HSR-31
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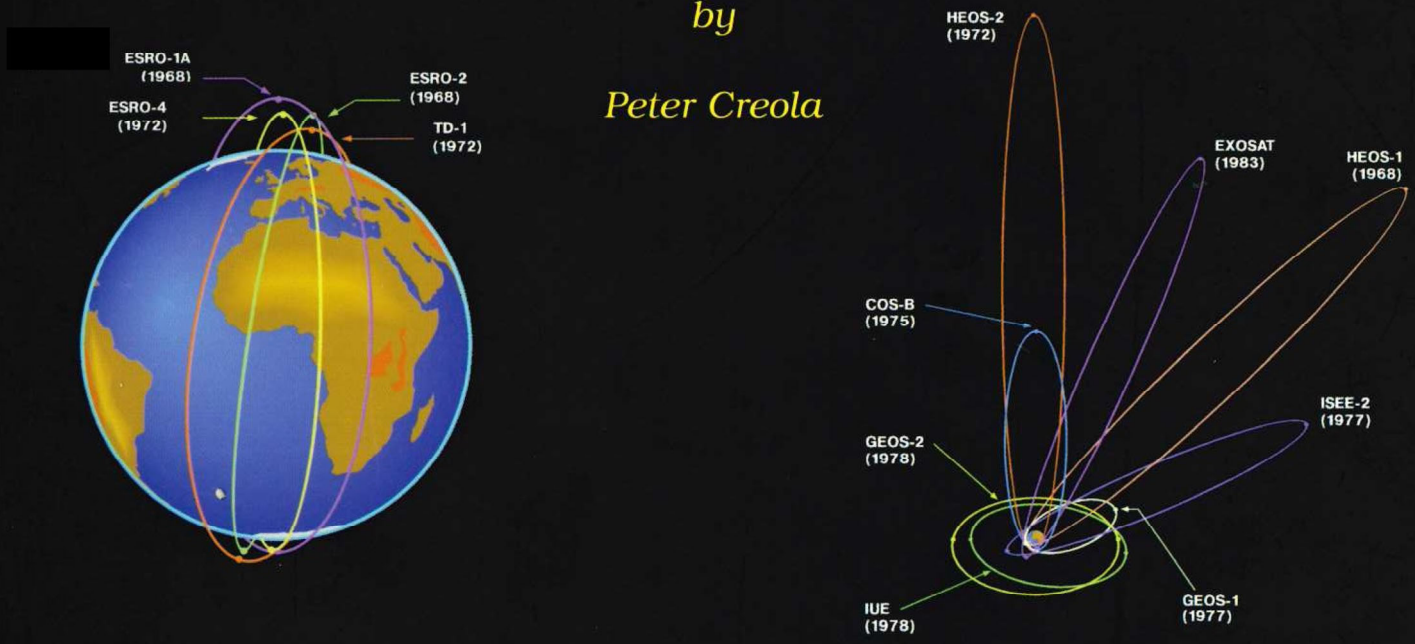
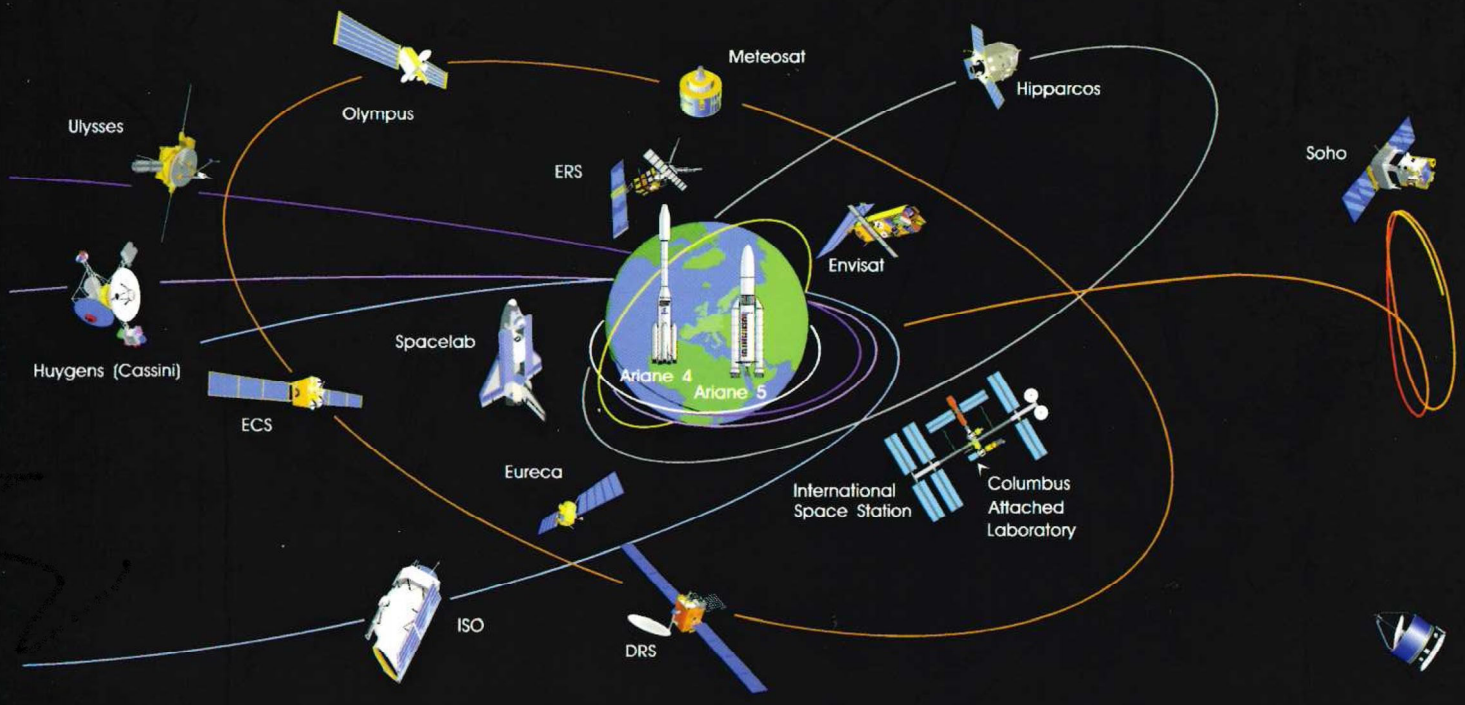
Switzerland in Space
a brief history

by

Peter Creola





European Space Agency
Agence spatiale européenne

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European Space Agency
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Peter Creola was formerly Head of the Swiss Space Office (SSO)

Title ***HSR-31: Switzerland in Space – a brief history***

Published by ESA Publications Division
ESTEC, PO Box 299
2200 AG Noordwijk
The Netherlands

Editor R.A. Harris
Price €10
ISSN 1638-4704
ISBN 92-9092-541-8

Printed in The Netherlands

Contents

Foreword

The history of Switzerland in space has, up to the end of the twentieth century, mirrored that of the country's participation in the emergence, consolidation and expansion of European space cooperation. It has done so more closely than the most of other European Space Agency (ESA) member states, and it has also been intimately related to Swiss membership of international space organisations. Very early on in the discussions about Switzerland's role in the exploration and exploitation of space it became clear that, for various reasons, Switzerland would not develop its own national space programme, but would instead actively contribute to European and global space initiatives.

The author of this short account has been personally involved with Swiss activities in space for 34 years. It therefore comprises a fair number of personal experiences, judgements and reminiscences. Consequently, it may lack historical objectivity – a goal which is perhaps inevitably elusive. However, it is hoped that a high degree of authenticity will compensate for this shortcoming, and that this history will therefore be a useful source for a more comprehensive study by a professional historian, in the future.

This account presupposes on the part of the reader some general knowledge about the history of European space cooperation, and about the programmes of the European Space Research Organisation (ESRO), the European Launcher Development Organisation (ELDO) and ESA. The basic historical background is treated at length in the following books:

1. *Europe in Space: 1960-1973,* J. Krige and A. Russo (ESA SP – 1172, Noordwijk, 1994)

2. *A History of the European Space Agency, 1958 – 1987* (ESA SP – 1235, Noordwijk, 2000)

   Volume 1: The story of ESRO and ELDO 1958-1973
   J. Krige and A. Russo

   Volume 2: The story of ESA, 1973-1987
   J. Krige, A. Russo and L. Sebesta

1 Introduction

When does a country decide to push out into space? Is it at a time when individuals begin to dream up space projects or to lay the theoretical groundwork for space exploration? Or is it only later on, when the government itself decides to become involved?

This question is debatable. But it is not in doubt that the great space pioneers – such the Russian Ziolkowsky, the German Oberth and the American Goddard – began their work with no support but only their own personal conviction and enthusiasm. Their respective governments became players much later on, and were driven by different motives.

It is therefore fitting to start this brief history with Leonhard Euler (1707-1783), who was born in Basel and taught in St Petersburg and Berlin. He was a pioneer of celestial mechanics, and his formulae are still used today to describe the rotations of asteroids, comets and spacecraft.

Forty years before the epoch-making flight of Yuri Gagarin, a Swiss citizen decided to travel to the edge of space. Professor Auguste Piccard, together with Paul Kipfer, made a record-setting balloon ascent on 27 May 1931, departing from Augsburg and reaching a height of 15.8 kilometres. German and American balloonists had already reached lesser altitudes. Professor Piccard was, however, the first to use a pressurised capsule – closely resembling Gagarin's *Vostok* in size and shape – which he had designed himself. The physiological conditions to which an organism is exposed at such altitudes are quite similar to those encountered in space, with the obvious exception of weightlessness. The scientific goal of the ascent was to measure cosmic rays and stratospheric temperatures. In both these respects, Professor Piccard's flight was a space-related endeavour. His stratospheric flights – the second of which took place in 1932 from Dübendorf airport in Switzerland, with Max Cosyns as his partner, and which reached an altitude of 16.2 kilometres – can therefore, to some extent, be considered the forerunners of the first manned space flights.

A different type of early Swiss space pioneer was Josef Stemmer. In 1925, aged 11, he started to design spaceships, using the works of Oberth, Hohmann, Goddard and Valier as his starting point. He built model spacecraft, and at the age of 15 gave his first talk on rocket propulsion at a Zürich school. Around 1930 he began testing small solid fuel rockets. In 1938 he tested a liquid-propelled aeroplane with a 4.8 metre wing span. His test flights seem to have ended in 1941. The fact that he persuaded his first employer, Scintilla, to build him a test stand is proof of his unfailing belief in the potential of rocket propulsion. His work appears to have contributed – in ways which still need to be fully explored – to the very first initiatives of the Zürich-based Contraves company in the field of rocket propulsion.

In 1944 and 1945 Stemmer published three booklets on rocket propulsion. In 1952, he also published a substantial tome called *Raketenantriebe*. This was one of the very first post-war publications on space technology. It contained an incredible wealth of historical and technical information about rockets and space, including detailed accounts of German wartime rocket development and technological work, ranging from the precursors of Peenemünde up to the Sänger spaceplane concept.

In 1950 Stemmer founded the Schweizerische Astronautische Arbeitsgemeinschaft (Swiss Astronautical Study Group) and became its first president. From 1951 onwards he served as secretary to the newly founded International Astronautical Federation, and jointly organised the fourth IAF congress in Zürich. At a time when there was little public knowledge about the possibility of space flight, he gave numerous talks on astronautics.

