

2 A brief history of space ethics

At the end of the 1950s, a French author wrote the following about innovation: "The passion that lives within the inventor has no relation, of any kind whatsoever, with its consequences. It is his personal reason for living, his own joy and his own suffering. His triumph over the provocative enigmas of nature is essentially personal. Whether this discovery is useful or perilous, fertile or destructive, it is of as little concern to him as the first rain. However, no-one is able to predetermine any of that. The consequences of a technical conquest of mankind are never predictable".⁹ Should we, due to this, rule out any ethical questioning of the engineer's field of science, through fear of scaring away those men and women who practice science and stifling their passion? Is it enough to hide behind the screen of a so-called neutrality and to leave it to the experts and academics of the ethics committees to decide on the eventual use of discoveries, inventions and innovations? It is not that long ago that the answer to these two questions would have been affirmative, under the pretext that ethics could only slow down the progress of science and that it would therefore be advisable not to be hindered by it. Astronautics was no exception.

2.1 A slow emergence

However, the idea of an ethics of space emerged with the space venture itself. Many were doubtlessly unaware of this, including those within the astronautical community, but it was evoked by John F. Kennedy himself during the speech he gave at Rice University in Houston on 12 September 1962. Having summarised the then recent commitment of the American nation in the space race to land on the Moon, he explained to his citizens: "We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and only if the United States occupies a position of pre-eminence can we help decide whether this new ocean will be a sea of peace or a new terrifying theater of war".¹⁰ Is it not a concrete definition of space ethics?

Also in 1962, astronomer Bernard Lovell, who had been knighted by the Queen of England the year before, published a book entitled *The Exploration of Outer*

JFK
"

Lovell

space
junk

Space.¹¹ Having presented the investigation techniques employed by the astronomers of his time, the structure of the solar system and of the universe, its origin and evolution, he devoted a final chapter to "Some reflections on ethics and the cosmos"; what exactly did he mean by this? The English scholar begins by reminding us that the main elements required for life as we know it on Earth, in this case carbon and hydrogen, are found in abundance in the universe. How, then, could we avoid asking ourselves the age-old question regarding the possible plurality of inhabited worlds and the existence of possible extraterrestrial life forms? Moreover, as an astronomer, Lovell knew all about the West Ford Needles project. In 1961 (then in 1963), the US Air Force placed several million copper needles into orbit around the Earth at an altitude of approximately three thousand kilometres. The aim was to create a ring of space dipole antennae to act as passive reflectors for military communications. The first attempt failed and the second attempt was only a partial success. These needles then formed clusters. At the end of the 1990s, 65 of these clusters could still be observed from the ground. Lovell questioned whether it was acceptable to contaminate outer space in this way, to biologically contaminate planets other than our own, as the probes we send into space could potentially do. However, he concludes his last chapter and his book on an optimistic note: the race to the Moon and, more generally, the space race on which the Americans and Soviets were embarking provided excellent opportunities to direct the budgets of these two superpowers towards peaceful activities....

Witnessing the birth and extremely rapid development of astronautical technologies, Pons in 1960 and Lovell in 1962, raised the question of ethics, deontology even, in their own respective ways. They realised that these technologies would offer, and were already offering, humans new possibilities and that it would be advisable to consider what place and purpose to allocate them. However, at that time, a more widely shared awareness was not yet promoted.

