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Pandora's Box? The Basic Legal Framework for Doing Business with a Space Station: An Inventory of Problems

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1. Space Stations: a Journey Into The Unknown?

It is more than twenty-two years ago that US astronaut Neil Armstrong was the first human being to set foot on the moon and space of “one small step for a man, one giant leap for mankind.” No single human endeavour in space has been able so far to challenge fantasy and stir curiosity among the public at large to such a great extent as the “Apollo 11” mission of that July back in 1969. As a matter of fact, sometimes one cannot escape the feeling that much of spaceflight since, especially of the US American brand, has been about beating the moon landing in setting a yet more challenging, inspiring and grandiose target. So far, that has never been achieved. Neither the space shuttles actually built nor the aerospace planes to be developed, inside or outside the United States, neither the “Mission to Planet Earth” nor the “Mission to Mars” (via the Moon) have been able to capture mankind’s imagination to any comparable extent.

The ultimate development in this respect is the one concerning space stations. The first one, the Soviet “Salyut-1” in 1971 provided for a human presence in space of almost 24 days, which was only a relatively moderate improvement in terms of time compared to the “Soyuz-9” mission in 1970, which stayed up for almost 18 days. The station itself, launched in April 1971 and de-orbited in October of the same year to burn up in the atmosphere, was therefore uninhabited for the large part of its relatively speaking none too impressive lifetime. Yet, it was the first step to create a living and working environment in outer space, the next step being the development of more permanent habitats and laboratories. The last of the Soviet “Salyut” stations, “Salyut-7,” launched in April 1982, witnessed a record during 1984 of almost 237 days of human presence; while the station itself, abandoned in 1986, made an (uncontrolled) entry in February 1991 over Argentina.

Meanwhile, the United States had also entered the arena: in May 1973 it had launched “Skylab,” roughly twice the size of the “Salyuts.” The latter were actually no more than readjusted spacecraft, which in a sense makes “Skylab” into the first ‘real’ space station. “Skylab” received three visits, remaining uninhabited however during the larger part of its lifetime, like the “Salyuts.” It finally reentered the atmosphere in June 1980, its debris touching down in Australia. Europe, in some ways the third spacepower, sent up its first “Spacelab” with the US space shuttle in November 1983. “Spacelab” missions however — to date there have been three more — only lasted about a week apiece, thus contributing relatively little to the development towards really permanent human ‘occupation’ of space by means of space stations.

Permanent habitats and laboratories in space are not as spectacular as pioneering steps on a virgin surface of course; arousing interest in the public at
large and consequently being able to involve large measures of government funds may therefore not be as easy. Partly for this reason, the previous efforts at least in regard of Spacelab were met with rather mixed enthusiasm.\(^5\) Partly for this reason also, the international enterprise of realizing and operating an international space station “Freedom” to last at least 30 years, with the United States, Japan, Canada and ten member states of the European Space Agency (ESA) as participating states, currently is in big trouble.\(^6\)

On the other hand, the only current example of a (semi-permanent) habitat in space, the Soviet space station “Mir”\(^7\) is, since Perestroika and Glasnost have been gaining ground, increasingly becoming the object of interest from a larger public than the space community. The tests undertaken partly as a stunt with Coca Cola on board “Mir,” as well as the visit to “Mir” of a Japanese journalist for over a week, are the best examples thereof. Permanent habitats in space moreover appeal to science fiction-gearied minds. It may well be that in hindsight the construction and operation of space stations will turn out to be a more consequential, enticing and important journey than even Neil Armstrong’s giant leap for mankind.

If it should turn out that way, it is clear that private enterprise will have a very important role to play.\(^8\) States, even the two still-leading space powers, United States and whoever will replace the Soviet Union in that respect, are becoming increasingly reluctant to use government funds for these kinds of long term, far-reaching projects, for all kinds of political-budgetary reasons. Furthermore, financing such space activities predominantly by government would run contrary to the almost global tendency towards capitalism and free market economics now that communism is on the wane. And finally, on a philosophical level as well, it would sound especially illogical for states to try to develop space as a quasi-normal environment for living and working by means of permanent space stations when completely financing (and controlling) it as states themselves.

This is a crucial point, for it means that, indeed, a number of arguments would plead for creation of a regime as similar as possible to the circumstances in which commercial enterprises operate on earth. After all, it is the other way around as well: commercial enterprises faced with multiple choices as to the environments they could in theory operate in, will certainly choose, for very earthly reasons, the most favourable environment(s) for their activities, and in the light of the factual problems regarding space activities, it would already be a tremendous achievement to have commercial activities in space take place in an environment very much resembling Mother Earth in relevant aspects. In other words: for commercial enterprises to become interested in undertaking activities related to space stations, not single leaps, but continuous progress is a fundamental necessity. Nobody will turn down “a quick buck,” but nobody will invest millions to obtain it. In this respect, the unknown aspects should be reduced to the absolute minimum possible, both legally and otherwise.\(^9\) At the same time, commercial enterprises themselves could contribute to making the Unknown a little bit less unknown by their own involvement, and make the Journey a little bit less frightening. Analysis will be needed to make clear whether by such activities a Box of Pandora is opened which perhaps would better remain closed at least for the time being, or whether the Journey looks still worthy of continuation.

2. Commercialization, Private Enterprise and Space Stations: the Non-Legal Parameters

For the above reasons it makes sense to take a closer look at the commercial aspects of space stations and their legal implications. Before going into more legal detail however, the non-legal parameters of our problem, which are essentially three, should be summarily sketched: they will turn out to have considerable impact on the legal framework also.