He was never afraid of being ridiculed, remaining deeply convinced that future events would prove him right.

The Swiss Government awoke to the potential of space while the initial steps were being taken to set up ESRO. The most notable event of this period was, without a doubt, the first ever multilateral intergovernmental meeting on space cooperation – the famous Meyrin conference, which led to the drafting of the ESRO convention. This history therefore opens with Meyrin, the first official involvement of Switzerland in European space cooperation.

The first section – “Switzerland and the foundations of European space cooperation” – deals with the period up to the “first package deal”. For the sake of clarity, some paragraphs in individual chapters contain references to developments outside the period covered.

The second section – “The emergence of Europe as a world space power: Switzerland’s role and position” – covers the period from the “second package deal" up to and including the Munich ministerial meeting in 1991. A short concluding chapter – “The end of the Cold War: new challenges and hesitations” – deals with the period up to the turn of the century.

2 Switzerland and the Foundations of European Space Cooperation

2.1 The beginnings

The famous Amaldi letter of 1959, entitled "Space research in Europe", had a significant impact in Switzerland. The young director of the Geneva Observatory, Marcel Golay, contacted the Minister for Education of the Canton of Geneva, Alfred Borel, who was also a federal parliamentarian and a member of the foreign relations committee of the Swiss National Council. In his turn, Borel succeeded in awaking the interest of Swiss Foreign Minister, Max Petitpierre, in a European space research organisation based on the CERN model. A period of meetings and consultations followed, at various government and academic levels. The overall conclusion was that the time was ripe to create a European organisation for space research, and that Switzerland should play an active role in setting it up. Taking the first step at an institutional level, the Swiss Academy of Sciences (then called the Swiss Society for Natural Sciences) set up a committee for space research. Golay became its first chairman and Fritz Houtermans, of Bern University, was elected as vice-chairman. In these capacities, Golay and Houtermans attended a meeting in Paris which had been convened by Professor Auger to establish the European Preparatory Commission on Space Research, known by its French acronym COPERS. However, the proposal by Golay and Houtermans that COPERS be based in Geneva was rejected, and Paris was chosen instead. They had failed in their first attempt to position Switzerland on the European space map of the future.

The discussions about the structure and mandate of the proposed space organisation very rapidly brought to light fundamental differences of opinion between scientists, government representatives and – predictably – delegates from its different potential member states. One such difference of opinion arose over the fundamental question of whether the organisation should be involved in launcher development. The Swiss delegates argued strongly in favour of a purely scientific organisation. On the one hand, they feared that launcher development would quickly drain funds from scientific activities. On the other, the Swiss feared that because launchers – even launchers for purely scientific satellites – were closely related to military launchers, being involved in their development could jeopardise Swiss neutrality, whose importance at the time was comparable to that of the ten commandments. The Swiss therefore considered that "the CERN model" was the way forward. Whilst it is true that, at that time, most versions of space launchers were derivatives of military launchers, it could have been foreseen that liquid boosters would soon be replaced by their solid-fuelled, and much more quickly launchable, cousins, thereby drastically reducing the military value of liquid-fuelled launchers. In addition, one might already have argued at that time that "the CERN model" could easily encompass launchers. After all, CERN provided the basic hardware infrastructure for high energy physics experiments, with its accelerators putting particles on their collision speeds at the right time and in the proper orbit. And what more basic infrastructure for space experiments could there be than a launch vehicle accelerating a spacecraft to the velocity required, and placing it in the desired orbit?

2.2 The Meyrin Conference

Though COPERS was not to be based in Switzerland, the Swiss team did have some success in the diplomatic arena during the initial discussions. Golay suggested to the Swiss Foreign Minister that the first intergovernmental discussions on European space cooperation be held in Switzerland. Petitpierre agreed, and CERN offered to host the event. The international parties were happy to accept, and all those arguing in favour of structuring the future space organisation along the CERN model hoped that holding the first official discussions at CERN would give them a psychological advantage.

The conference – the first ever multilateral and intergovernmental meeting on space cooperation in the world – took place in 1960, from 28 November to 1 December. It ended with the signing of a formal agreement to set up COPERS. The first meeting of COPERS was held in 1961, on 13 and 14 March, in Paris. Harry Massey was elected as the new chairman. Additional members were Luigi Broglio, Henk van de Hulst and Marcel Golay. Pierre Auger was appointed executive secretary.

2.3 Switzerland and the ESRO negotiations

The Swiss delegates were given few formal instructions to bring to the negotiating table. The lead negotiators were Golay, the scientist, and Samuel Campiche, the diplomat from the Swiss Department of Foreign Affairs. They understood each others' needs well, and quickly developed a close personal relationship. One of the hottest issues under debate was, of course, the funding system. The scientists wanted a stable financing arrangement, so that programmes spanning several years could be carried out. The government representatives, however, wanted to retain spending control, in accordance with national budgetary procedures. The Swiss actively helped to engineer the final compromise, which combined multi-annual funding – which had to be unanimously approved – with a yearly budget requiring a two-thirds majority for approval.

In May 1962 the final documents that were needed to create ESRO were sent out to the governments involved, and the convention was signed in Paris on 14 June 1962. Switzerland's signature was given subject to ratification, as were those of most of the other countries involved.

The process of approving the convention in both chambers of the Swiss Parliament was uneventful, and concluded with the government receiving unanimous authorisation to ratify the convention. Across the party spectrum, the overwhelming view was that Switzerland could not afford not to take part in the opening of the space frontier, and that tangible scientific and industrial benefits would result from its doing so. But there were also political considerations. The "address to parliament" which sets out Switzerland's motivations for joining ESRO states: "It is obvious that space research cannot be left as the exclusive domain of the United States and the Soviet Union ... Europe, and Switzerland itself, would soon suffer the consequences."

The address also refers to Switzerland's second defeat on the question of where to base the new space organisations. Having failed to win the seat of COPERS for Geneva, the Swiss Government, together with the Canton of Vaud, had offered 60 hectares of land, half way between Geneva and Lausanne, as a site for what was eventually to become the European Space Research and Technology Centre (ESTEC). Their bid failed, mainly for the obvious reason that other countries considered that hosting the first big European research organisation, CERN, was quite enough for a "small" member state.

2.4 The decision not to join ELDO

In addition, the "address to parliament" dealt with the question of whether Switzerland should also join ELDO, whose convention was also open for signature. It proposed that Switzerland should not join ELDO, because there was little interest from Swiss industry. Launcher development had been specifically excluded from the ESRO convention, and ELDO was seen by the Swiss government as a primarily industrial undertaking. However, the reason why Swiss industry was not interested in ELDO was not mentioned in the address. This was, in fact, that industry had been asked to pay the ELDO contribution out of its own pocket. It was naïve to assume that Swiss industry would even consider doing so. How could Swiss industry ever win a bid if it had to bear development costs itself, while industries in other member states – and of course in the USA – could rely on government funding? It is true that, in 1962, few Europeans foresaw that sooner or later independent access to space was going to be the key to any serious involvement and that, in the long run, dependence on the US launcher monopoly would become unacceptable. It is, however, surprising that in 1962 the Swiss authorities, while officially recognising the political significance of ESRO, failed to perceive the political importance of a European launcher.

It would take the Swiss Government 10 years to begin to realise – at the time of the initial clashes between ESRO and the USA on launch priorities, and of the *Symphonie* affair – that Europe could no longer rely on US launchers. Before these events took place Switzerland, like Denmark, had nevertheless asked for observer status in ELDO. The string of ELDO failures and cost overruns seemed to prove that the Swiss decision not to join ELDO had been correct for other reasons, namely the utterly inadequate management structure. However, when ELDO began a process of internal reform, and the *Europa 3* project took shape, the Swiss Government began to consider joining the *Europa 3* programme. But, as we know, it was too late, for ELDO itself collapsed.

2.5 The setting up of national structures

During the negotiations on the creation of ESRO it quickly became obvious that, with or without a national programme, some kind of national structure needed to be established to coordinate Swiss space interests and efforts.

The first body to respond to this need was the Swiss Society for Natural Sciences (SNG), the precursor of the Swiss Academy for Natural Sciences (SANW). It did so by creating a Commission for Space Research, under the chairmanship of Golay, to discuss and coordinate the country's scientific needs in the space arena. But at a government level, the first attempt to create a coordinating structure dates from January 1962, and is closely related to the question of which government department was to be put in charge of space affairs. The Department of Foreign Affairs (which was at that time called the Political Department), which was handling the ESRO negotiations, took the initiative. The Department's Division of International Organisations (DIO) sent out invitations to a preliminary interdepartmental meeting – which was held in June 1962 – to discuss the idea of a space committee combining representatives of science, industry and government.

At the beginning of 1963 the DIO sent out a consultation document containing a draft proposal to the government that an "Advisory Committee on Space Affairs" be established. There followed a period of intense discussions between several government departments. The main bone of contention was whether responsibility for space affairs should also be assigned to a particular office. The Finance and Transport Department argued that responsibility should be given to what was called at that time "the Delegate for Nuclear Energy Questions". The Foreign Affairs Department, however, believed that setting up the committee was sufficient, and that it should retain responsibility for space affairs for the time being, particularly as ESRO was still in its gestation period. It was clear that several years would be needed before ESRO reached cruising speed and Swiss interest in space was capable of greater focus.

The proposal had to go through eight drafts, over a period of six months, before it was decided that the Advisory Committee on Space Affairs should be set up, and that it should be composed of representatives from all seven government departments and from all scientific and industrial institutions with an interest in space matters. Its mandate would be to advise the Federal Council (the Cabinet) on all issues relating to the exploration and utilisation of space. At the same time it was decided that, pending resolution of the issue of who was to have responsibility for space matters, an interdepartmental committee should be set up within the administration to coordinate Swiss space interests. However, this committee was not to meet for years. It would assume its functions only in 1992, when it would become known as the "Interdepartmental Coordinating Committee for Space Questions" (IKAR). The question of who should be responsible for space affairs had still not been answered, and it came up again in 1967, when a national space programme was being considered. It would be finally settled only in 1998 and in 2000, with the two-stage creation of the Swiss Space Office (SSO). The SSO would be created within the Swiss Science Agency, which was part of the Department of Home Affairs. Until 1998, however, the Department of Foreign Affairs retained responsibility for the political, financial, legal and international aspects of space affairs. The Office for Science and Research – which had been progressively created out of the old office of the Delegate for Nuclear Energy Questions – was responsible for scientific and – together with the Department of Foreign Affairs – industrial aspects of space affairs.

2.6 The inquiry into a national space programme

The first four meetings of the Advisory Committee on Space Affairs, which took place between December 1963 and December 1964, dealt with the teething difficulties which ESRO was experiencing in areas of technology and management, the question of whether Switzerland should join ELDO, the beginnings of Intelsat and the need to create a Swiss national space programme. In a letter to the President of the Swiss Confederation, the Commission's first chairman, State Councillor Eric Choisy, pointed out that in order for Switzerland to truly benefit from participation in ESRO, a sum of no less than the Swiss ESRO contribution should be spent on national space science activities. This meant an estimated funding of between 15 and 20 million Swiss francs for the first five years. The Advisory Committee on Space Affairs discussed the idea, and in 1966 entrusted the task

of drafting a detailed proposal to the Space Research Committee of SNG. The resulting proposal encompassed a wide range of disciplines, from sounding-rocket experiments to mass spectrometers for satellites, and experiments with the Large Astronomical Satellite project (*LAS*), and even included the construction of a Swiss ground station for scientific satellite data.