Twenty years later, in August 1982, at the second UNISPACE conference in Vienna, held to expand on international thinking in terms of space politics and law, several delegations expressed their concerns and their expectations. The Dutch delegate asked how it would be possible to put space at the service of developing countries, allowing them to acquire greater technological independence. He also raised concerns about the large share of space budgets still allocated to military activities. Despite the commitments undertaken by nations in the first Outer Space Treaty drawn up in 1967 (see below), the threat of the militarisation of space still seemed at this time to be a cause for concern. The Holy See representative, Msgr Peressin, also raised concerns about a possible transfer into space of terrestrial military confrontations: "[modern-day humanity] would need a very strong sense of solidarity and a firm desire to implement it at national and

international levels. Unfortunately, these magnificent perspectives are overshadowed by the transfer into space of our military confrontations". The Greek delegate, Constantine Prevedourakis, defended similar ideas, focusing simultaneously on the mythology of his native culture and on the spirit of peace and cooperation that had been sweeping through Vienna since the end of the 1960s. Finally, Professor Soedjatmoko, rector at the University of the United Nations, invited to take a serious look at the crisis facing humanity: that of having reached the limits of its own planet. Would space not offer mankind a chance of survival, an opportunity to conquer new territories? However, to seize this opportunity would still require sufficient maturity to accept the need to find the best solution for everyone and to refuse to only support specific interests. He concluded: "Our generation is able to launch spaceships of the mind that may serve as pathfinders for epochs to come".

It was apparently the same line of thinking that inspired a UNESCO initiative the following year. The international organisation, headquartered in Paris, asked V. S. Vereschtn, Vice President of the "Intercosmos" Council at the Soviet Union Academy of Sciences, to prepare a round table on the subject of international cooperation in space. "Preserving space as a haven of peace and cooperation between the world's nations, and not allowing humanity to get accustomed to the idea that militarization of space is supposedly inevitable, wrote Vereschtn, is one of the chief objectives of law and ethics at the present time." The round table was held on 16 December 1983, as a teleconference bringing together six representatives from four continents. Peter Jankowitsch, then president of the Committee on the Peaceful Uses of Outer Space, stated with satisfaction that space provides humanity with a new vision of itself and, as such, leads to the creation of a new ethic. Despite this, he voiced some concern: "Whilst the first decades of the exploitation and use of space were characterised by a fortunate evolution of principles [of non-acquisition of rights of sovereignty in space and of celestial bodies, exclusively peaceful use in the interests of mankind] and whilst in particular the cooperation between the main space powers, the Soviet Union and the United States, have made great headway – the joint flight baptised *Apollo-Soyouz* constituting a spectacular step in this process –, the most recent years in space history are somewhat lacking in examples of international cooperation. On the contrary, several of the main principles pertaining to the use of space – and in particular the principle of an exclusively peaceful use of space activities – appear increasingly threatened". For his part, the American Isaac Rasool showed himself to be more sensitive to deontological questions such as the contamination of outer space and the status of data and information gathered. In agreement with Vladimir Kopal, Professor Bortzmeyer made a direct link between ethics and international law, in order to establish what he qualified as "organised and systematic devel-

Weapons

opment", whilst highlighting the necessity of imposing a general principle of governance alongside the declaration of outer space as common heritage of mankind. He also was anxious to turn technologies whose primary purpose often remained military to the benefit of peace.

Despite its relevant perspective and rich content, this meeting had no immediate concrete follow-up within UNESCO. It would take the UN organisation nearly 20 years to revive its interest in space. However, the initiative of December 1983 may have inspired the meeting held in Casablanca in March 1984, under the aegis of the Royal Moroccan Academy and the following title: *De la déontologie de la conquête spatiale* (The deontology of the conquest of space). Going through the presentations of this event, it is impossible not to be struck by the lucidity of the participants. Whilst most of them appeared still concerned by the threat of an increasing militarisation of space (President Reagan launched his Strategic Defense Initiative, often referred to as Star Wars, in March 1983), all the same, they did not forget the other challenges arising from space activities. In addition to the challenges arising due to technological expertise (the congestion of orbits and the proliferation of debris, the pollution caused by launchers, etc.) come legal and diplomatic issues (which sovereignty? how is data shared?). One of the participants at this meeting asked whether the "Earth's damned" would be joined tomorrow by "Space's damned" following difficulties, even the impossibility of Third-World countries accessing data and space technologies. How would it be possible not to feel excluded or even dispossessed, faced with the arrogance of the space powers and prevailing inequality? The participants of the session in Casablanca recognised that one of the key issues was not so much to specify or to revive the spirit of Vienna, the letter of international agreements having already been drafted and signed, but to put them into practice, in other words to define an explicit deontology and to ensure its application. How could this exploit be a success with no coercion possible and relying solely on good will? There is also the question of the consequences of the use of space resources on cultures, on their spreading or on the contrary on their isolation or even their disappearance. More generally, is it possible to consider or to claim that space has already led to and may still lead to true innovations in the sociocultural domain?