First, one should make an effort to define the term “commercial.” Basically to my mind “commercial” points to the main motive of the activity in question being that of making profits, even if only in the longer term.\(^10\) Thus, an undertaking can be called commercial even if it is losing money, and even if that loss is accepted for a certain amount of time, alternatively if that loss turns out to accompany the undertaking during the whole of its time of life. “Commercialization” of space activities consequently means that the profit motive is becoming paramount for undertaking those activities at all. Essentially it is the motive which distinguishes commercial undertakings, e.g. in space, from scientific, military or
(other) non-profit undertakings, where the main motives are respectively to increase knowledge, to realize the security of a political entity or to strive for other non-material goals, but which of course sometimes turn out to realize profits on the side.

Second, in the context of "commercialization" also the term "privatization" has often been used, and although the relation between the two is indeed one of close connection, they should not be confused.11) "Privatization" should be defined as a development where private, i.e. non-governmental, enterprise is becoming (more) active in certain fields of society.12) It is thus based on an altogether different criterion: it is not the motive for which an activity is undertaken that counts in this respect, but the actor of the undertaking concerned.

Therefore, private bodies may very well act for non-commercial motives as much as for commercial ones: the Red Cross, the National Academy of Sciences, the Catholic or Protestant Churches and the Society for the Protection of Animals are some of the very different examples one can think of in this respect. These kinds of entities, however, in view of our topic will not be dealt with here.

Likewise, public bodies may very well act for commercial reasons, as governments often are as much (or even more) in need of money than private entities. So when we deal with commercial aspects of space activities in general, we have to keep in mind that apart from private entities usually associated with commercialization and commercial activities, governmental or semi-governmental entities are also involved. At the same time, private entities provide for a good focus as the commercial motive, when it is present, is almost invariably clearly the most important, whereas in the instance of government activities, the commercial motive is usually much harder to distinguish and set aside from other motives. Private enterprise, for the very reason of their being non-state bodies in a primarily still state-oriented legal environment, are the best vehicles for an analysis of the legal aspects of commercialization.13) That commercial activities as such, even if undertaken by private entities, are allowed under space law, may by now be taken for granted.14)

It is important finally to come back once more to the definition of commercialization and its intricate link with privatization. In order to understand the particular form of commercialization in relation to space activities, one should remain aware on the practical level of the basic distinction between the two necessary corollary elements of any commercialization, buyers of goods and services, and sellers of the same (amongst whom of course also are the original producers of the goods and providers of the services), who among themselves conclude transactions regarding those goods and services. Every space activity really consists of an intricate web or chain of many entities, most of whom thus turn out to be buyers and sellers in regard of different products and services at the same time. Nevertheless it should be kept in mind that if one speaks of privatization within the framework of commercialization, this really means that in respect of the relevant goods and services private enterprise is allowed to act as buyer, or seller, or both. The theoretical standard of a totally private market presupposes nothing else than that all buyers and sellers are private entities.15) It may already be stated that a rather mixed picture emerges as to the actors in commercial activities in outer space, although governments nevertheless play a dominant role in most respects, and relatively few of the big transactions take place between buyers and sellers who are both non-governmental.

Third, when turning to the specific issue of space stations next, a few more basic elements should be kept in mind. The unique aspects of space stations, when compared to other kinds of space activities, derive from the fact that they are intended as (semi-)permanently habitable space objects.16) Other space objects are either (semi-)permanent but uninhabited, such as satellites; or expendable and unmanned, such as launching rockets themselves; or even manned but either expendable (in the sense of being able to operate only for the duration of one trip) such as the lunar modules or re-usable (but still returning to earth only days after departure) such as spaceshuttles and aerospace planes.

This fundamental characteristic firstly makes space stations into large and complex structures, which have to be assembled in space and thereby need more than one launching.17) A second consequence of permanent habitability is that the factual status of space stations is not any longer similar to that of transport vehicles, so far the only manned space objects, but becomes much more akin to that of an area of a state. Thirdly, due to its fundamental goal of coping the earth's living environment in an outer
space area, it is a much more logical vehicle for all kinds of commercial activities which as such have little or nothing to do with space activities.

And fourthly and finally, because of the complexity of the undertaking of operating a space station, and the expensiveness thereof, such undertakings will usually be internationalized to an even greater extent than with respect to other space endeavours. "Freedom," to be built and operated by 13 states, their space agencies and companies, of course is the best example of such internationalization. But also the case of "Mir" is relevant in this regard, as the economic situation in the former Soviet Union, which is moreover enhanced by the political situation, makes international participation and investments particularly welcome.

In short, in many respects space stations, if not already by now, at least in the light of their ultimate goal and purposes, show a great similarity to floating pieces of human environment, accidentally happening to be far away from normal human environments — rather than to transport vehicles intended for short term specific purposes and with passengers all having one simple goal: to become transported to the place of destination.

3. Captains or Kings? — The Basic Legal Framework for Space Stations

The aforementioned non-legal parameters are very relevant for the basic legal framework for space stations. This will become even clearer when we turn to the legal implications of the commercial aspects of space stations. It is submitted that, partly for reasons enumerated above, it is essential to concentrate on such a framework first, while secondly, without in any way claiming to be exhaustive, a few clearly relevant legal areas will be scrutinized to some greater extent. Thus the following approach suggests itself. When one tries to analyze the legal aspects of commercial activities — whether private or public — within the non-legal framework dealt with above, it is tantamount to saying one should concentrate on what law applies in a *way in personam* to the buyer and the seller, and *in term* to the transactions they conclude, which includes the product or service itself and consequently, as an example, product-liability or what is effectively liability for the damage caused by activities respectively.