The toughest issue was, obviously, how to fund such a broad programme. Several options were considered, resulting in an initial funding proposal, which was put to the government in September 1967. The Finance Department, however, opposed the ring-fencing of any specific funding for a national space programme, and thus effectively killed the proposal. Taking into account the vast difference between the cost of experiments performed in space and on the Earth, the chances of success for any space experiment proposal were slim when it had to compete for funding with earth-based disciplines.

The final verdict was given by the government in May 1968. It duly noted the (somewhat downscaled) proposal, but decreed that a national space programme would have to be funded from existing sources. This decision was extremely frustrating for the space scientists. Golay – who had led the drive to create ESRO and for Swiss membership of this organisation – was particularly vocal in his disappointment. He claimed that, without its own national space programme, it made no sense for Switzerland to be a member of ESRO. He advised that the country pull out of ESRO, only five years after the convention had come into force. Unsurprisingly, his advice was not followed. The Department of Foreign Affairs wanted Switzerland to support the new common European space agenda. It is significant that, at this time, as the rest of Europe was pursuing economic and political integration, Switzerland was becoming isolated. It was felt that membership of CERN and ESRO would partially compensate for this trend, by proving that there was a pan-European area of activity in which active Swiss participation was both politically and constitutionally possible. In addition to these political considerations, some space scientists and industrialists believed there were significant advantages to Switzerland's continuing membership of ESRO even if Switzerland did not have a national space programme. They were to be proved right. But it would only be with the creation of the Swiss brainchild *PRODEX* (Scientific Experiment Development Programme – the acronym *PRODEX* comes from the French "PROgramme de Développement d'EXpériences Scientifiques") within ESA, that the full and adequate participation of Swiss space scientists in European space programmes would finally be secured.

2.7 The constitutional issue

A particularly interesting objection to a Swiss national space programme came from the Justice and Police Department, which pointed out that the Swiss constitution provided no legal basis for this activity. The principle of subsidiarity is among the basic tenets of the Swiss Confederation. The Cantons – that is, State Members of the Swiss Confederation – only grant authority to the Federal State in specific areas, which must be set out individually in the constitution. In the absence of this specific granting of authority, the Cantons retain exclusive control. Thus, ironic as it may sound, while the Soviets were launching Sputnik, and the Americans were landing on the Moon, Switzerland's space activity remained in the domain of its 26 Cantons.

There was, however, one exception to the principle of subsidiarity. Power to negotiate and adopt international treaties on any matter rests exclusively in the hands of the Confederation. This explains why, although the decision to join ESRO posed no constitutional problems, the creation of a national space programme did. It was only much later on that, during a comprehensive revision of the Swiss constitution, the Swiss Space Office was able to successfully propose that the situation be rectified. Therefore since January 2000, the date on which the revised constitution came into force, the ability to legislate on space matters is listed as one of the specific areas of authority of the Swiss Confederation.

2.8 The early days of Swiss space science

Despite their failure to secure specific funding for space research within the ambit of a national programme, Swiss space scientists from various universities participated, during the early 1960s, in NASA research in the areas of Moon probes, celestial mechanics and satellite geodesy. The Geneva Observatory was very active in

balloon-borne experiments as early as 1964, using a stabilised gondola which it had designed itself, and which was launched with balloons from the French national space agency CNES.

The Institute of Physics at the University of Bern swiftly emerged as the leading group of scientists developing mass spectrometers for sounding rockets and, later on, satellites. It was funded by the university and the Swiss National Science Foundation. The funding was relatively modest, and it was only the determination and skill of the Bern group that enabled it to develop the first Swiss satellite experiment, a mass spectrometer for the *Geos* satellites, which was ultimately flown in 1980 and 1985.

Another project in which the University of Bern was involved, the *Apollo* Moon landings, was a special case. In 1965, Johannes Geiss had proposed that NASA carry out an experiment to collect solar wind particles from the Moon's surface. This experiment was both simple and of great scientific value. It was selected as one of the experiments which were to be carried on every lunar landing mission, and it became the only non-American experiment to be part of the *Apollo* landings. By combining scientific arguments and diplomacy, Geiss even succeeded in convincing NASA to deploy the Swiss solar sail before unfurling the US flag, in order to maximise the sail's exposure time. Swiss institutions also received lunar probes from *Apollo*, and later on from the Soviet Union's unmanned Moon landings.

The *Apollo* and *Geos* experiments put Swiss space science firmly on the world space map during the first decade of European space cooperation. This was quite an achievement, given that the first seven ESRO satellites had flown without any Swiss experiment on board, and the Large Astronomical Satellite project – in which Geneva had been heavily involved – had been cancelled.

2.9 The beginnings of Swiss space industry

Three sectors of Swiss industry – watch-making, machine-building and defence – were well placed to participate in space developments. The watch industry, however, faced problems of its own, in the shape of the need to adapt to changes in technology and markets. Machine building, meanwhile, was content to remain with its traditional products and customer base. It was only in the defence sector, therefore, that at least one company was keenly interested in space. This was Contraves, part of the Oerlikon-Bührle group. Contraves carried out preliminary studies and research over a lengthy period, beginning in 1946. In 1959, it secured a contract from the armament division (KTA) of the Department of Defence for the "Kriens Project", which was to develop a radar-guided ground-to-air missile. The project, however, soon ran into technical and financial difficulties and, instead of continuing to support the development of a Swiss missile, the Swiss Army opted to buy British Bloodhound units. The Kriens Project was terminated in 1965. Contraves then, adopting a "mini Blue Streak" strategy, went to ESRO and proposed that it develop a sounding rocket named *Zenit*, directly derived from the ill-fated anti-aircraft missile. The first demonstration launch of *Zenit* took place on 27 October 1967 from the Sardinian launch range of Salto di Quirra. The Universities of Bern and Geneva provided two makeshift experiments for *Zenit* to carry, which measured atmospheric density and pressure, in addition to UV radiation from the Sun. The flight was successful, and ESRO ordered two *Zenits* for its sounding rocket programme. The first one was not launched until July 1971, malfunctioned and in the context of the first Package Deal the sounding rocket programme was terminated.

Contraves had more luck with its forays into the satellite business. One of those bidding for the contract to construct ESRO's first satellite was the Laboratoire Central des Télécommunications (LCT), a French subsidiary of ITT. LCT contacted Contraves and suggested that they submit a joint bid to ESRO, led by LCT as prime contractor and bringing in Bell Telephone's Belgian subsidiary BTM. Contraves agreed, and took responsibility in the bid for the satellite's structure and integration. Somewhat surprisingly, they won the contract. Swiss industry had obtained a first and quite sizeable slice of the space pie. Though Contraves never participated to such a large degree in later ESRO and ESA satellites, this first contract established the Swiss firm as a leading satellite structure manufacturer for a number of future projects, notably under ESA's science programme.

The other Swiss company which achieved a head start over its competitors was the Compagnie Industrielle Radioéléctrique (CIR) from Gals, in the Canton of Bern. Its founder, Eric Muller, believed that space was a rich field for diversification and expansion. He attempted to organise a joint bid by several leading Swiss watch companies for a contract to manufacture the timing system of ESRO's telemetry network ESTRACK. Surprisingly, none of the established companies was prepared to take the risk of being prime contractor. CIR therefore led the bid, and won it.

Combined with the *ESRO 1* contract which Contraves had won, these work orders added up to a total of 12 million Swiss francs at the beginning of 1966, assuring an excellent initial return on its investment for Switzerland. In the early discussions about the introduction of industrial return rules in ESRO, Switzerland, pursuing its traditional *anti-dirigiste* line, argued for the route of open competition. Soon, however, it became clear that companies from smaller Member States which lacked national programmes or funding for pre-development studies would face increasing difficulties if competition were not regulated. It must also be noted, however, that the overall interest of Swiss industry in ESRO contracts was low. Even in procurement actions where ESRO itself had identified potential Swiss contractors, there was often no response to calls for bids due to sheer lack of interest, vision and a spirit of risk-taking. Consequently, Swiss industrial return deteriorated year after year, and in 1972 Switzerland saw the lowest return coefficient of any Member State.

Combined with Switzerland's minimal participation in the space programme at a scientific level, this decline was potentially dangerous. Those opposed to Switzerland's activity in space now had ammunition for their argument that ESRO was not a worthwhile investment for the country. Given the situation it was, ironically, fortunate that both ELDO and ESRO were in crisis. Because of this, the question of whether or not to invest in ESRO became elevated from a Swiss issue to one of pan-European politics. Once again, the diplomats stepped in to defend Switzerland's active partnership in ESRO, arguing that this partnership was an act of solidarity which could salvage European space cooperation.

However, even the lowest return coefficient meant numerous contracts which were interesting to the still fledgling Swiss space industry. In addition to Contraves and CIR, an increasing number of companies and institutions began to participate in the space industry, both as subcontractors to the "Big Two" and as independent contractors. In addition to satisfying the terms of the ESRO contracts which were available, a small number of suppliers in certain niche areas began to serve NASA's needs.

2.10 Switzerland in Intelsat

In 1962, Switzerland had to take a position on the first US overtures aimed at establishing world-wide cooperation in space telecommunications under the aegis of Comsat. In 1963, the Swiss Government decided that it should be represented at a series of diplomatic meetings which soon became known as the Conférence Européenne des Télécommunications par Satellites (CETS). The Swiss delegation to these meetings was led by representatives of the Department of Foreign Affairs and the Federal Post and Telecommunications Administration (PTT). As a result of these meetings, Switzerland participated in the negotiations on the creation of the Intelsat consortium in July 1964. Switzerland was a member of the European negotiation group, which was led by Italy and also included France, Germany, the UK, the Netherlands and Belgium. Switzerland was also, unofficially, considered to be representing Scandinavian and Austrian interests. In the address to the Swiss Parliament which proposed that it approve the interim Intelsat agreements, the Swiss Government said that the way in which the USA had conducted these negotiations was not completely satisfactory, and neither was the resulting agreement. But it also pointed out that this was due to the technical superiority of the US parties to the negotiation. However it concluded, optimistically, that the arrangements were provisional, and that the definitive Intelsat arrangements, which would be concluded in 1969, would permit the mandate, structure and working methods of the organisation to be adjusted in the light of experience.

Switzerland's transatlantic telecommunications traffic was, at that time, already considerable. This was due to the country's successful international business relations and the presence of a large number of US companies and numerous international organisations in Geneva. Both a country's Intelsat contributions and its level of

representation in the Interim Communications Satellite Committee (ICSC) were based on an estimate of its transatlantic telecommunications traffic. Switzerland's initial share amounted to 2%, equal to that of Italy and Japan and considerably higher than that of other small European states. Switzerland was therefore represented from the outset on the ICSC, Intelsat's international governing board. Reinhold Steiner, the Science Counsellor at the Swiss Embassy in Washington, was jointly appointed by the Department of Foreign Affairs and PTT to be the Swiss ICSC representative. Steiner very quickly became a specialist in Intelsat affairs and procedures. His attitude was that the Intelsat Arrangements were already biased enough in favour of the USA and Comsat. Whatever modest power was delegated to the ICSC – as the sole international body within the organisation – should therefore, he believed, be scrupulously adhered to. Conflicts with Comsat were inevitable. To quote one Intelsat delegate, Comsat was acting as "Lord High Executioner and Lord High Everything Else". It had a double role, being both the US representative on ICSC, with 53% of the votes, and at the same time the manager of Intelsat. Obviously, this gave Comsat numerous opportunities to ensure that the ICSC would be unable to act in the interests of all its member states, and supervise the manager efficiently. Procurement was a constant subject of controversy. The technological gap between US and European companies, together with Comsat's powers and policies, led to a situation in which the USA saw half of the investment in global telecommunications systems paid for by its international partners, whilst 90% of the contracts went to US companies. It was only over the years – due to the advent of the first European telecommunications satellite programmes and to Steiner's intense engagement in favour of a more balanced Intelsat, that the situation began to evolve.