We can conclude that at the start of the 1980s a wave of concern spread through the international space community with regards to an ethical and deontological questioning, partly with regards to the outlook revealed by legal work: the UNISPACE II conference in Vienna, the UNESCO teleconference in Paris, the meeting organised by the Royal Moroccan Academy in Casablanca may be considered as the successive stages of a rising awareness which by no means remained at a superficial level but rather resulted in the definition of the main focus points and the essential view points for future space ethics. Unfortunately, save the

discourses and acts published by the Moroccan institution, nothing arose from or was retained of these three initiatives. Although the Japanese space agency NASDA conducted a study into the cultural consequences of space activities on Japanese society in the late 1990s, it was another fifteen years before ethics was granted any significance within the space community.

"At the initiative of the Director-General of UNESCO, Mr. Federico Mayor, and acting on a proposal by the Director-General of the European Space Agency (ESA), Mr. Antonio Rodotà, a new working group was set up to consider the ethics of outer space in December 1998 on the basis of a partnership between UNESCO and ESA". It is in these terms that the report published by UNESCO in July 2000, under the title *The Ethics of Space Policy*, explained the origin of the renewed interest of the space sector in ethics: a proposal from the European Space Agency and a UNESCO initiative. Coordinated by Professor Alain Pompidou, the working group¹² attempted "to identify the difficulties and fears, opportunities and promises associated with the conquest of space, while providing the necessary explanations in the clearest and most comprehensive manner possible, taking account of the needs of the populations in their specific socio-cultural context". From this report, I will take a triple definition of space and one notable omission. Space is presented as a dimension, in other words a place, an environment; as a tool, due in particular to the communication and observation satellites; and finally as a perception as held by the general public and portrayed by the media.

UNESCO

The notable omission is the coverage of military activities. The strictly civil nature of ESA projects and programmes was incidentally the main reason given by its managers to explain its last-minute withdrawal from a conference held around the same time, in March 1999, at the Darmstadt University of Technology in Germany. The organisers of this event had set aside a significant amount of time to discuss the question of the military use of space technologies, space dominance and the weaponization of outer space.¹³

Following this report, UNESCO set up within its World Commission on the Ethics of Scientific Knowledge and Technology (COMEST¹⁴) a sub-commission devoted to outer space. This sub-commission led several actions, mostly with the support of ESA: reports, conferences, etc. Since 2005, it seems to have become inactive, without doubt due to redundancy or competition with another United Nations organisation, the Committee on the Peaceful Uses of Outer Space (COPUOS, see below). In June 2001, following the publication of the *Ethics of Space Policy* report by COMEST, COPUOS in fact devoted one of the sessions of its annual conference in Vienna to the topic of space ethics. This was no doubt a way to mark its territory, a reminder that it had been the first to explore the field of space ethics, due to its legal expertise.

At the same time, the French Space Agency CNES, adopted a similar process. At the start of 1999, Gérard Brachet, the Director General of the French space agency, entrusted a group of engineers with the task of exploring the field of space ethics. Less than three years later, in October 2001, a book was published to divulge the fruits of this exploration, entitled *Icarus' Second Chance*. Six months earlier, the management at CNES had created the post of Ethics Adviser. The role of the appointed adviser would be to continue the work started by this group of CNES staff.