In other words, it would be logical to ask the following questions. First: what jurisdiction, meaning the sum of the respective powers to proscribe law through legislative action and to enforce law through executive and judicial action, apply to a certain buyer or seller who undertakes a transaction in relation to the space station. Second: what law applies and what courts are competent, to judge on conflicts related to the transactions, whether under contract law or under tort law.

How to deal with these questions? As the ultimate purpose of creating space stations is the creation of a semi-normal living and working environment in space, the point of departure for analysis of such a framework should thus be as closely related to the earthly situation as possible. On earth, law systems can be basically divided into the body of international law and the various national, domestic legal systems; states, being the subjects of the one and the sovereigns of the other, forming the pivotal link and at the same time the borderline between the two. Thus, international law deals with states, and a still rather limited number of exceptions aside, with states only, whereas it is the national law of one state or other which regulates the daily life of those people and entities falling within its scope and the workings of society, economy and policy of that state.

When it comes to potential conflicts between international law and national law, basically international law rules supreme, although the fact has almost been removed from public consciousness because, first, the rules of international law are not nearly as well-established, generally accepted and elaborated as are those of national systems, and, second, the basic tenet of international law and its most fundamental principle of sovereignty of states is a pervasive one: unless clear proof of the contrary exists, states are free under international law to act as they like. Nevertheless, all domestic legislation can be seen in theory as filling in the framework provided for by international law.

This basic legal framework for all human activity on earth has important consequences for commercial private enterprise and their activities. It means first, as far as such activities are purely internal from a state's point of view, that public international law basically leaves it to the state in question to regulate those activities legally or otherwise — or indeed, not to regulate them. As soon as international elements
become involved, either as personae or as res, this situation changes. Public international law does not, usually, accept enterprises as subjects of international law, of international rights and obligations. What it
does, is partially applied principles of state responsibility, such as due care responsibility, and jurisdiction, where the territorially-based jurisdiction usually is seen as overriding jurisdiction otherwise based; and for the rest allow states to establish their own systems of what is called private international law, dealing domestically with potentially applicable foreign jurisdictions, and to conclude agreements among themselves relating to these matters.

Transposing this analysis to outer space in general, first, basically similar results appear. The focus here inevitably lies on public international law, which thus forms the basic framework for any commercial use of outer space. Further elaboration, which is sometimes provided for nationally, will therefore not be dealt with to any great extent in this essay.

A third venue which can be taken in respect of outer space specifically to fill in the framework is that which is sometimes called "astro-law," a body of rules yet to be developed as a kind of private law for outer space. Such a system would effectively mean turning outer space into some kind of extraterrestrial territory which is under control not of a single sovereign state but falls under the sovereignty of the, or a, community of states. As any such law system moreover can only be subsidiary to the public international law-framework, the states implementing the former themselves being subjects of the latter, it will only come to the fore wherever relevant in the latter’s context, just as is the case with domestic legal systems.

In the light of the non-legal parameters discussed before, it would be even more logical to apply this analysis to the specific issues of space stations. Indeed, it will turn out in a way to be applicable, since a legal perception of space stations as quasi-territory of one state or another (or, if the case might arise, of a community of states) would be in line both with their meta-goal of creating permanent habitats in space, and with the concurrent issue of interesting and involving commercial and indeed private enterprise in these undertakings.

This would, firstly, relate well to the size and complexity-issue relating to space stations, which means that the definition and relevance of the term “space object” under space law will be seen to have gained a special importance, as parts of a space station can be considered as a space object of its own or only as a component part of a space object, depending upon the circumstances.

It would, secondly, be logical in view of the semi-territorial nature of space stations. Legally, that would mean increasing the factual importance of the consequences of registration under space law, such as jurisdiction and control. Related issues of liability will tend to get overlooked, as the notion of “launching” and consequently of “launching state” will tend to become irrelevant, especially if the space station is already active for a long time.

Thirdly, as a consequence of space stations’ goals in terms of their normality as a working environment and the consequent possibilities of all kinds of commercial activities, those activities could have little or no relevance from a space law-point of view, and yet are dealt with or will have to be dealt with legally at any rate. The sale on board of a space station by one member of a crew of a photo camera to another member has not much to do with space law, yet in principle has to be dealt with legally.

And fourthly, the tendency towards internationalization once more brings jurisdictional questions to the forefront, as in principle different jurisdictions will be at stake. Possibly, use can be made with respect to these issues, whether by analogy or directly, of the principles e.g. concerning private international law, presently existing on earth. The fundamental issue as it relates to international space stations here is the concurrent existence especially of the quasi-territorial jurisdiction of the state of registry of (part of) the space station and the personal jurisdiction of another state over its nationals happening to be present in that (part of the) space station.

As to the other two non-legal parameters discussed before, they would call for the same use of territory and its legal complement of jurisdiction. Commercial activities, the motive being the only criterion distinguishing them from other activities, can take all different forms; the commercial motive merely means that it concerns production of a good or provision of a service somehow undertaken in return for payments estimated to at least offset costs of production or provision. From a legal point of view, thus “production,” “provision” and related “contract” (or other agreement) are the three key-words which the framework will have to deal with.
“Production” of goods takes place somewhere, and usually falls therefore in rem under some kind of territorial jurisdiction as to e.g. taxation and product-liability. The commercial motive may at a certain stage make it interesting or even adamant that the place of production is somewhere else; territorial jurisdiction shifts with it. Would it not then be logical, to apply this, by creating a system of quasi-territorial jurisdiction, to a shift of production to outer space as well?