The Swiss ICSC representative's relentless defence of the international character of Intelsat made him the target of a direct attempt by the USA to get him sent off the pitch. During the preparations for the negotiations about the definitive Intelsat arrangements, which were scheduled to begin in 1969, the Swiss ambassador in Washington reported to Bern that US parties had told him that Steiner would not be welcome as a member of the Swiss delegation to the negotiations. This attempt to remove Steiner was not, however, successful. Switzerland played a very active role during all phases of the Intelsat conference, which lasted from 1969 to 1971. The delegation to the conference – which included Steiner – was led by senior diplomats from the International Organisations Division. These diplomats felt – largely because Steiner had meticulously reported all the machinations of Comsat – that more was at stake than just the technical issue of how to manage the world's first global system for satellite applications. The Swiss Government had come to realise that the real issue was whether the first practical benefits to result from space technology would remain forever in US hands, or whether other nations, in particular Europe, would wake up and react against the imperialist attitude of the USA by acquiring their own technical capabilities and transforming Intelsat into a truly international organisation.

The Swiss delegation at the Intelsat negotiations became part of an alliance of like-minded countries, the "Group of 54", which fought hard to defend principles such as the internationalisation of the management structure and legal status of Intelsat, an Assembly of Parties with real powers, the freedom to create regional systems, balanced voting rights on the Board of Governors (the successor to the ICSC), and the status of the main agreement as an international treaty. Switzerland chaired one of the plenary negotiation bodies and some working groups. The delegation had to live through some of the more bitter episodes of the Conference, such as the eavesdropping on European caucuses, the distortion of minutes, diplomatic interventions in states' capital cities behind the backs of the front-line negotiators, and last minute withdrawals by the US Delegation from previously agreed texts. The head of the Swedish Delegation became so frustrated at one point that he openly accused the US delegation of using "Warsaw Pact methods" and – in an idiosyncratic protest – spoke only French, instead of English, from then on.

The negotiations ended with the inevitable compromise, leaving both sides dissatisfied on important issues. However the Europeans, though often split into pro-American and "Gaullist" camps (the Swiss were part of the latter), enjoyed several successes. At the closing meeting, just before an address by President Nixon, an enormous bouquet of red and white flowers was placed in front of Steiner. The attached card said: "With thanks from all those who appreciated your courageous efforts and to whom you were an inspiration."

Some years later, when the Intelsat Board of Governors decided in 1978 to buy a first *Ariane* launch, well before the European launcher had even flown, the proof was there that the organisation had become truly international.

When the US Government set out to privatise Intelsat, thereby dismantling what it had once defended as the only set-up appropriate for global space telecommunications needs, the Swiss delegation pushed strongly for an Intelsat form which safeguarded at least some of its public service principles, by splitting the organisation into a private entity and a residual intergovernmental body.

Switzerland's membership of three other international satellite organisations, Eutelsat, Eumetsat and Inmarsat, was relatively straightforward, and is therefore not covered by this history. It should, however, be mentioned that the Eumetsat Plenipotentiary Conference was convened by the Swiss government in Geneva in May 1983, and that Switzerland is the depositary for the Eumetsat Convention.

2.11 Switzerland and European applications satellites

The first designs for European applications satellites were developed within CETS. The aggressive way in which the USA had imposed its views on European and other international parties in the satellite telecommunications field had made it amply clear that, without its own technological efforts, Europe would be irrevocably left behind. Swiss representatives from the newly founded Swiss Association for Space Technology participated in the technical study group of CETS, which published its first report in December 1965. This report recommended the development of a "conventional" experimental telecommunications satellite, but also stressed the potential which applications satellites held for meteorology and air navigation. Very soon, attention became focused on a TV broadcast satellite. In May 1967, an ESRO study awoke Swiss interest in such a satellite. In March 1968, following a positive recommendation from the Advisory Committee on Space Affairs, the government allocated the first instalment of the funding for Switzerland's participation in the European telecommunications satellite programme. But Switzerland also noted, with considerable irritation, that any common European effort ran the risk of being compromised by national programmes and joint projects such as the Franco-German telecommunications satellite *Symphonie*. However, Switzerland clearly perceived the political advantages ov a common and autonomous European effort, particularly in the area of TV broadcasts from space, where it was feared that the superpowers would sprinkle Europe with broadcasts in a unilateral fashion.

2.12 Switzerland joins the CSE

From 1966 onwards, the European Space Conference (CSE) became the main forum for discussing Europe's role in space projects. Since the CSE was born out of an initiative by ELDO Member States looking for potential customers for the *Europa* launchers, the Swiss authorities were at first sceptical of the conference. However, in September 1967 the government decided that Switzerland ought to participate in future meetings of the CSE. The country therefore officially joined the only organisation which looked further than ESRO, ELDO and CETS, towards a common and coherent European space programme which would encompass all fields of space exploration and exploitation, including launchers, and an overall European space organisation. The second CSE meeting, which took place in 1967 in Rome, set up a committee chaired by Jean-Pierre Causse to draw up proposals for a coherent European space policy. His report recommended, among other things, the development of cryogenic launchers, and the launch of a Direct-TV satellite in 1980. At the November 1968 CSE meeting in Bad Godesberg, ministers discussed the Causse report, and agreed in principle to merge ESRO and ELDO into a single European space agency. In its comments on the Causse report, the Swiss Delegation said that it basically agreed with its recommendation that there should be better coordination of European space efforts, a balanced programme comprising bigger and smaller science projects, and applications programmes such as the Eurovision TV satellite and meteorological satellites. It underlined, however, that Switzerland would continue not to participate in launcher development, and even suggested closer cooperation with the USA in this area. Because of this, Switzerland expressed doubts about the desirability of founding an overall European space organisation whose responsibilities would include launcher development. It is somewhat surprising to note that, while the political implications of telecommunications satellites were clearly seen, those of launchers were not. It seems odd that at this stage Switzerland was contemplating the development of satellites which would compete with

those of the USA, while depending on being launched by "the other side". The Swiss – like many other Member States – waited another five years before finally streamlining their logic.

Despite widespread uncertainties and disagreements about the direction which European space cooperation ought to take, the Bad Godesberg conference was a real turning point for Switzerland. A mere four years after the ESRO Convention – which was based on that of CERN – had come in force, the relatively naive concept of a space programme which focused on fundamental space research was already a thing of the past. Economic and political considerations now carried much greater significance. The Swiss government encountered little criticism from the tiny group of space scientists active in Switzerland when it embraced the view that a much broader programme was required. It pushed for swift progress towards programmatic and institutional consensus. In its comments on the *CETS-C* (or "Eurafrica") project, which geared towards operational telecommunications services, the government pointed out that Europe needed to pull its act together quickly in order to secure a better deal during the negotiations about the definitive arrangements for Intelsat. It added that European industry must acquire the necessary technological know-how to avoid continuing dependence on the USA. The government also said that it appreciated the importance for its European integration policy of a rapid decision on a telecommunications satellite programme to be carried out by the reformed ESRO. A decision on this project, said the government, could make the difference between the project being led by a European space organisation outside the EEC framework, or being taken over by the EEC.

Towards the end of 1969, the telecommunications effort underwent another change of direction, towards a regional system tailored to the requirements of the European Conference of Postal and Telecommunications Administrations (CEPT). Switzerland was, of course, keen to participate in a project such as this.

At this time, Switzerland had to formulate a response to the first invitation issued by the USA to European nations to participate in its post-*Apollo* programme. Again, the links between this programme and the launcher issue were not clearly perceived at the time. However, the concept of optional programmes constituted a safeguard against a too rapid and too costly overall involvement. The Swiss government developed its line on future European space programmes in response to a letter written in November 1970 by the German research minister, Hans Leussink, in his capacity as chairman of the CSE. Switzerland, it said, was prepared to join a telecommunications programme, in addition to either an international air traffic control or a European weather satellite system. It agreed to reductions in space science activities and in *post-Apollo* studies, but said it would not participate in launcher development.

The Swiss stance on launcher development was, however, elaborated on in an extremely significant way. The Swiss government said that it welcomed negotiations with the USA about the availability of launchers for European science and applications satellites. But it added: "The results of these negotiations could throw a new light on the entire launcher issue, and could lead Switzerland to review its previous position."

2.13 Switzerland and the First Package Deal

The crisis in ESRO was dramatically heightened by the French, and later Danish, denunciation of its Convention. Switzerland took part in all the phases of the negotiations which led up to the First Package Deal, in December 1971. This deal provided for a reduced scientific programme, and an enlargement of ESRO's mission to include three applications satellite programmes.

While accepting the principle of a reduction of the science budget to make room for the development of applications, the Swiss delegation insisted that sounding rockets remain part of the programme. Finally, however, taking into consideration the minimal use which Swiss scientists made of sounding rockets, Switzerland agreed to hand over the Esrange launch base to Sweden, and to have sounding rockets transformed into a untypical optional programme, which would be run by Sweden on behalf of all participants. It must be remembered that optional programmes were not a novelty introduced by the ESA Convention, but had already been provided for in Article 8 of the ESRO Convention. The crisis over funding for the *TD-1* satellite was

resolved by Switzerland joining all the ESRO Member States in the effort to save the *TD-1* project from cancellation. Only Italy had proved unwilling to fund the project.

In its address to Parliament in August 1972, the Swiss government summarised the events which had led to the First Package Deal, and set out its reasons for supporting fundamental reform of ESRO. It stressed the success which ESRO's first six scientific satellites had enjoyed, but failed to mention that none of them had carried a Swiss experiment. It did not hide its disappointment at the delay in implementing the CSE decision on a coherent overall European space programme, the decision which had precipitated the ESRO crisis. However, it said that it fully supported a fundamental change of direction for ESRO's programme, following the Council decisions of December 1971. It asked for approval of Switzerland's participation in the first phases of all three applications satellite projects – for meteorology, air traffic control and telecommunications – because there was clear interest from industrialists and potential users. The address also asked that Parliament approve the Esrange agreement. It provided for a financial contribution of 21 million Swiss francs up to 1974. It also announced that the agreements between ESRO and the Member States participating in each of the three projects would be submitted for approval, in a later address to Parliament, after they were signed.

The government's overall assessment of the interest of ESRO's new programmes to Switzerland was quite unequivocal: "Switzerland's abstention ... from the dynamic developments in space science and space technology currently taking place in other industrialised states would be irresponsible ..."

Whether Swiss Members of Parliament were more impressed by the rhetoric or the arguments, the resulting debate was minimal. Both chambers approved the necessary funding unanimously.