In January 1999, notified of the study undertaken by ESA and UNESCO, the famous French scientific journalist Albert Ducrocq used his column published in the *Air et Cosmos* review to voice his opinion concerning these space ethic initiatives. He supported the idea according to which space debris presents practically no danger to Earth. In reference to discourses about Mars samples, he added that they only provoke fear among the public and detract from the scientific interest of such a mission. He concluded: to adopt an ethical stance, to draw up a sort of space charter "risks giving credit to the argument according to which, not content with wasting resources, astronautics is harmful enough to put the planet in danger". In other words, the innocent intention of ESA could "be highly detrimental to the case for space".¹⁵ Ducrocq's position is worth focusing on. He believes there are enough arguments to defend the idea according to which space would largely avoid the ethical questions with which other technological domains are today confronted. In other words, there would be a space specificity in this domain.

No doubt an echo of a few members of the astronautical community, the reaction of the renowned French journalist merits attention and respect. However, due to the initiatives of ESA and CNES, his reaction did not prevent ethics from taking firm root in the field of space. Organisations such as COPUOS devote seminars to the subject; conferences organised by the International Astronautical Federation (IAF), by the International Academy of Astronautics (IAA) and the Committee on Space Research (COSPAR) welcome discussion on the theme of space and ethics. the International Space University (ISU), located in Strasbourg (France) honours its intercultural and interdisciplinary dimension by running its summer school and its master's in ethical issues. Studies assigned to the European Science Foundation (ESF) by the European Space Policy Institute (ESPI) concerning the future of space activities also touch on this new field. However, CNES is the only space agency to have appointed individuals or a team responsible for the ethical dimension of their activities and even, as I have already observed, the interest of ESA would appear to need a new impulse. In terms of space, ethics still remains a frontier to be crossed.

2.2 Lessons to be learned

Ten years after the publication of Professor Pompidou's report and the start of the work by CNES in terms of ethics, what are the lessons that can be learned from this period?

The first takes the form of an observation: this approach has sparked and still sparks much interest among those to whom it is presented. The initial reaction is often one of surprise. "Space ethics? Never heard of such a thing!", "I have absolutely no idea what that could be about...". Many of our contemporaries would sum space up as a series of spectacular events, with high media coverage, which apparently have nothing to do with what the word ethics normally designates: medical research, financial practices, academic councils, etc. However, once our contemporaries have been shown the cultural roots of space conquest and the social issues of these activities highlighted, most of them recognise and appreciate the approach adopted in terms of ethics. They are attune to this return to, or simply this focus on, the human factor within space activities and achievements, a view that is not just limited to the presence of astronauts, to manned flights.

A second lesson concerns the implementation of an ethical approach within a professional environment. At the start of the 2000s, those passionate about space ethics sought to multiply the opportunities to talk about it and promote it. They wrote articles and books, attended colloquiums, organised sessions during international conferences, and gave interviews in various professional reviews, which was without doubt the best approach to adopt. However, a dwindling interest, even total lack of interest, soon occurred, posing a threat. What might be the reason, what could be the solution? I actually like telling my colleagues at CNES: "If you are a competent engineer or a committed scientist, you will in fact be practising ethics all the time, without realising it...". It is not therefore a question of introducing concern for ethics to their professional activities because it is lacking, but moreover a question of demonstrating the already effective presence of this concern, to further highlight it, to share it and to expand on it.