It must be added, that as to production, territorial jurisdiction can also apply to the producer instead of the product, once more through the place of production, although here other principles of jurisdiction, notably that based on nationality, and thus in a way in personam, could also come into play. Taxation for instance can fall in this category as well.

As to “provision” of services, mutatis mutandis the same applies; although it is sometimes much harder to point to a specific place where the provision takes place — does an international bank transferring Dutch guilders on an account held in Amsterdam into Japanese yens on an account held in Tokyo provide its service in the Netherlands or in Japan? —, on earth interplay of the various potentially applicable jurisdictions, whether territorially or nationally-based, whether really in personam or in rem, has been taken care of in general by the existence of bodies of private international law, where public international law provides the first choice for one domestic system of private international law or another, usually through the lex loci making the territorial jurisdiction decisive.²⁹

The relevant “contracts” likewise are regulated by a body of private international law, public international law usually making the first choice guided by territorial jurisdiction, although a caveat must be made here. The contracting parties, after all, can decide among themselves to deviate in many ways from basic principles such as those mentioned before. The paramount issue in this respect, of dispute settlement in case the contract, or the product or service it deals with, becomes the object of serious disagreement, has two sides: that of applicable legal system(s) as to the interpretation of the contract and the consequences of, and judgement on, the dispute itself, and that concerning which court or courts have jurisdiction over contract, consequences and dispute.³⁰
Both issues are often taken care of in the contract itself, the territorial basis for jurisdiction through public international law coming into play only subsidiarily thereto. In general, it once more seems logical to equate space stations in law to pieces of territory, for the purpose of dealing with commercial activities related thereto.

Privatization finally directly deals with the role of states and their jurisdiction, primarily based on territory — and secondarily on nationality.³¹ The essence of privatization being the creation of non-state entities, the question arises under space law as well as under general international law, as to their place under that law. Space law, so far generally state-oriented, provides for a dual solution through its liability- and responsibility-regimes.³² The liability-regime uses the territorial principle by making a state liable for damage caused by a space object launched by whomsoever from its territory or facility,³³ whereas the responsibility-regime basically uses the national principle by speaking of “national activities,” “whether carried out by governmental agencies or non-governmental entities.”³⁴ The problem remains however that the liability-regime only deals with one important aspect of commercial activities, including those of private entities, namely that of damage caused somehow in relation to those activities, whereas the responsibility-regime is often seen as a very general principle, without further elaboration hardly capable of regulating every detail of e.g. commercial activities of private enterprise. In order not to make commercial activities (whether undertaken by private or public entities) on space stations unduly different from similar or identical activities down on earth, and for the purpose of a comprehensive and logical approach to privatization in regard to outer space, it seems best once more to transfer the territorial principle as far as possible to space stations being an alternative to earth as a place to do business.

Therefore, one thing seems to have become clear: that, in order to try to deal with all the different commercial aspects of space stations within one coherent and comprehensive legal framework, it is necessary to start equating space stations to pieces of territory, and then to try to analyze the deviations thereof and the consequences and relevance of those deviations. In legal terms: the framework should have a king at its head, a (quasi-)sovereign with all related legal powers, and not a captain, merely equipped with those powers necessary to reach the
next destination in rather good order.

Let us therefore approach the problem of analyzing the legal aspects of commercialization of space stations in this way, as that will clarify to the greatest extent possible the achievements and shortcomings of the legal regime as it exists today. Partly for this reason as well, it becomes logical as a starting point to deal with the first of the basic issues relating to space stations: the earthbound phase of each space station’s life before taking off towards outer space; a phase moreover which indeed has important legal aspects relevant for commercialization in respect of space stations.

4. Producers and Products — Legal Aspects in Regard of the Pre-Operational Phase

It has already been argued that the undertaking to build a space station as (semi-)permanent living and working quarters is a very challenging and special endeavour indeed. This already applies to the first phase, which still takes place on earth, where a well-established body of private international law regulates the potential clashes that would arise out of differing or divided answers to these questions. A Dutch company selling a manufactured piece of equipment to a French one, the contract stipulating Swiss law to be applied to it, and next getting into some dispute regarding the deal, more or less knows to what extent Dutch, French and Swiss laws apply both in personam and in rem.

Legal aspects of commercialization indeed become already apparent in this phase, the pre-operational phase of development and construction on earth. Although development, pointing mainly to drawing tables and computer calculations, and construction, pointing mainly to turning lathes and assembly rooms, could of course be seen as two different phases, I take them together. The main element in both subphases for the purpose of my analysis is the fact that all these activities, and consequently the transactions involving the products which are to form part of a space station and the services necessary to realize the building thereof, are taking place on earth, and their direct effects remain confined to the earth.

This means that those commercial transactions indeed are of little relevance from the point of space law as opposed to general international law, as there is simply territorial jurisdiction of some state or other applicable. If the German government in the framework of ESA’s contribution “Columbus” to space station “Freedom,” contracted MBB-ERNO to manufacture a part of “Columbus,” the contract would simply be regulated by relevant German laws. Likewise, MBB-ERNO’s contract with a German subcontractor would be ruled by such laws. Liability between the two parties for instance, in respect of damage caused by activities or services as much as by defective products, would be regulated by German law; at least, it has been excluded from the operation of Article 16 of the IGA and does not fall under the scope of the Liability Convention either. To begin with, the concept of damage there only deals with “loss of life, personal injury or other impairment of health; or loss of or damage to property ( . . . )”; mere liability for breach of contract e.g. seems not to be included thereby. Furthermore, the Convention clearly deals with international claims, even if in the first instance only two entities are involved.