3 The Emergence of Europe as a World Space Power: Switzerland's Role and Position

3.1 Launchers versus the *post-Apollo* programme

During 1971 and 1972, the Swiss delegation participated actively in the numerous discussions, at various levels, about a comprehensive space programme for Europe. The lessons which Switzerland had learnt during the Intelsat negotiations were a major influence on the stance which it took. Past uncertainties – about issues like the advisability of a single European space organisation, the level of collaboration on space matters with the USA, and the launcher issue – were gradually replaced by a firm stance in favour of European space autonomy. Continued dependence on the USA and self-subordination into the role of junior partner was no longer considered to be an acceptable stance for Switzerland or for Europe as a whole. That, at least, was the opinion held by the Federal Department of Foreign Affairs, which was leading the Swiss ESRO and CSE delegations, and was responsible for the political, institutional and industrial policy aspects, and for the budget. Other government departments were more sceptical, and pointed out that an expansion of Swiss participation in space activity into the launcher and *post-Apollo* fields would be costly, risky, and potentially detrimental to more urgent Swiss needs outside the space sector. From a political perspective the facts spoke for themselves, particularly in the area of launchers. The USA was still exploiting its launcher monopoly, and made even paying foreign customers feel that they would always come second to US interests. When NASA interrupted – without any consultation – the countdown to the launch of ESRO's *TD-1A* satellite because it had decided to assign the launcher instead to a US weather satellite, even the scientists started to realise that a European launcher was an inevitable necessity in the long run. The resulting diplomatic protests were successful, and *TD-1A* was launched in March 1972. On this occasion, the Swiss delegation made a statement in the ESRO Council underlining the dangers of dependency on US launchers, even for scientific satellites. Switzerland had been following the evolution of ELDO closely, and had already requested and obtained observer status on the ELDO Council. Unfortunately, the Swiss observer did not have much more to report home than technical delays, management farces, financial troubles, disunity among ELDO Member States and a string of half successes and outright failures.

However there was hope, in the form of the *Europa 3* programme, which was intended to be tailor-made for European applications satellites and managed through a reformed ELDO. Several internal reports even discussed whether Switzerland should join the *Europa 3* programme. During 1972 the USA, at the request of a European delegation led by Belgian minister Théo Lefèvre, spelled out its launch policy. The USA's statement of intent was everything which could have been hoped for by advocates of autonomous European launcher development. The USA said that it would launch any commercial satellite if, and only if, its launch was recommended by Intelsat. This was the final straw. Switzerland had fought, alongside many others, for the freedom to establish regional systems outside Intelsat, and had accepted Intelsat's internal consultation procedures only because the Assembly of Parties' opinion was to take the form of a non-binding resolution. The decision to make Intelsat recommendation a prerequisite for US agreement to launch a foreign satellite clearly violated the spirit of the compromise, because a negative recommendation would amount to an embargo on the launch, unless the USA decided unilaterally that it did not object to the satellite mission and would launch regardless of Intelsat's recommendation.

Negotiations about Europe's participation in the *post-Apollo* programme were similarly revealing. The US offer to Europe of contracts to build elements for the programme grew progressively smaller. Most delegations, including that of Switzerland, wanted to see the development of an interorbital transfer vehicle called the *Space Tug*, which seemed likely to become a more dynamic and independent part of the programme than just a laboratory contained in the Shuttle payload bay. The Swiss Delegation insisted that the USA must provide formal launch guarantees for European *Tug* missions, particularly if Europe abandoned the *Europa 3* programme and was then forced to rely exclusively on the Shuttle system. This point related to a fundamental problem which

characterised this entire episode of the negotiations. The US offer had clearly been made with the intention of discouraging Europe from embarking on a heavy launcher programme that would threaten the US launch monopoly. It therefore had the potential to divide CSE Member States over the fundamental issue of Europe's role in space.

In April 1972, the first comprehensive report on all the possible options for European participation in the *post-Apollo* programme was discussed by the CSE subcommittees. Switzerland raised doubts about the arrangements for cooperation on the *Tug*. During the ELDO Council's discussion of the report on the *Europa 3* programme, the Swiss observer pointed out that this launcher would be a valuable alternative to *post-Apollo*, if no agreement could be reached with the USA.

3.2 Switzerland and the Second Package Deal

By June 1972, the scope of the USA's cooperation offer had been further reduced, and US launch policy had been declared to be independent of Europe's participation in *post-Apollo*. A report from the Swiss Delegation noted that Europe now had to decide whether it wanted to continue to accept the conditions which the USA had imposed on European satellite systems, or whether the time had now come to bite the bullet and develop its own launcher.

Over the next few months it was not always easy for Switzerland, one of the smaller Member States, to navigate through all the options and opinions. Germany basically said no to *Europa 3* and yes to the development of *Spacelab*. France took the opposite view. The UK said no to both and Italy was undecided, though it leaned towards the German position.

The decisive ministerial meeting, which was held in December 1972, came as a great relief to Switzerland. The tensions leading up to this meeting had increased to the point where it seemed that the ESRO science programme and the three applications projects might not even survive, and that the UK's proposed single agency uniting national programmes would be disruptive rather than constructive.

The results of the meeting were seminal, and are justly known in European space history as the Second Package Deal. They were that three new programmes would be undertaken: a heavy launcher assuring autonomous access to space, a space laboratory which would be launched by the Shuttle, and a maritime communications satellite. In addition, it was decided that a single European Space Agency (ESA) would be set up.

At the ministerial meeting, the Swiss Delegation was not at the forefront of the negotiations. However, it did participate in the consensus which was reached. The Delegation had been authorised to announce that Switzerland would make a modest contribution to both the launcher and the space laboratory programmes. This was a decisive step, in which Switzerland officially recognised that, in order to become a real space power, Europe had to develop an autonomous launch capability. However, by participating in the space laboratory it also wanted to demonstrate that it attached real importance to transatlantic cooperation. The very essence of the Second Package Deal was, after all, that after bitter disagreement about whether to opt for autonomy or cooperation, Europe would go for both.

3.3 The negotiations on the ESA Convention

Negotiations on the ESA Convention did not have to start from scratch. The revised but not yet signed ESRO Convention provided a starting point. In a first phase of the negotiations, practical and political questions about to how to integrate ESRO, ELDO and all their technical and administrative personnel into a single organisation took precedence over the drafting of legal documents. No less than four working groups and one restricted committee worked out the detail, under the supervision of the CSE's Committee of Alternates. The author of these lines chaired the Legal Working Group, whose mandate was to convert the results of higher level negotiations into watertight legal language. This threw up many and sometimes complicated questions, and what was supposed to be basic drafting work often sparked new debates, particularly once the date set for signing the Convention had to be postponed due to pressure from the French.

One problem which Switzerland hoped to eliminate through the ESA Convention was the approval procedure for optional programmes. Under the ESRO Convention, a separate intergovernmental agreement between ESRO and the states participating in a programme had to be drawn up for each programme. The impact on Switzerland and some other states was that, as each agreement had the status of an international treaty, it had to go through the parliamentary approval process. Switzerland's participation in any optional programme could therefore only be provisionally decided until it had been approved by parliament (legal issue) and ratified. This was inconvenient in many ways for Switzerland, not least because its financial contribution to the programme could only be released after ratification.

The solution to this problem, which I proposed, and which was ultimately accepted, was based on a simple trick: the ESA Convention would state that all Member States would participate in all optional programmes unless they decided not to do so. The mechanism was thus turned on its head and, in the case of Switzerland, this offered a unique opportunity to do away with the parliamentary approval process. The reasoning behind this approach was that, by accepting the rule that in principle each Member State would participate in each optional programme unless it decided not to do so, parliament ceded overall authority to the government, which was free to opt out of participating in any particular programme. Even more succinctly: only parliament could say yes, but the government was able to say no on its own.

During the parliamentary debate on the ESA Convention, which was otherwise uneventful, one bright member of parliament noticed the trick and tried to object. She believed it excessive to give the government a *de facto* blank cheque for all foreseeable space programmes. However, she found no support for this view, and therefore accepted the consolation prize offered by the foreign minister: parliament would no longer be involved in selecting the programmes in which Switzerland would participate, but it would nevertheless be regularly updated on the programmes in which the country was active.

Since then, Swiss participation in ESA's optional programmes has been a matter for the government, despite the fact that the relevant programme declarations are still equivalent to international treaties under Swiss law.

Only once has this system come under attack. A left-wing private organisation called the "Swiss Peace Council" published a study in 1988 which attacked Swiss involvement in ESA as being partially motivated by military interests, and as therefore infringing on Switzerland's neutrality. It condemned the transfer of control over participation in optional programmes from parliament to the government, and described the Advisory Committee on Space Affairs as a self-service shop for science and industry.

This study did not affect the prevailing opinion in Switzerland that the ESA Convention, despite its numerous imperfections – which reflected delicate balances between conflicting interests – provided a good basis for European space cooperation in which Switzerland could be an active member. After it was signed on 30 May 1975, and the ratification procedures were completed, it finally came into force in 1980. The Swiss were among the first to deposit their instrument of ratification, and the Swiss Delegation has, on numerous occasions from then until the present day, vigorously defended the principles of the Convention, and stood up for their application in both letter and spirit.

3.4 Swiss contribution policy

The very first optional programme to fall outside the mandatory envelope was a simple arrangement: to cover the Italian shortfall, all other Member States shared the cost of *TD-1A* in proportion to their GNP.

In the case of the three applications programmes which were begun under the ESRO Convention, the GNP shares of the participating states were not called into question. This scheme, like the *TD-1A* arrangement, offered only a limited flexibility to participants: the option to participate or not to participate.

During the period of the two package deals, there was considerable anxiety in Switzerland about the long term financial consequences of participation in all three applications programmes. Between 1964 and 1971, Swiss contributions to ESRO reached 47 million Swiss francs. As a result of the two package deals they rose from

10 million Swiss francs in 1972 to 26 million Swiss francs in 1975, despite the exchange rates being favourable to the Swiss franc. These increases raised quite a few eyebrows in circles whose members remained unconvinced that Swiss involvement in European space cooperation was essential for the nation. However, the increases would have been far more substantial had it not been for the early phases of a participation policy which was being rolled out. This phenomenon manifested itself for the first time when negotiations with the USA on the *Aerosat* satellite for aeronautical communications ran into difficulties. The airlines' interest in satellite communications declined because of the introduction of alternative communications techniques. In informal talks between the Department of Foreign Affairs and the Department of Economic Affairs the expression "sacrificial lamb" began to be used. In June 1974, Switzerland's renunciation of its participation in *Aerosat* could be justified on programmatic grounds. However, it also demonstrated to the space sceptics that the optional programmes system allowed certain priorities to be established, and that the administration was prepared to exercise restraint. The programme was subsequently cancelled, in any event.

When it had to be decided which states were to participate in the programmes of the Second Package Deal, Switzerland went one step further. It not only sacrificed a further satellite programme, *Marots*, but announced that – while it supported the goals and current direction of European space cooperation – it would make only minimal contributions to the launcher and space laboratory programmes. This percentage was initially set at 1% for each programme, but was later increased by 10% during intense negotiations aimed at assuring comprehensive funding. Switzerland ended up with the politically significant differentiation of a 1.2% contribution to the *Ariane* launcher programme and 1% to *Spacelab*.

The beneficial effects of this restrictive participation policy in moderating the increase in the Swiss contribution budget were clear enough. The negative consequences, however, were not seen from the outset. Though Switzerland was in excellent company in departing from the GNP scale for the new programmes, it contributed its share to the leadership positions and habits of the major contributors in each programme.