Therefore, those responsible for or with an interest in space ethics must see beyond long *ex cathedra* dissertations and overly theoretical or academic thoughts and promote its integration into the practicalities. Priority must be given to what those who act have to say, before questioning them and asking questions about the meaning, means and consequences of their practices. Now, of the conferences to which I would be sent by CNES on my own to talk about space ethics, I prefer those at which a colleague first takes the floor to speak about future planetary exploration missions, of the

management of space debris, of the possibility of exploiting lunar resources or of the UFO study group, before sharing my questions and opinions with the auditorium, from my own ethical perspective and experience. I am convinced that this is the right way and the right point at which to bring up the topic of ethics.

no cases

A third lesson can be learned from the response to a question often posed to CNES: why, in 2001, did the management team not appoint an ethics committee, as several French scientific research and technological development organisations had already done? The reasons are as follows. Firstly, because the subjects addressed by space ethics do not strictly speaking constitute “cases” or “files” to which it would be possible to assign a group of experts or academics. It is more a question of topics to be studied, to be researched over the long term. Secondly, if CNES were confronted with a real ethical issue (as genetic engineering researchers, doctors, etc. are), it could submit it to the ethics committee of one of these other organisations (e.g. CNRS) with which it often collaborates. Is it not precisely one of the characteristics of the space venture to implement and maintain permanent and effective links with a number of scientific and technological fields? For all that, it should not be concluded that space ethics has no specific or unique character. On the contrary, it provides us with what is simply and yet appropriately referred to as the “point of view of Sirius”. It is as if space involved reaching both a physical and an intellectual height, as if it offered the chance to introduce a different perspective in the intuitive understanding that we have of the reality, issues and challenges it proposes or imposes. I will now give a few illustrations of this ownership of space.

2.3 Space law, a heritage in progress

space law

In the brief history of space ethics given above, I purposefully omitted a whole branch: space law. Theories and opinions diverge concerning the place to be granted to the legal field in relation to ethics. Nonetheless and with regards to the modern history of space, I do not hesitate to associate law and ethics very closely: the premature genesis of space law profoundly marked the slow development of space ethics, by creating several key fundamental principles and by having them recognised by the international community, by establishing competent structures integrated on an international scale. In other words, space law appeared as the oldest expression of space ethics, in a specific geographical, historical and cultural location.

space law

2.3.1 Genesis of space law

Space law is essentially based on international treaties drawn up during the 1960s and 1970s, at a time when space activities were those of a monopoly of a few space powers, first and foremost the United States and the Soviet Union. However, the founders of astronautics had already envisaged the establishment of a legal system specific to the field of space. Following the works of Konstantin Tsiolkovsky, E. Laude focused people's attention, as early as 1910, on what he called cosmic law as a different and independent legal branch of air law. Later, at the time when the V2s, retrieved in Germany at the end of the Second World War, were used to conduct the first scientific experiments in outer space, the research community also started to ask questions about the necessity and content of a space law. When, on 4 October 1957, during the International Geophysical Year, the Soviets launched Sputnik 1, no State protested against being flown over by the Soviet satellite, without prior authorisation. The Soviets raised the idea of a tacit agreement of States, in order to successfully conduct the meteorological, magnetic and electrical exploration of the upper atmosphere to which that year was devoted. Others regarded this event as a spontaneous acceptance of the principle of the freedom of the use of space, a principle that would later be evoked when drawing up international treaties. Meanwhile, the US Department of State requested the regulation of space activities, emphasising the exceptional and transient nature of the "argument" of the International Geophysical Year.

In fact, the principle of a space treaty that would be placed under the aegis of the United Nations was evoked for the first time in 1956. The year after and following the launch of Sputnik, several studies were conducted. The International Council of Scientific Union (ICSU) looked at the scientific aspects of the space conquest, whilst the International Astronautic Federation (IAF) established the Permanent Committee of Space Law in 1958 (later known as the International Institute of Space Law, IISL, in 1960). During this time, the United Nations adopted, on 14 November 1957, resolution no. 1148 recommending the pursuit, within the context of disarmament, of "the joint study of an inspection system which would only allow objects to be sent through outer space exclusively for peaceful and scientific purposes".