In case these commercial transactions turn out to be international, because buyer(s) and seller(s) are from (at least) two different states, this merely means that private international law comes into play in order to deal with the question what jurisdiction to what extent is to be given priority in a given case. If MBB-ERNO were thus to contract the Dutch Fokker company, the place of contract or stipulations within the contract would make either German of Dutch (or in some instances a third country’s) law applicable — just as much as when Fokker would provide an airlock for an Airbus aircraft, instead of a pressurized “Columbus” module. Once more, the IGA does not provide for a specific piece of what could be called “astro-law” in this regard, apart from the issue of liability for all sorts of damage, which is excluded by the specific cross waiver regime of the IGA. Mutatis mutandis, the same would hold good for tort disputes.

Consequently, the only relevance of such international transactions not being doubly-private but involving government entities either as seller(s) or as buyer(s) or both, is potential application of the general public international law-doctrine of state immunity. The application itself however is provided for once more by domestic laws; with regard to international transactions once more private international law providing for the choice of law. Thus, if it
was the German government contracting Fokker to provide an airlock, and consecutively a dispute were to arise related to this contract, either German or Dutch law would decide whether Germany could claim state immutity or not.

It may be added, that such transactions will by nature (selling or buying of products or services) as much as by purpose (the realization of a specific kind of space activity, more precisely the creation of a space station) be of a “jure gestionis” character. Only in case therefore courts are still applying the principle of absolute state immunity will companies or other states becoming commercially involved with such a state really run a special risk, namely that of not having contractual obligations to them honoured by such a state, and not being able to have such obligations enforced in court.

There remains one type of case to be dealt with here, where totally earthbound commercial transactions can have implications with regard to space law: the problem of product liability. The mixed nature of the commercialization in this respect becomes clear, as “[s]pacecraft ( ...) are chiefly manufactured by private corporations, a rule which certainly applies in the USA; they are, however, usually owned by the State.” Owned by a state or not, once the spacecraft or object is launched into outer space and then proceeds to cause damage as defined under space law, the state(s) which come(s) under the heading of launching state become liable for such damage.

Thus, producers of defective products, even if they are sold to other entities, can make a state which in the end launches or procures the launching of the object, or from whose territory or facility the object is launched, liable for the damage. It then depends once more upon the domestic law of the state involved (or, concerning international transactions, the domestic laws of the states involved plus relevant rules of private international law making a choice between those), whether states have some kind of recourse once their liability has been invoked on an international level. Likewise, the questions as to what extent various producers within a chain of producers each contributing their own production-plus-assembly actions to an intricate and complex end product such as (a part of) a space station can incur product liability for the end product turning out to be defective, is a question of the domestic law(s) of the state(s) involved, and, where relevant, rules of private international law.

“Freedom” in this respect does not really provide for an exception, although the IGA in Article 16 concerning cross waiver of liability effectively includes all kinds of product liability. Under the terms of the IGA, however, for example damage incurred by the German government, because of use of a defective Japanese element in its contribution to “Columbus,” does not fall under the cross waiver because, for the purpose of Article 16 of the IGA, the Japanese manufacturer would be a related entity of Germany and not of Japan. Thus, such damage could indeed be claimed from the manufacturer by Germany through other, applicable, liability-rules — i.e. German ones.

Other elements of law important for commercial enterprises as to this phase, specific agreements between relevant states e.g. in the framework of the European Space Agency or the European Communities taken aside, are also simply dealt with by domestic law systems, and, under circumstances, private international law. Examples here are taxation questions and anti-trust laws.

Thus, it is very easy indeed to see that territorial jurisdiction is the fundamental basis of every particular legal regime and therefore provides in itself the basic legal framework for the earth-based phases of space station-undertakings.

5. Who Pays the Damage? — Legal Aspects in Regard of Liability and the Launching Regime

A specific kind of legal regime appertains to the next phase any space station has to pass through: the launching phase of the various parts of any space station, and although it does not solely relate to this phase, it is more prominent and relevant here. It is a regime already mainly provided for by space law — or at least one specific part of space law: the liability regime. This, consequently, will also apply to any commercialization to be found in the ‘industry’ or ‘business’ of launching. Here, the basic dichotomy of privatization in relation to commercialization, concerning sellers and buyers respectively, becomes apparent, for private entities may be seen to become involved both in providing launching services and in using them.

Liability, of course, is an important legal aspect of
any activity, commercial or not, private or not, and the same holds good in space. To what extent certain activities are seen as potentially profitable, and therefore would be undertaken commercially, depends partly on the consequences of that activity causing damage, i.e. the extent to which such damage could or should be compensated.

The liability regime in a way is the exception to the rest of space law, which is basically applicable either to outer space or specific parts of outer space (such as the moon and celestial bodies) or to activities which are in such a way defined that they either take place in outer space itself, or are almost exclusively focussed on outer space (such as the registration obligations for space objects). As the Liability Convention makes clear, its regime applies to damage occasioned during the launching as well, so that it also covers these parts of the launching which take place on earth and in the air space-trajectory to outer space. It even applies to launched objects which never reach outer space as it also covers attempted launching.