This in turn led to managerial tensions and subsequently helped to bring about some – fortunately unsuccessful – attempts to introduce weighted voting. In a way, ESA lost its "innocence" in the matter of contributions when non-GNP scales were accepted. At that time, however, it was the only way in which still significantly diverging interests could be reconciled under one programmatic umbrella.

For Switzerland, the negative consequences resulted from the industrial return system. Whilst a PNB participation opened the way to responsibility for subsystems such as structural elements, contributions of 1% entitled it to little more than crumbs from the table of the big players. Very soon, increasing pressure began to be felt from the industrial members of the Committee on Space Affairs for a return to higher percentage involvement.

Due to the self-imposed limitations under the Second Package Deal, Switzerland's budget for contributions to ESA remained more or less flat for over ten years. As a result, its percentage contribution to the overall ESA budget fell to under 2%, half of Switzerland's share of the total GNP of the ESA Member States.

During the years which followed, the failure to increase the Swiss contribution and the consequences of this failure, particularly for the industrial sector, were discussed on numerous occasions within the Swiss Administration and the Committee on Space Affairs. Despite receiving recommendations that it participate fully in certain space programmes, the government cut back on its contributions, and in some cases decided not to participate at all.

A good example of the trend relates to the *Olympus* advanced telecommunications satellite. Switzerland was upset by France and Germany's refusal to develop a heavy telecommunications satellite within ESA. It took part in the preparatory phases of ESA's *M-Sat* project – which later became *L-Sat* and then *Olympus* – making contributions of up to 7.5%. The aim of Switzerland's participation was to demonstrate that even if two big contributors refused to go ahead, the determination of the others, including one big country to take the lead (in this case the UK), was still sufficient to realise even the largest projects within a common framework. In other words, Switzerland was aiming to teach the French and the Germans a lesson. Fortunately, *Olympus* was indeed

built, launched and operated successfully. However, Switzerland decided in 1981 to withdraw from its development phase, purely for financial reasons.

At the beginning of the 1980s, the Committee on Space Affairs finally took on a more active role under its dynamic new chairman, Franz Muheim, state councillor for the Canton of Uri. The Committee presented its findings and recommendations in 1984, in a widely publicised report entitled "Switzerland and Space". The report recommended a much more systematic evaluation of interests which Switzerland could have in ESA's programmes, as well as a substantial increase in its contributions.

The recommendations contained in "Switzerland and Space" began to be implemented in 1985, when the Commission evaluated ESA's proposals for the ministerial meeting in Rome. Eight evaluation criteria were developed, including scientific value, industrial and economic potential, user interest and overall coherence. An interesting criterion concerned Europe's role in space. The Committee said: "Through its participation in European space cooperation, Switzerland seeks to contribute actively to European unification and autonomy, as well as to the strengthening of Europe's position in relation to other parts of the world."

In its subsequent decision on Switzerland's involvement in the preliminary phases of ESA's new programmes, the government followed the Committee on Space Affairs' recommendation for a new contributions policy. This meant that, in future, Switzerland would participate in user-related programmes – such as Earth observation and microgravity – at GNP level (which was, at the time, 3.87%), while limiting its participation in the big infrastructure programmes *Columbus*, *Ariane-5*, *Hermes* and the *Data Relay Satellite* to 2%.

This formula for participation largely satisfied the Swiss scientific community and industrialists, while remaining acceptable to the Department of Finance. With some variations due to renewed budgetary constraints, this is the basic formula which was applied until the recent past, when it was finally decided that, in all programmes with identifiable Swiss interests, contributions should be based on GNP.

As a consequence of the 1985 decision, the Swiss contribution to ESA finally began to rise above 30 million Swiss francs a year, reaching over 120 million Swiss francs a year in 2000.

3.4 The diversification of the Swiss space industry

In its early years, the Swiss space industry concentrated on a few areas; satellite structures, mechanical ground support equipment and ground station electronics. When European space cooperation began to broaden and intensify, Switzerland became active in other fields, and an increasing number of Swiss companies acquired know-how in, and contracts for, quite a broad spectrum of space-related activities.

A survey carried out by the Committee on Space Affairs in 1983 showed that 21 Swiss companies and institutions acted as direct or second tier contractors for space products over the period from 1970 to 1983.

Among those products – in addition to those in the three traditional fields mentioned above – were dedicated software, systems analysis, timing systems, test and control equipment, telemetry and telecommand systems, frequency standards, satellite receiving stations, cryogenic equipment, slip rings and space optics, in addition to space science experiments and the fairings for the *Ariane* launcher.

These two last deserve special mention. Before the *Geos* satellites, Switzerland had no experience in designing, constructing and exploiting space science experiments. In order to create *Geos*, a fruitful and intense collaboration between Contraves and the Physics Institute of Bern University arose. Contraves made a financial loss on the project, but a world class, state-of-the-art mass spectrometer was developed, one which even today stands out as a masterpiece in miniaturisation, reliability and performance. This laid the foundation for today's relatively widespread involvement of Swiss scientific institutions in space science experiments, and their continuing cooperation with Swiss companies, mainly under the auspices of the *PRODEX* programme.

The other area worthy of special mention is the development, construction and series production of the fairings for the *Ariane* launcher. In the early days of this programme it was not clear in what way Swiss industry could

become involved, since it lacked experience in the launcher field, and Switzerland had made a minuscule financial contribution (1.2%) to the *Ariane-1* programme. Consultations between CNES, the programme manager, and Swiss companies had covered relatively static elements, such as interstage skirts and motor nozzles. The fairings stood out as being the only important subsystem which fitted both the skills of Swiss industry and the Swiss *Ariane* budget. Negotiations on the fairings went well, and Contraves was awarded the contract to develop them. Contraves was – for the first time – heading a Swiss consortium which comprised the Swiss Federal Aircraft Factory in Emmen, Pilatus in Stans and the Flug-und Fahrzeugwerke FFA in Altenrhein.

Development of the fairings got off to a somewhat rocky start. Among the difficulties faced were decisions about construction methods and an interesting example of US technology transfer policy. Contraves had proposed the use of a vertical separation system – basically a hose with an explosive cord inside which blew apart the two halves of the fairings – from McDonnell-Douglas, to be built under license in Switzerland. The US State Department refused, under the munitions control regime, to grant the license. It said that it would sell Contraves the systems it needed. The relevant policy was spelled out in a letter to the ESRO Director General, which said: "US policy encourages the sale of space hardware and launch services and discourages transfer of technology and know-how related to production of such hardware and services". CNES objected to Contraves buying the systems from the USA, because there was a clear risk of continuing political dependence on the superpower. The system therefore had to be developed from scratch in Switzerland. The resulting system was entirely successful and bore a strange resemblance to that of McDonnell-Douglas, which had not been patented in Europe.

The *Ariane* fairings proved a special case in another respect. In a modified form, they became the first Swiss space subsystem to be exported to the USA. The American company Martin Marietta chose a modified *Ariane-4* fairing over those made by traditional US suppliers to equip the commercial version of *Titan III*. *Titan III* thus became the first US launcher to rely on a non American subsystem. This was a quite a tribute to the quality of Swiss space hardware, and to its ability to compete in the commercial sector.

Unfortunately, *Titan III* was not a commercial success. It was used only once, to launch NASA's ill fated *Mars Observer* spacecraft.

Contraves enjoyed another success in the export market of the 1990s, when it was chosen to build a stretched version of the *Ariane-5* fairings for the European launcher's biggest competitor, Lockheed Martin's *Atlas 5*.

3.5 The widening of Swiss space science capabilities

After the *Geos* experiment, Swiss space science capabilities began to expand. In 1983, Swiss organisations had participated in space science projects on 38 separate occasions, either on projects that were under way or on ones which had been successfully concluded. These organisations were five universities, the two Federal Polytechnic Institutes and three additional institutions. However, very few of these projects included the actual building of hardware, because of the continuing difficulty in obtaining national funding.

In 1985 a breakthrough came, after Switzerland proposed that ESA set up its first optional science programme, *PRODEX*. It must be remembered that – apart from observation satellites – under the rules of ESRO and ESA, individual experiments had to be financed nationally.

At a meeting in or around 1984 with Professor Johannes Geiss and the late Ernst Trendelenburg, then director of ESA's science programme, I suggested a perfectly legal money laundering scheme which would benefit space science in Switzerland. Since there was no legal basis for national space expenditure, it was possible to propose that ESA launch a new optional programme, in which Switzerland would be the only participant, whose sole aim would be to finance Swiss experiments for ESA satellites. If such a programme were set up by ESA, Swiss contributions would take the form of international obligations, and could thus be paid for using federal powers to execute international treaties. The idea took hold, the practical arrangements were worked out between ESA and the Swiss Delegation, both the Executive and Council approved the proposal and, in December 1986, the Swiss delegate proudly and unanimously – as Switzerland was the only participant – voted to approve the *PRODEX*

budget for the following year. *PRODEX* was a big success, both in Switzerland and in ESA. More and more countries saw advantages to the scheme, and today the number of participants has grown to eight.

In Switzerland, the effects of *PRODEX* were felt almost immediately. For the first time, substantial amounts of money were available to finance hardware development. More and more groups and institutions from across the spectrum of space activities – from astrophysics and the study of the solar system, to microgravity and Earth observation – became involved. The flagships of *PRODEX* are the *SOHO* solar and heliospheric mission – which carried no less than three experiments whose development had been achieved through primary or at least substantial Swiss involvement – and *Rosetta*, which will carry the Swiss *Rosina* mass spectrometer experiment that will expand the boundaries of experimental technology and cost as much as a small satellite.

A special case of the active role which Switzerland played and continues to play in space science was the foundation of the International Space Science Institute (ISSI) in Bern. In the early 1990s, a small group of Swiss space scientists lead by Geiss came up with the idea of an international forum in which scientists from across the world could meet, compare the results of their experiments and derive at little cost a substantial added value effect by synergistic and comparative post-mission research. Initial discussions about such a forum between the Swiss authorities and ESA took place in May 1994. The concept of ISSI was also met with the warm approval of the Inter-Agency Consultative Group (IACG), which was composed of the space directors of the world's four leading space agencies. In December 1994, the ESA Council unanimously agreed to Switzerland's proposed ISSI, and also agreed that ESA would contribute financially to the Institute, together with the Swiss Confederation and the Canton of Bern. ISSI was formally set up as a foundation, and its initial capital was provided by Contraves sponsorship. It has become a real success story.

A different kind of Swiss space science institution emerged later, in the context of ESA's Integral programme, when Professor Thierry Courvoisier, of the Geneva Observatory, won a bid to erect the Science Data Centre for the International Gamma-Ray Astrophysics Laboratory (*Integral*) in Versoix.

3.6 Claude Nicollier

The minimal contribution of 1% which Switzerland made to the *Spacelab* programme gave it no claim to a Swiss berth in the Shuttle cockpit or the space laboratory. It must, however, have been towards the end of 1975 that I received a phone call in my capacity as permanent Swiss delegate to ESRO/ESA. The voice on the line said: "My name is Claude Nicollier. I am an astronomer and a military pilot and I would like to know how to become a *Spacelab* astronaut." Nicollier was an early bird, as no selection procedure for astronauts had yet been decided upon. Thanks, however, to ESA's science director Ernst Trendelenburg, Nicollier was offered a fellowship at the European Space Research and Technology Centre (ESTEC), where he became familiar with the culture of ESA, and with its programmes and procedures.