In 1958, the UN set up the Committee on the Peaceful Uses of Outer Space (COPUOS). Until 1962, the first agreements between the United States and the Soviet Union aimed to ensure that States did not disrupt the space activities of other States. It was not until 1965 that France became the third space power. COPUOS then created two subcommittees, one legal and the other scientific and technical. The legal subcommittee managed to fairly quickly compile a text aimed at regulating the legal problems associated with the peaceful use of space and the

1956

principle of non-appropriation. The scientific and technical committee was notably put in charge of the two questions dealt with in this book: the management of space debris and planetary pollution. Alongside COPUOS, other specialist UN institutions indirectly assisted and continue to assist with the elaboration of a space law: UNESCO, the International Telecommunications Union, the World Meteorological Organization, the International Civil Aviation Organization. Intergovernmental organizations specialising in space activities were also involved in this task; these included Intelsat (a consortium set up in 1964 which became a private company in 2001), Intercosmos (of Soviet origin) and ESA.

The principles of space law are set out in the *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, or Outer Space Treaty, dated 19 December 1966. It was signed on 27 January 1967, first ratified on 10 October 1973, and has today been ratified by 97 States and signed by 27 others. These principles were then completed and developed by other international texts:

- the *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*, concluded on 22 April 1968;
- the *Convention on International Liability for Damage Caused by Space Objects*, concluded on 29 March 1972;
- the *Convention on Registration of Objects Launched into Outer Space*, concluded on 14 January 1975;
- the *Agreement Governing the Activities of States on the Moon and other Celestial Bodies*, concluded on 18 December 1979.

Several resolutions adopted by the United Nations General Assembly also need to be added to this list of agreements and conventions. These include the resolution of 3 December 1986, pertaining to remote sensing principles (no. 41/65) and the resolution of 14 December 1992, pertaining to the use of nuclear power sources in outer space (no. 47/68). To present day, these resolutions have been implemented by the member States.¹⁶

2.3.2 Responsible States

The responsibility of States in terms of space activities constitutes a significant aspect of space law. This question is principally dealt with in the 1972 Liability Convention although it was already detailed in Article VI of the 1967 Outer Space Treaty: "States Parties to the Treaty shall bear international responsibility for national activities in outer space, whether such activities are carried on by

governmental agencies or by non-governmental entities..." In other words (and this is what makes space law so unique), all "national" space activities are assimilated to activities of the States, whether carried out by their citizens or by foreigners in their country, by their nationals from the territories of other States or even from international zones. By virtue of Articles VI and VII of the same Treaty, the responsibility of States Parties shall be understood according to two meanings: that of the control of the actual activities (responsibility) and that of financial compensation in the event of damage caused by these activities (liability).

The 1972 Liability Convention specifies the scope of application of this specific rule for the compensation of damage caused by a space object on the ground, in air space and in outer space, based on the notion of "launching State". The first Article of this Convention defines this notion as follows: "The term 'launching State' means: a State which launches or procures the launching of a space object; a State from whose territory or facility a space object is launched". In other words, this notion essential to space law is defined based on four alternative criteria: the State which launches, the State which procures the launching, the State from whose facility a space object is launched and the State from whose territory a space object is launched. In this way, for a single object launched into outer space, several countries may be recognised as "launching States" and therefore be jointly responsible for damage which may be caused by this object: "a launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight". Article III of the convention specifies that "in the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is due to its fault or the fault of persons for whom it is responsible". No time limit is specified in terms of this liability, which in itself poses a new legal problem as objects launched into orbit may remain there for several centuries. During this period, the space objects may change ownership and, consequently, launching State (or a new launching State may become involved). They may also be moved repeatedly without the launching State(s) being informed despite the fact that the latter remain legally liable.