On the providing side, since a number of years ago, the launching of space objects has become one of the most commercialized and privatized fields of space activities. In the United States, apart from NASA, the governmental space agency involved more or less as a spider in the web, for a number of years private corporations such as Martin Mariëtta, Hughes and McDonnell Douglas have offered their rockets to carry satellites to various orbits, in a competitive and commercial manner. In Europe, the semi-privatized company of Arianespace has in the ten years or so of its existence even grabbed at least 40% of the commercial launcher market. And both the Former Soviets republics, desperately looking for money and a way to help restructure their economy, and the Chinese Government, also keen on hard currency, have started to offer their launching services for very competitive prices.

Before we try to analyze the legal aspects of commercialization in this respect however, it must be noted first that their relevance for the issue of space stations is at the moment fairly limited. The buyers of commercial launching services from providers such as those listed above, are mainly those wishing to operate satellites for telecommunication or remote sensing activities, the only other two fields of space activities where commercialization may be said to have had a considerable impact already. As the space station's parts to be launched are in the end provided by states through their space agencies (thus non-private) and any financial return or money in the space station is on the short term out of the question and on the longer term still highly uncertain, the commercial motive so far plays an unimportant part in these launchings.

The buyers of these launching services will tend to look therefore at other aspects from the cost of one launcher as compared to another, such as reliability (technical as well as organizational), or, due to the complex nature of any space station project, the advantages of having a command structure as simple as possible, i.e. as much as possible within one body. And, indeed, the elements of "Freedom" are to be launched on the US space shuttle. For the moment, Hermes, yet to be realized, is planned only to launch the Man-Tended Free Flyer, an ESA-project not part of the permanent core of "Freedom." On the one hand, its realization has come under considerable doubt, on the other hand, if the space shuttle is going to encounter still more problems, it may at sometime in the future even be called upon to perform stand-in services — for instance, when ESA would decide to go ahead with its own elements of "Freedom" after some restructuring and in partnership with other states also willing to press forward in that sense.

And direct commercial involvement in the launchings even by private entities could become a reality, if the current trend of restructuring and budget cutting is going to hit both space shuttle and Hermes programmes. The trend towards capitalism and free market economy in (formerly) communist countries and governmental financial problems in (already) capitalist countries may well force increasing involvement of private expendable launch vehicle-operators acting for profits. Hence, it is still interesting to look into the structure of legal rules in respect of launchings of (parts of) space stations.

On the using side, it seems unlikely that entities with commercial motives, public or private, will in the near future use launching services in respect of planned activities related to space stations, whether those launching services are provided commercially or not, by government or by private enterprise. The outlook e.g. for doing business on the international space station at all is too grim for that whereas dong business on "Mir" already at first sight seems
to be equivalent to taking vast and unknown risks in legal and other terms. Entities looking for profits in space activities which need to use launching services can get far better value for money by getting involved in telecommunications or remote sensing. Nevertheless, that may of course change. If Coca Cola has made a lot of money with its advertisement on “Mir,” next time they may think of doing bigger, and buy someone’s launching services. At the moment, the owners of “Mir,” whoever they are, are earning some US$15-20 million for each foreign guest making a short trip to “Mir”; from their point of view it is definitely worthwhile.

Commercialization in respect of provision, or in respect of use of launching services basically however does not differ much, as far as liability is concerned. In all such cases, basically the Liability Convention contains the international legal framework relevant thereto. It may be considered binding upon even those states who did not ratify it, as it is supposed to be an elaboration merely of Article III of the Outer Space Treaty, the ‘Magna Carta’ of space law.

The Liability Convention provides for liability for damage for what is called the “launching state,” and precedes this by defining it in basically four different ways. Thus, a state becomes liable for damage if it is the state that launches the object causing the damage, the state that procures that launching, the state from whose territory it has been launched or the state from whose facility it has been launched. As, moreover, launchings undertaken within the framework of, or by, intergovernmental organizations do not in any way exclude liability for the member states of that international organization, in theory an unlimited number of states can become liable for damage by the object launched.

What is the relevance of this regime for commercial undertakings in respect of space stations? As far as they are public, it means of course that, so far, states launching or procuring the launching, or even offering their launching facility or territory for hire for launches, of parts of space stations, can become liable for damage caused by such part of a space station. It is important to note this seeming obviousness, because it tends to get forgotten once the space station is settled and well in operation. The extension here of e.g. territorial jurisdiction, as a consequence of the definition of “launching state,” seems almost automatic, and domestic filling-in almost obligatory, while at the same time it does not acknowledge separate status of the space station or its parts as (quasi-)territory, because the territorial link of the launching still rules supreme. It is as if Dutch aircraft flying to Canada must still be considered for all liability purposes as being an extension of Dutch territory, even while at the gates of Montreal Airport.

This last conclusion is underscored by actual facts in two ways. First, usually a state that launches itself does so from its own territory or facility, only in case of procurement is the use of ‘foreign’ launch sites a common phenomenon. And second, in case of more than one launching state becoming involved, the launching-contracts explicitly take care of derogation or eventual damages being claimed from the state whose territory or facility is used, whereas it is usually that state which is appointed registration state.

That the Soviet government, respectively its successor as a state, is still liable under the Liability Convention as a launching state for any damage that might have occurred in Argentine territory caused by the falling down of debris from its Salyut-7 station in February 1991, even though the actual launch had taken place almost nine years earlier, may still be considered logical. However, likewise, in theory European states, even those contributing a small portion to ESA’s “Columbus” budget and thus co-procuring the launching, could be held liable if the international space station “Freedom” is going to de-orbit some 30 years from now and causes damage by doing so. If the de-orbiting has been occasioned by actions on the US module it would be much more logical in view of the quasi-territoriality of the US module and the related US jurisdiction to hold the United States liable, as a corollary of its jurisdiction which means that it is either culpable itself or has jurisdiction to try the culprits, than those European states.