The pre-selection procedures for the first ESA astronauts were held, in each Member State, in the summer of 1977. Nicollier was among the five Swiss candidates to be selected for presentation to ESA, and was one of the two Swiss remaining when the ESA selection procedure had reduced the total number of candidates to 12.

In the end he was selected, together with Ulf Merbold and Wubbo Ockels, to be among the first to fly aboard *Spacelab*. He was the one who had to wait the longest for his first flight. However, this gave him the opportunity to become the first non-American mission specialist, and he therefore held considerably more mission responsibility than the other two ESA astronauts, who only had payload specialist status.

Nicollier's first mission did not come until 1992, when he flew with *STS-46* and successfully deployed ESA's European retrievable carrier *Eureca*, a multimission platform, which unfortunately flew only once. Thanks to his professional abilities and skill as an astronaut, he flew on a further three missions, including two servicing missions to the *Hubble Space Telescope*. He also became also the first non-American to perform extra-vehicular activity from the Shuttle.

The reaction in Switzerland to Nicollier's spaceflights was enthusiastic. In common with those of other countries, Swiss astronauts are the only people active in the space field who have equal access to the public and

to the highest levels of government. They therefore constitute an invaluable, but unfortunately underexploited, resource for fostering understanding of and support for Europe's space goals.

3.7 No to *Columbus* and yes to *Hermes*

The situation in which European space politics found itself at the beginning of the 1980s was strikingly similar to that which had existed a decade earlier. Once again, Europe faced fundamental decisions about major programmes which were to shape its future in space. The USA had offered that Europe cooperate in the space station. However, the advocates of European space autonomy insisted that it was the right time for Europe to acquire its own full space capability by developing the most highly performing commercial launch vehicle in the world, *Ariane-5*. In addition, they said, Europe should take the first steps towards developing its own capabilities for manned space flight, in the form of the *Hermes* spaceplane, which would be launched on top of *Ariane-5*.

As had been the case ten years previously, it was easy to see that the US offer of European participation in its space station had very concrete political aims. NASA administrator James Beggs expanded, with relaxed candour – at a 26 January 1984 White House briefing on the space station – on the aim behind the offer which the USA had made to Europe. “We hope,” he said, “they will spend a lot of money with us, because to the extent that they use their resources to collaborate with us on something like this, they will not be using their resources to compete with us in space, and that's important too.”

The writing was on the wall. However, most European negotiators, carried away by enthusiasm for cooperation with the USA, simply refused to read it or to think about the implications. Thus it was that when Beggs toured Europe in spring 1984, he was very warmly greeted in most of its capital cities.

Switzerland was an active member of the European negotiating team on participation in the US space station. As had happened with the *post-Apollo* programme, the scope of the USA’s offer to Europe was progressively reduced. The Europeans disagreed among themselves, and were not prepared to invest sufficient money to become an indispensable partner. However, most believed that in participating in the space station project they would not repeat the mistakes which had been made during the *Spacelab* programme, because this time it would be a “real partnership”.

For Switzerland, the question of the military uses to which the space station might be put acquired crucial importance when, at the end of 1986, the US Defence Department declared its interest in the space station. Not only had the neutral ESA Member States reason to be worried but, because there was a “peaceful purposes clause” in the ESA Convention, the problem concerned them all. Switzerland explained its position on numerous occasions. It would not object to the military use of the US part of the station, as long as the US refrained from using its “use quota” of the European module for military purposes. The USA refused to accept this limitation. However, without a blush, it reserved its own right to veto European use of the ESA module if they judged it to be incompatible with US foreign policy and national security.

In a spirit of considerable compromise, the Swiss finally said that they were prepared to live with this situation provided that the USA specifically said that it would not use the space station to test offensive weapons. Though it was unlikely that the USA would do so, the USA was not prepared to accept any restrictions at all on its use of the space station. During this period of negotiations, I was the target of an almost hilarious intimidation attempt by a Swiss employee of the US Embassy in Bern who was in charge of space affairs. When I was asked about the status of the space station negotiations I remarked that things were not going well. The brave defender of US interests replied: “What can you hope for? Switzerland’s going to sign in the end.” When I insisted that Switzerland would not sign if there was no progress, he did not hide his anger. “Watch out how you deal with America, Mr Creola,” he said. “They have a file on you!” When I could not resist joking that I considered this to be a great honour he accused me, in front of others, of “taking bribes from the French”.

The issue of the potential military use of the space station was never satisfactorily resolved. A kind of consensus on interpretation was supposed to be embodied in a confidential exchange of letters between the USA and European heads of delegations, an exchange which avoided public and parliamentary scrutiny in Europe.

Switzerland did not find this acceptable. In March 1988, the Swiss Delegation asked for its name to be deleted from the preamble to the draft Intergovernmental Agreement, and in April the Federal Council decided not to participate in the *Columbus* programme.

When the global political landscape changed, and Russia became part of the space station programme, things looked different. From then on, Switzerland shared the widespread feeling that extending a participation agreement to Russia was an important and integral part of technological peacekeeping, and that the potential military use of the space station had become a non-issue. Consequently, in 1995 Switzerland decided to join the revamped programme, and to make a contribution of 2.5% to it.

Switzerland's attitude to the *Hermes* programme was very positive from the outset. At the ministerial meeting held in Rome in 1985, at which support for including *Hermes* in the resolution on programmes was at best lukewarm, the Swiss Delegation stated that *Hermes* would be the linchpin of complete European space autonomy, and that the project therefore was therefore very interesting to Switzerland.

From then on, the *Hermes* programme had the continuous support of the Swiss Delegation to ESA. The Delegation pressed for speedy decision making and warned against any attempts at downscaling. It must be remembered that, at least during a brief period of grace, *Hermes* enjoyed strong support from ESA Member States, with its preparatory phase being heavily oversubscribed. Switzerland was the first country – before even France – to accede to the declaration on the *Hermes* programme. It was also opposed any normalisation procedures which would have reduced its 2% contribution.

Given the circumstances, it came as quite a shock to the Swiss when, at the ministerial meeting which was held in Munich in 1991, they discovered that France and Germany had reached a bilateral agreement on a new balance of programmes and consequent financial cutbacks. This agreement would ultimately lead to the *Hermes* programme being dropped, thereby putting an end to Europe's attempt to build its own full space capability. From a political point of view, *Hermes* was the first ESA project to be a victim of the end of the Cold War. It was literally downscaled to death.

4 The End of the Cold War: New Challenges and Uncertainties

The end of the Cold War and the demise of the Soviet Union put an end to competition between the two superpowers in space, and to Europe's drive to position itself between them. The result was reduced interest in big development programmes, notably *Hermes,* a change in the scale of Europe's investment in space, and an increased emphasis on international cooperation and on applications programmes which catered for short-term market prospects and Earth-bound monitoring requirements.

Switzerland was prompted by the change in the political environment to take stock of its own goals in space and of its role in European space cooperation.

In order to do this, the Committee on Space Affairs published, in April 1991, a brief report entitled "The future of Switzerland's participation in European space cooperation". This report placed Switzerland's space activities in the context of Swiss foreign policy, European integration policy, scientific policy and industrial policy. It made nine sets of recommendations, including the fostering of equality at an institutional level between the world's space agencies, increased activity in the area of Earth observation, investment of the "peace dividend" in space technology, the use of space as a means of ensuring international security, the avoidance of discrimination against ESA Member States who are not members of the European Union, an increase in science and user-driven applications, an increase in cooperation between space organisations, an increase in funding for the *PRODEX* programme and in support for the *ISSI*, support for Swiss SME's involved in ESA programmes, and an increase in Swiss contributions to ESA programmes to the GNP level of 4%.

In November 1991, when the position which Switzerland was to take at the ministerial meeting in Munich was being finalised, the Swiss government adopted the recommendations of this report as guidelines for Swiss space policy, with a reservation on the part of the Department of Finance. These guidelines remain in force today – although one minor revision was made to them in 2000 – and apply particularly to Swiss space policy *vis-à-vis* ESA.

On a national level, the implementation of these guidelines resulted in better coordination between the government departments which had interests in space, in addition to substantial increases in Swiss space science funding through *PRODEX*, and increased general awareness of the importance of space.

One attempt to stimulate Swiss space science was, however, unsuccessful. My after-dinner suggestion that Switzerland develop a nanosatellite that would be cheap, exciting, innovative, and so light that Arianespace would be unable to refuse it a free launch, grew into the idea of a Swiss/Austrian minisatellite with the appropriate name of *Alpsat*. Teams of volunteers from science and industry in both countries discussed the project and drew up specifications. In December 1994, they produced a conventional plan for the development of a solar wind and magnetospheric monitoring satellite weighing 200 kg that would need half an *Ariane-4* to place it in the highly eccentric orbit which was envisaged. Such a project was obviously far beyond the means of any financing available either in Austria or Switzerland. In the absence of a specific national funding source, it was intended to finance the Swiss portion of the project through *PRODEX*. After many meetings and attempts to downscale the project, it still cost about 25 million Swiss francs, far beyond the funding available nationally. It was informally put into hibernation in 1999, where it still sleeps, awaiting better times. Its only remains are study reports, the minutes of amicable bilateral meetings and its draft logo: a lone cow in front of two crossed alphorns.

Among the most important developments to take place in European space cooperation during the decade between the end of the Cold War and the end of the 20th century was in the relationship between ESA and the EU. Continued success in areas such as space science, Earth observation and launchers could not hide the political vacuum its policy level. A period of intense meetings and negotiations culminated, in November 2000, in the unanimous adoption of a joint European space strategy by the ministers for space of the ESA Member States and the EU research ministers.

Switzerland had always, with good reason, insisted that the principle of non-discrimination against ESA Member States which did not belong to the EU be scrupulously adhered to, in letter as well as in spirit. However, it welcomed every step towards closer cooperation and coordination between the two organisations. Switzerland was, in fact, the first ESA Member State to propose, long before the actual negotiations began, the establishment of a framework agreement between ESA and the EU to define their respective responsibilities and generate synergy. The route which Switzerland would have to take if it were to become a member of the EU is long and hard. However, Switzerland has a vision of ESA becoming the space agency of an enlarged and consolidated European Union. This would, Switzerland believes, be a positive and necessary step towards strengthening Europe's position in the face of the challenges which the 21st century will bring. A common space strategy is a means of recognising, at the highest political level, the importance of space for the future of Europe and for the long-term survival of our western, liberal, technology-based culture.

One of the problematic issues at the turn of the century is the dispersion of European space efforts among ESA and various national agencies. This is not a viable situation. Only by the effective integration of existing national capabilities, temperaments and loyalties into the truly single European Space Agency which was envisaged decades ago will a true European space policy and capability emerge.

Another serious issue is the dramatic difference in the level of public funding for space which exists in Europe, compared to the USA. Over the past ten years, this disparity in the level of support for space has added up to the staggering amount of over $200 billion. It is only thanks to the ingenuity of European space engineers and to efficient management that Europe beats or stays in the lead over America in key areas. It is time for Europe to wake up and do something about the fact that the USA is continuing to build a space infrastructure that will ensure its omnipresence in the world and serve its aspirations to hegemony.

The picture is bleak, particularly because Europe has no autonomous human spaceflight capability. At a time when China is on the verge of launching human beings into space, European astronauts are still condemned to hitchhike into orbit. Despite all the progress which has been made in robotics and telepresence, the presence of real human beings in space will be necessary and desired when our expansion into the solar system, the next chapter in human evolution, begins. It will be for the historians of the future to relate whether human civilisation, including Europe and Switzerland, was able to move out into space and avoid the terrifying alternative of collapse into a second stone age or worse, due to the combined effects of overexploitation and overpopulation of our home planet.