The 1972 Convention goes on to specify several pertinent points, in the event of accident:

- determination of the launching State or States in the event of a joint launching. In this latter case, the launching States may conclude agreements regarding the apportioning among themselves of the financial obligation in respect of which they are jointly and severally liable;

- damage claim procedure and possibilities of enlisting a Claims Commission;
- joint liability: the victim may turn to the most solvent of the launching States to demand the full amount of compensation, the latter being able then to demand funds from the other launch States, if the distribution of the financial liability has not been established between them in an agreement;
- composition and running of the Claims Commission, etc.

fault

Commonly used on Earth, the notion of fault is not easy to use when applied to space activities as it explicitly refers to a regulation which, in most cases, does not exist or is difficult to apply as it exists in several forms and under several designations. This is, in particular, the case of space debris in circumterrestrial space which has led to the drawing up by space agencies of several types of recommendation: the *Mitigation Guidelines* of the Inter Agency Space Debris Coordination Committee (IADC), the NASA standard and the European code of conduct. The way in which these texts define "good behaviour" in space leads to several different and sometimes even opposing points of view.¹⁷

The notion of fault also raises the question of evidence. How is it possible to gather evidence when the activities in question take place hundreds and thousands of kilometres from the Earth's surface, in zones that are difficult to access? Let us return to the example of space debris. The most readily available information about objects moving around in space is obtained via American space surveillance systems (see below). NASA regularly publishes and circulates a catalogue of objects moving around our planet. This document is of course declassified, of limited precision and refers only to objects which the United States considers to be pertinent. How credible is this information when attempting to investigate an incident to determine fault and liability? One-off or partial observations conducted by other nations have allowed the errors, mix-ups and even omissions of the American services to be highlighted whether these were unintentional (the identification of small and far-off objects is difficult) or deliberate. How can we therefore hope to provide tangible, solid evidence in the event of a dispute?

It goes without saying that, in space, fault and proof are very difficult to establish. Even so, the application of the singular notion of launching State must not be only *a posteriori*, i.e. after the incident or accident, but *a priori*. It can then become a tool, a political lever that allows us to ask questions that should be inevitable: what rules need to be applied? To whom does the satellite really belong: the customer, the insurers? Who makes the decisions?

Finally, the question of the implementation, monitoring and control of this law comes. We cannot simply define regulations concerning the use of space. We must

be able to check the compliance with these regulations by the different players and operators. This requires the implementation of independent means of observation. Then, if a breach is duly observed, e.g. a violation of the principle of the use of space for peaceful purposes, a sanction would need to be applied. However, is it possible to establish such a system of space policing at an international level? More realistically, it is now recommended, notably by COPUOS, that we ensure the national application of rules defined at international level. So, each State is requested to implement a national legislative system in compliance with international space regulations. There is a risk that we could find ourselves in a situation identical to that of the law of the sea where the practice of flags of convenience exists. A State could in effect choose not to impose the application of international measures on its inhabitants and the companies on its soil and to thus favour the implantation on its territory of operators more concerned with the reduction of their costs than common good. For the time being, the main space States have signed and do implement the UN treaties. However, the risk of flags of convenience turning up in space cannot be ruled out.

In April 1995, the Sea Launch company was set up. It uses the three-stage Russian launch vehicle Zenit-3SL from the floating Ocean Odyssey platform, built based on the Norwegian technology of off-shore oil drilling platforms. The platform is installed as close to the Equator as possible, near Christmas Island, in order to minimise launch power. The Seattle-based Boeing Commercial Space Company owns 40% of the company, the Moscow-based company RSC-Energia owns 25%, the Anglo-Norwegian company Kvaerner Maritime a.s. owns 20% and the Ukrainian company SDO-Yuzhnoye/PO-Yuzhmash owns the remaining 15%. With its headquarters initially in the Cayman Islands, Sea Launch recently opened its offices in the USA, in the State of Delaware, and has offices in Seattle and in Oslo, Norway. The port of registry for the command and assembly ship, and the platform is Long Beach in California and both ships are registered in Liberia. They belong to two different companies, subsidiaries of the Sea Launch Company. It is hardly difficult to imagine the legal quagmire that the smallest claim or complaint would provoke, in the event of an incident or accident, in the context of such a complex set up.