In regard of private enterprise becoming involved in the launchings of parts of space stations, it will usually be the state from whose territory the part is launched, that will be liable if damage is occasioned thereby. Even if the launching itself is undertaken and also paid for (i.e. procured) by one or more private companies, i.e. involving both a private seller and a private buyer, and the launching facility is also operated by a private entity, the state whose territory witnesses the launching will be liable.

This has two important consequences. First, it
would mean that (only) in case of launches as described just before from facilities outside any national territory (read: jurisdiction), for instance from a platform on the high seas, no state can be held liable under the Liability Convention — unless one could argue that a state has a duty to prevent its nationals (juridical or otherwise) to organize or participate in launchings for which no state could be held liable. In other words: states would be really under a due care responsibility for their nationals. 65)

Thus, any claim based on damage should be brought on the basis of the responsibility of states for their national activities, including those of non-governmental entities. 66)

That such a claim might very well succeed in principle if the seller, i.e. the launch provider, is a national of the state held responsible, seems clear. In regard of the state of nationality of a buyer of launch services things may perhaps seem to lie differently. Can one hold a state responsible if one of its nationals allows himself to have his satellite launched by a national of another state, outside any state’s territorial jurisdiction on a private facility? 67)

If the system is to be watertight, that question should also be answered in the affirmative.

Article VI of the Outer Space Treaty provides for such a responsibility for national activities, i.e. usually considered as based upon the link of nationality, with concurring authorization and continuing supervision being offered as instruments as far as activities in outer space are concerned. Other activities relevant for outer space fall by definition within one territorial sovereignty or other (except of course if undertaken on the high seas or some parts of Antarctica) as well as under one national sovereignty or other.

Whether the state thus in the end held responsible for the international wrongful act of not preventing damage from being caused by a national activity, has any recourse against the private entity really causing the damage, depends on national legislation. For completeness’ sake, it must perhaps be added that in this respect the term “national activities” should also be seen to apply to a permanent resident of the appropriate state in case the person in question has no nationality at all: a stateless person launching from the high seas or unclaimed parts of Antarctica could thus still indirectly create some sort of liability for one state or another.

It is my opinion that territorial application of Article VI, not through the territory from which the space station is launched but through perceiving in law the space station as a piece of territory of its own and all activities taking place on board to be national activities, would solve the aforementioned problems concerning seeming inapplicability and illogicality of application of the liability-regime through the launching state-notion. Such a perception would, both through Article VI of the Outer Space Treaty and through general public international law, create quasi-territorial jurisdiction as a counterpart to the general international responsibility for national activities, which is jurisdiction based on territoriality as much as (or rather even more than) on nationality.

It would also have the advantage of partitioning liability-through-responsibility along logical lines in case of both provider and user of the launching service being private entities. The national activities for which the state of nationality of the former would then remain responsible, e.g. if damage occurs, would be the launching activities, whereas the state of nationality of the latter would become responsible for all activities of the space object that was launched after it had started to function, i.e. after the launching phase had really ended.

The second consequence of the definition of launching state for the commercial activities of private entities relates closely to those last remarks. Private entities under international space law cannot be held internationally liable; in case of damage being caused by their activities, it is one state or other that is going to be presented with claims. 68) In the case mentioned before, it is the state from whose territory the relevant (part of the) space station is launched, even if it does not more than having the launching take place on its territory. Once more, for these states it depends upon their respective national legislations, to what extent those claims can be derogated to the entities actually causing the damage.

And indeed, some states, notably the United States, Sweden and the United Kingdom, have already provided for national space legislation to derogate liability claims in respect of launches from their territory, or alternatively by their nationals. 69)

Elsewhere, it would need extensive research into the various national legal systems, in order to clarify to what extent domestic laws not (specifically) aimed at space activities could still provide for such derogation.
Generally speaking, it may be said that the liability-regime uses territorial jurisdiction as the foremost basis for dealing with launchings. As far as the launching phase itself is concerned, this seems a logical and convenient mode of operation. In regard of space stations, in regard of the multiplicity of functions, states and entities involved, and activities possible, and in regard of the projected life spans, for the operational phase this seems to be far less logical and convenient. Instead, space stations once more will probably best be seen as "territory" themselves, creating their own "territorial jurisdiction." That brings us to the next phase, that of operation of the space station in question. While it has to be kept in mind, that the space law-regime of liability remains relevant thereto as well, this specific regime will not be dealt with concerning the operational phase: the analysis provided so far nevertheless, mutatis mutandis, still applies to that phase.

6. Mine or Thine? — Legal Aspects in Regard of the Operational Phase

Any space station’s operational phase is the most peculiar in legal terms, as it is here that the space station’s unique elements and characteristics are being shown most clearly. As already mentioned, the main characteristic of being designed for long-time human habitation effectively would turn any space station into a kind of floating piece of territory. No longer would it simply qualify as a transport vehicle under space law with “launching” as the most important fact basically providing for legal consequences — despite the fact that for example the present liability regime is still based on this notion, unless specific arrangements have been made.

Thus, here in particular, the question arises as to what extent the ultimate authority on board would not be any longer a kind of captain, mainly involved in making travelling decisions, but instead a kind of king — or at least his deputy — making all kinds of decisions as to what happens on board just as if, indeed, if concerned a piece of territory. The question has already been summarily dealt with in general. As to this specific issue, the question then would follow as to whom a space station or a specific part thereof would “belong”: is it mine, so that my jurisdiction applies, or is it thine?

