a test satellite aimed to measure the drag met by the launcher in its journey into orbit. Less difficult was the relationship with the ESRO, where Italy could put into practice the experience gained in the field of scientific satellites, the matter in which it was definitely a step ahead comparing with other European nations.

Unfortunately it was not possible to verify whether the work done by the Italian industries that dealt with space was valid, because the European launcher was never able to bring into orbit the Italian test satellite test Italian STV, later renamed ELDO / PAS. Despite three revisions of the program nor Europe 1 or 2 or 3 succeeded to operate correctly all three stadiums built by France, England and Germany. The failures and growing doubts about the success of the program brought Italy and the UK to withdraw the organization, France, anyway, did give up and, together with Germany, started a new project for another European launcher to be named Ariane.

On the structure of ESRO, which had instead proved to be a valid and well organized agency working, it was decided to merge the two organizations flowing into a single space agency. The new founded organization became known as European Space Agency (ESA). The choice to put the headquarters in Paris put France into a inevitable leadership role toward to other nations, being able to impose the sharing of the Ariane project as European launcher.

The experience acquired by Italian space industries, in the meantime, through the construction dell'ELDO / PAS was not wasted, it was a good boost to set an immediate start of planning for the creation of a communications satellite. This new field of use of the space was initiated by the United States as precursors, with the launch of TELSTAR's first telecommunications satellite in 1962 . Fiat Avio (then Aeritalia), AERFER, Montedel, Selenia, SNIA BPD, Financial BREDA, Italian CONTRAVES, FIA and Montecatini, joined in the CIA/CNA, consurtium, starter to develop a project for a telecommunications satellite called SIRIO, which

stands for *Satellite Italiano per la Ricerca Industriale e Operativa* (Italian Satellite for the Industrial and Operative Research). The new project, presented by Professor Francesco Carassa in 1968, was aimed at the realization of a telecommunications satellite, capable of transmitting by frequencies considerably higher than similar satellites.

The CIA/CNA realization took off on 25 May 1977, sent into orbit by an American rocket Thor-Delta, launched from the NASA Kennedy Space Center. The work was so perfect to largely survive to the planned duration. On 3 September 1979, at the end of its scheduled life, the satellite still had enough fuel to continue operations. On 24 March 1983 it changed its orbit reaching the China overhead and it was later sold to the Chinese lasting until 1985, after eight years of continuous operations.

Its sequel, however, had not the same luck. With SIRIO 2 CIA/CNA reused the same technologies employed in the realization of SIRIO 1, aiming at its internationalization. The goal was to share the project with other countries, trying to regain prestige toward the European nations. In 1978 the ESA Council of Ministers approved the sharing of the project. SIRIO 2 was born with the participation of France, with a sharing of 15%, of Germany with 11%, Switzerland, Belgium, Denmark and USA with lesser sharing. The launch was planned the ESA base of Korou in the fifth launch of the new European launcher Ariane. Unfortunately, seven minutes after the launch, the third stage failed, provoking the fall of the SIRIO 2 into the Ocean.

The occasion for the Italian industries to demonstrate the value gained by launching the SIRIO 1, came out thanks to an opening by Americans, intentioned to share their various space programs.

Thanks to the Apollo 11 flight, on 20 July 1969, the first American astronauts were able to walk on the lunar soil. The heavy budget required for the Apollo missions, combined with the important resources employed in the Vietnam War,

forced the Nixon administration to cut remaining Apollo missions and simultaneously the NASA budget. Very soon the US space agency, trying to reduce program costs, decided to open to other nations, especially European, trying to start a sharing policy, able to reduce expenditures. The most important of that aimed to the creation of a reusable space module. ESRO and Italy took the opportunity and the result was an agreement for the develop of a space module, to be placed inside the Shuttle, to allow astronauts performing experiments while in orbit, waiting for the International Space Station, still far from being realized..

ESRO approved the project in December 1972, putting as condition the free and voluntary contribution from the member countries. The European country that most of all showed interest was Germany followed by Italy. To begin study phase of the project several consortia were formed, joining companies from all European nations. Finally different proposals for the Spacelab development were presented to ESRO and NASA Committees. The MESH consortium, headed by the German ERNO and including the Italian company Aeritalia, prevailed with its proposal.