2.3.3 The law retranscribed

Some States, including the major space powers, have adopted legislation aimed at governing their national space activities and thus at implementing their international obligations. These States include the United States, Russia and Australia. European countries are progressively following in their footsteps. Following the

United Kingdom in 1988, Belgium adopted a space law in 2005 and other laws are also being drafted in Germany, Italy, Luxembourg and Switzerland. France is also up there, as a space law was voted in June 2008. Following the example of other national laws, the primary vocation of the French law consists in implementing rules to authorise and control national space activities, particularly those undertaken by private companies, in compliance with obligations arising from international treaties. These rules are very much a necessity as the French State is heavily involved in space activities. In effect, France is home to the CSG (Centre Spatial Guyanais, the Europe's Space Port located in French Guyana), making it a launching State for all Ariane launchers and now also for Vega and Soyouz launchers. It is likely to be liable for all damage caused by a space object launched from this base, whether by the launch vehicle or its debris or by the launched satellite. Moreover, the major European space operators, whether Arianespace or Eutelsat, are companies governed by French law. In this case, the law sets out an important role for CNES as far as the implementation of this law is concerned, notably entrusting it with testing the technical compliance of national space systems.

Up to now, France has been able to manage national space activities and ensuing risks predominantly via conventions, i.e. by constraints, in particular technical, imposed in the agreements concluded with the main players in the space sector, principally ESA and Arianespace. These constraints include CNES doctrine of back-up, a collection of technical rules drawn up by the French space agency, which aims to manage the technical risks created by risky activities taking place at the CSG. French space law reinforces the role of CNES in the matter, expressly entrusting it with the general task of protecting persons, property and the environment, on ground and in flight, concerning the CSG.

Now its history has been recounted and its legal context set out, we are at last ready to tackle the subject of space ethics itself. It is important to remember that space ethics is fundamentally and always human. It is part of the oldest dreams and myths, those same dreams which drove the human species from the lands of Africa to the territories of the sky.

⁹ Quoted in to Arnould, Jacques. *La seconde chance d'Icare. Pour une éthique de l'Espace*. Paris: Cerf, 2001: 84–85.

¹⁰ *Public Papers of the Presidents of the United States*. 1962. 1: 669–670.

¹¹ Lovell, Bernard. *The Exploration of Outer Space*. New York: Harper & Row, 1962.

¹² Alongside Professor Pompidou, this group includes five members whose names and job titles are as follows: Jean Audouze, astrophysicist, Research Director at the CNRS, Director of the Palais de la découverte, Ezio Bussoletti, Professor at the Naval University of Naples, Director of the Experimental Physics Institute; Carl Friedrich Gethmann, Professor at the Institute of Philosophy of Essen University, Director of the European Academy for Study of the Consequences of Scientific and Technological Progress; André Lebeau, Member of the National Air and Space Academy, Professor at the Conservatoire National des Arts et Métiers (CNAM), former Deputy Director-General of the European Space Agency, former President of the French National Space Research Centre (CNES) and Sir Geoffrey Pattie, Director of Communications of The General Electric Company.

¹³ See *Space Use and Ethics*. Ed. Wolfgang Bender, Regina Hagen, Martin Kalinowski and Jürgen Scheffran. Volume I: Papers. Münster: Agenda Verlag, 2001.

¹⁴ Acronym taken from the French name "Commission mondiale d'éthique des connaissances scientifiques et des technologies".

¹⁵ Ducrocq, Albert. "Éthique spatiale. Une bonne intention qui pourrait fort mal servir la cause de l'espace". *Air et Cosmos*. 1686 (1999): 39.

¹⁶ See *Text and status of treaties and principles governing the activities of States in the exploration and use of outer space, adopted by the United Nations General Assembly A commemorative edition, published on the occasion of the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III)*. UN: Vienna, 1999.