5 Miscellaneous Reminiscences

Over the years, I have been involved in a number of initiatives which were not directly part of the evolution of Swiss space policy but which fitted in well with the general policy of the Swiss Delegation. This policy was to push for a strong ESA and for better publicity for European achievements in space. Some of these initiatives and their attendant issues, a selection of which are discussed here, were – at least from our present perspective – relatively minor. It will be up to professional historians to judge whether they deserve a mention in the annals of European space history.

5.1 The naming of *Ariane*

On the day after the final meeting in Brussels on the financing of the Second Package Deal, the ESRO Council also met in Brussels. There, it decided to accept the three programmes of the Second Package Deal as part of its own official programme, pending the entry into force of the ESA Convention. The Swiss Delegation seized this opportunity to propose that the unwieldy working name of the launcher, *L3S* (which stood for "lanceur de troisième génération de substitution"), be replaced by a definitive and more attractive name. Only the French Delegate, André Lebeau, backed Switzerland. All the others did not think the name of the launcher was important. However, I insisted that it was, and passed around a sheet of paper on which delegates could suggest names. Some of these were simply jokes, like "William Tell" and "Edelweiss", which came about because the meeting was being held on 1 August 1973, the Swiss national holiday. This exercise proved that many delegates did not take the naming seriously. Other suggestions, such as "Orion" and "Vega", were more usable. The latter name came up three times, and it therefore won the informal competition. A name had still not, however, been officially decided upon. In the text of the launcher agreement, which was still under negotiation, the name of the launcher was left blank. Then, in September 1973, the day came when the documentation of the agreement had to be approved by the Administrative and Finance Committee (AFC). By coincidence, I was chairing this committee which met, exceptionally, in Bern. When I proposed that we now bite the bullet and insert the name "Vega" in the text, the French Delegation objected. It had been instructed by French minister Jean Charbonnel to do so because at the time "Vega" was the name of a French beer. The French deemed only three names to be acceptable; "Penelope", "Phoenix" and "Ariane". The German Delegation immediately objected to "Phoenix", because the ashes of ELDO were still hot. "Penelope" was also thought to be unsuitable, and so "Ariane" was chosen. Nobody could have foreseen that, almost 20 years later, ESA's small launcher would be called "Vega".

5.2 The fight for "ESA"

During the negotiations on the ESA Convention, I proposed that the new organisation should be known only by its English abbreviation, in order that it present a unified public image. This had not been the case with ESRO and ELDO, which in French publications were also referred to as CERS and CECLES. The French Delegation objected, claiming that such a move would discriminate against the other official languages. The guardians of the French language were so alarmed by the proposition that a letter from the French foreign ministry landed on the desk of the Swiss ambassador in Paris. The letter asked whether the Swiss government was aware that its delegate was militating against one of Switzerland's own official languages. The Swiss delegate was rather amused by this turn of events, but finally proposed a compromise. In its Convention the new organisation would be called ESA, ASE (in the French version) and EWO (in the German version). However, in its relations with contractors and the public the organisation would call itself ESA, in all languages. This was the only point at which the name mattered. Fortunately, the French were able to live with this compromise, and today ESA is really known only as "ESA".

5.3 The "Secretariat" is promoted to "Executive"

In another debate over terminology, the Swiss Delegation proposed that the title "Secretariat", which had been used in the era of ESRO and ELDO to describe the Director General of the organisation and his staff, be replaced by the more appropriate term "Executive". The reason for the proposed change was that the management responsibilities required of those overseeing the execution of space projects went far beyond the duties required of the "Secretariat" in other intergovernmental organisations. No formal decision was taken, but the "Secretariat" leapt at the chance to change its name, and the term "Executive" came into general use.

5.4 The renaming of ESRO

After the ESA Convention had been signed, it took several years for it to be ratified in all Member States. Pending the entry into force of the ESA Convention, the legal framework for the execution of the programmes which had been determined by the Second Package Deal was provided by ESRO. In legal terms, this was a practical and effective solution. However, it had the considerable disadvantage that, for several precious years, ESA would remain unknown to the public. I consulted the ESRO Convention and found an elegant solution to the problem in the wording of Article 1. This article did not say "The European Space Research Organisation is hereby established" but "A European Space Research Organisation is hereby established." By using this wording, the ESRO Convention did not in fact ascribe a name to the organisation of which it was speaking, it simply described its nature. My conclusion was that the ESRO Council was therefore free to change the name at any time. Hence, the Swiss Delegation proposed that ESRO's name be changed to "ESA". This proposal was accepted unanimously. It was thus that ESA was able to begin its activities in 1975, despite the fact that its legal basis remained that of ESRO until the ESA Convention finally came into force in 1980. The first meeting of the ESA Council, the governing body of the organisation, was therefore able to take place in June 1975, and to address the many pressing issues on its agenda. Also, the first official ESA satellite, the cosmic ray observatory *COS-B*, was launched only weeks later, on 9 August. Five precious image-building years had been gained.

5.5 *Euromoon*

Following a proposal put forward by myself and Professor Hans Balsiger of the University of Bern, the results of ESA's lunar study were discussed in 1994 at an international workshop in Beatenberg, which had been jointly convened by ESA and the Swiss government. The meeting turned into the first symposium to discuss an internationally coordinated return to the Moon. It ended with a solemn declaration that this would happen, but the decision came to nothing due to lack of funds and to the different priorities of governments and other space agencies.

I nevertheless attempted to drum up support for a return to the Moon by drafting, in May 1996, a preliminary concept for a project called *ELSPEX* (European Lunar South Pole Expedition). The project's intention was to mark the turn of the millennium with a unique robotic mission, whose goal would be to establish the first European presence in the only region of the Moon where water ice had been detected by the US Clementine mission. It was envisaged that the last *Ariane-4* would be the launch vehicle. It was also hoped that Arianespace would sponsor this high-profile mission by giving it a free launch. The idea quickly gained support in Switzerland from Professor Balsiger, who was at that time the chairman of ESA's Lunar Advisory Group, and Hans-Peter Schneiter, the director of Contraves Space. The project specifications were refined through meetings with ESA astronaut Wubbo Ockels, and an international Initiating Committee of Scientists and Industrialists was set up. A feasibility study, with Ockels acting as study manager, was approved by ESA. The results of this study were presented at a workshop at ESTEC in March 1997, under the mission's new brand banner "Euromoon". However, the first *Ariane-5* launch failed, and Arianespace announced that it was consequently unable to provide a free launch. The subsequent phase of the study, carried out by an enthusiastic young team led by Ockels, was supported by some smaller firms. It led to an attractive scheme based on innovative technology, and a vast public fund-raising campaign. In December 1997, a formal *Euromoon* programme proposal, supported unanimously by the Long-Term Space Policy Committee, was submitted to the ESA Council. The Council,

however, proved itself bereft of vision. In April 1998, it finally vetoed a drastically downscaled version of *Euromoon*, "Lunarsat".

5.6 *Teamsat*

A idea which fared better than *Euromoon* – because it was much more modest in scope and did not need Council approval – was *Teamsat*. The Executive announced at a Council meeting that, for the sake of caution, and despite everything that had been done to rectify the fault which caused the first launch's failure, the second *Ariane-5* launch would carry only two mock-ups simulating typical upper and lower payloads. I was critical of this timid approach and insisted that, at the very least, a small launch opportunity for young engineers should be offered on Flight 502. The Executive moved quickly on this. An extremely dedicated team of young graduate trainees, which was again led by Ockels, built Teamsat themselves at ESTEC in the record time of one year, by using spare hardware from other projects. The small satellite was launched successfully on 30 October 1997. It transmitted, among other things, the first live images of fairing and payload separation.

5.7 The Long-Term Space Policy Committee

During the first half of 1993, Gaele Winters from the Netherlands and I were competing amicably for the post of chairman of the ESA Council. When the Swiss mounted a diplomatic campaign in favour of their candidate, the Netherlands alerted the foreign ministries of other Member States, who finally gave preference to the candidate from the EU Member State.

However, I was given the consolation prize of chairmanship of a brand new committee. This was the Long-Term Space Policy Committee (LSPC), whose remit was to consider the future of space activity and its importance for our civilisation, and Europe in particular. The original proposal had been to create a think tank which would compensate for the lack of vision which was often exhibited by an ESA Council bogged down in day to day problems. I had made this proposal at the ministerial meeting in Granada in 1992, and was supported by Austria at that time.

Chairing the LSPC was both a fascinating and a frustrating experience. The Committee was given a very broad mandate. It was composed of representatives from academia, industry and the space agencies who were appointed as individuals and were not bound by official instructions. It was to report directly to the next ministerial meeting, and would therefore avoid any attempt at censorship by Council at delegate level.

These were ideal circumstances in which to develop a brave vision of the long-term potential of space. However, it proved to be very difficult for my colleagues to genuinely think in the long term and let their minds wander freely into uncharted territory. Nevertheless, a gratifying team spirit finally developed, and the team produced two glittering reports, one for the ministerial meeting held in Toulouse in 1995, and one for that held in Brussels in 1999.

Very few of the numerous recommendations contained in these reports have been or are about to be implemented. However, there remains some hope that the two reports helped to demonstrate that the future of our civilisation – based as it is on science and industry – is inextricably linked to space.

Appendices

Bibliography

1. Peter Creola's personal notes, reports and articles, 1969-2000 (complete set with the author)

2. Addresses by the Swiss government to the Swiss parliament
   - on Switzerland joining ESRO, September 1962
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Selected Swiss space milestones

1960	Meyrin Conference
1962	Signing of the ESRO Convention
1963	Creation of the Swiss Government's Advisory Committee on Space Affairs
1967	First launch of the *Zenit* sounding rocket
1967	Switzerland joins the European Space Conference
1969	First solar wind experiment on the Moon
1969-1971	Intelsat negotiations
1975	Signing of the ESA Convention
1980	First satellite experiment (*Geos*)
1984	Report on "Switzerland and Space"
1986	Beginning of the *PRODEX* programme
1991	Guidelines on Swiss space policy adopted by the Swiss Government
1992	Claude Nicollier's first spaceflight
1994	Beatenberg Moon Workshop
1995	Creation of the International Space Science Institute in Bern
1998	Creation of the Swiss Space Office
2000	Federal Government given competence for space matters under the revised Swiss constitution
2000	Consolidation of the Swiss Space Office

Swiss contribution to ESRO/ESA in MEuros (current e.c.)

1969	1.400
1970	1.865
1971	2.046
1972	2.125
1973	4.246
1974	4.041
1975	6.776
1976	9.933
1977	8.903
1978	9.857
1979	11.460
1980	12.736
1981	13.217
1982	12.835
1983	14.692
1984	16.727
1985	18.323
1986	23.113
1987	22.979
1988	26.751
1989	34.421
1990	41.633
1991	49.332
1992	56.673
1993	59.718
1994	62.623
1995	69.547
1996	71.949
1997	68.016
1998	71.763
1999	71.680

European Space Agency
Agence spatiale européenne

Contact: ESA Publications Division
c/o ESTEC, PO Box 299, 2200 AG Noordwijk, The Netherlands
Tel (31) 71 565 3400 - Fax (31) 71 565 5433