After overcoming various difficulties in the integration and assembly phase, for the components manufactured by different industries, Spacelab, with its flight unit, were received in the American Space Center, under the supervision of the Vice President of the US, George Bush, on 2 February 1982. The European Spacelab took off from Cape Canaveral on 28 November 1983, onboard the Shuttle Columbia. Among the crew of Space Shuttle there was also the first European astronaut. Part of the agreement signed between NASA and ESRO (which in meantime became ESA) included the possibility, for European astronaut, to be included in the scientific team, among the crews of the Shuttle missions. The first European astronaut was the German Ulf Merlborg, out of a severe selection, he could fly with the Shuttle, perform several scientific test, and safely land with the Columbia Shuttle on 8 December 1983. The Spacelab demonstrated a perfect performance, remaining absolutely operative after his first flight.

Meanwhile the many projects carried out by our country suggested a reorganization of the space policy. Under the pressure of different Italian Ministers of Research and Development, on 25 October 1979 was finally approved a plan that became the basis for the future Italian Space Agency: the National Space Plan (PSN). The PSN was established with the intent of managing unilaterally and directly all the projects. Luciano Guerriero was appointed Administrator and immediately he approved five-year financing plan, to be divided in two parts of three plus two years, to rationalize spending needed to complete the space projects still outstanding.

The new projects that were approved in the PSN were divided in plans unilaterally conducted by Italy, plans conducted in European cooperation environment and plans regulated by bilateral agreements with international non-European countries. Among the projects run by Italy alone has to be mentioned definitely the definitely ballistic missile Alfa, while among the projects shared with the ESA, the most important financed by the PSN was the production, by the Italian company SNIA, of a rocket-boosters for the Ariane 2, able to increase the lift power and the payload to send in orbit, giving more thrust in the departure phase.

But the international partner to which the PSN was referring with major emphasis were the USA. Together with NASA the Plan developed two projects of great importance. The first was called IRIS, pointing to the creation of a propulsion system able to put into orbit light loads, directly from the Shuttle cargo bay. The project certainly more futuristic came from the idea of Professor Columbo, who imagined placing satellites in orbit, linked with a cable to roll directly from the Shuttle. This project named Tethered was developed and implemented, but its first two flights, for different reasons, did not have the desired success.

It was finally time for Italy to end the pioneering stage in its space adventure. By the law number 186/1988 the Italian Space Agency (ASI) was established, providing it with a President and a Board of Directors who, under the supervision of the Ministry of Research and Development, had the powers to manage the

space policy with a legal position in either as a agency of public, and an agency private law, for which it was possible to sign agreements, on the space segment, with the space agencies of foreign countries.

Although ASI was born with the clear intent to convey in a single voice the positions of the industrial and the academic worlds, even today, this challenge has yet to be won. At least the ASI foundation was able to relax relations between ESA and Italy allowing the Italian industry to gain its part in the scene. After the failure of the Hermes project France poured on Italy its disappointment, trying to bag, as compensation, projects proposed to ESA by Italy. The fact that Italy will be able to launch its rocket only in 2012, further exemplifies the success of French to block the Italian initiatives.

It was difficult, for international observer focused about Italy, to understand in which direction the national space policy was aiming, in particular what was the best partner to choose for enabling development and progress in the field. In one of the most critical moment for the relations between Italy and ESA, when it was clear that the Hermes program had to be cancelled. The Secretary of ESA at that time, Jean Marie Luton, said: "There is a political problem that Italy must solve between Europe and the United States ." He referred to different opinions existing, in Italy, between the academic world, more inclined to agreements with the US, and the industrial world, turned to the acquisition of contracts in Europe.

In conclusion, while it is impossible to compare scientific conquests with economic benefits, it is fair to say that the role played by US has been a positive contribution for the Italian growth in the space segment, while the view on the European contribution, able to offer financial gain to the industries, but less growth in terms of knowledge and capabilities, remains rather discordant,.