If the juridical framework for everything happening on space stations or their parts and more basically for providing answers to the question “mine or thine?” would best be provided by the same rules as it has been done down on earth, let us indeed start with earthly international law principles. They entail first and foremost the delegation of jurisdiction to one territorial sovereign or other, and only next the designation of specific legal regimes for pieces of land or sea happening to fall outside any territorial sovereignty (be they either “terra nullius” or “terra communis,” or even a special form of the latter called “common heritage of mankind.”)

Territorial sovereignty, however, according to Article II of the Outer Space Treaty, does not apply to outer space, and Article I even suggests outer space to be something akin to the common heritage of mankind. On the other hand, that of course would not mean that any space object, whether part of a space station or not, is really no-man’s land or a commonality.

As is the case in sea law with respect to ships on the high seas and in air law with respect to airplanes in airspace over those high seas, space law provides for a kind of quasi-territorial jurisdiction through a registration regime. Article III of the Outer Space Treaty provides the core element of this registration regime; whereas in sea law and air law jurisdiction is closely related to nationality, registration Convention goes on to detail that provision: in case there is only one launching state, that state is obliged to register the object and thereby become its state of registry; in case two or more states qualify as launching states, one of them should be jointly determined to become its registration state.

In any case, the state of registry through its exercise of jurisdiction and control really becomes quasi-territorially quasi-sovereign over the space object. Quasi-territorially, because it is of course not really territory as such, which means that once it would fall down on real territory, any fiction of territoriality would cease to exist and the only territoriality which would remain in play would be that of the state on whose territory the space object would have fallen down. Quasi-sovereign, because especially in case more than one launching state is involved, jurisdiction (and control) cannot be apportioned automatically, and for instance could be shared on
agreement between the launching states involved.\textsuperscript{81}]
This all, of course, becomes especially relevant in respect of space stations. With space stations having a single launching state (and therefore, by definition, only one state who can become the state of registry, thus having full jurisdiction and control automatically), the situation is relatively simple. National law would apply, as far as it is expressly or impliedly extended to space stations in outer space, as a consequence of the legislative part of jurisdiction.\textsuperscript{82} and would regulate all legal aspects of doing business. Thus, tax laws could apply, as they are usually based on the territorial principle for (legislative jurisdiction\textsuperscript{83}; or antitrust law, likewise usually based on territorial criteria.\textsuperscript{84} Both, moreover, could be construed either in personam or in rem, once more depending upon national application.

In case of international involvement, of a French astronaut visiting “Mir,” either specific arrangements would need to deal with the jurisdictional issue and thus with the legal framework for commercial activities — whether private or not —, or the law of the state of registry would apply quasi-territorially.\textsuperscript{85} Bringing Article VI of the Outer Space Treaty in line with this situation, i.e. making the Soviet Union respectively its successor responsible as a state for everything happening on “Mir,” would create a logical counterweight to this jurisdiction.\textsuperscript{86} Regarding the exemplary French astronaut on “Mir,” that would mean that he would fall, for all his commercial activities as well as for other activities, under the jurisdiction of the successor to the Soviet Union, and would have to submit to the latter’s laws, including its system of private international law (as far as that would exist and apply). The French state on the basis of his nationality would only retain the residual jurisdiction over nationals and the right of offering diplomatic protection in case it does not agree to a specific Soviet legal action, as a corollary to the responsibility of France under Article VI of the Outer Space Treaty for its national activities.\textsuperscript{87}

A much more complex situation will arise in cases of structural and permanent international involvement in space stations, where the need for redefinition of Article VI of the Outer Space Treaty is shown even more forcefully.\textsuperscript{88} The most interesting example in point is provided for by “Freedom,” where, it being a truly international space station, multiple jurisdictions come into play. The basis in this respect is provided for by the Intergovernmental Agreement (or IGA). The liability regime, a problem of its own regarding “Freedom” as well, will not be dealt with here.\textsuperscript{89}

The IGA provides through Article 5 (1) that, in accordance with Article II of the Registration Convention, the United States and Japan each register their own modules, part of “Freedom,” whereas the European Space Agency (ESA), having accepted the rights and obligations of the Registration Convention in accordance with its Article VII, registers the European module, “Columbus.” Article 5 (2) consequent apportions jurisdiction and control over those modules; ESA having the task of dealing within its framework with the problem of not being a sovereign entity used to, and fit for, exercising jurisdiction.\textsuperscript{90} This jurisdiction and control moreover under Article 6 (1) has been closely linked to ownership, which in respect of the station’s elements belongs by definition to the respective states of registry.

A complication however immediately arises, which indeed makes clear that any jurisdiction to be exercised can only be quasi-territorial and quasi-sovereign, and that any contract or other commercially relevant action on board of the space station cannot be that simply allocated to one jurisdiction to the exclusion of others.

Article 5 (2) of the IGA in its first sentence provides for an important alternative basis of jurisdiction: partners also “retain jurisdiction and control (…) over personnel in or on the Space Station who are its nationals.” As such, this is a common phenomenon on earth too, where very often in a like manner both the territorial jurisdiction of one state and the jurisdiction of another state over its nationals are seen to apply. On earth, usually the territorial jurisdiction is granted priority: for contractual law as much as tort law the lex loci is usually applied unless specific reasons would make application of other jurisdictions more logical, and in criminal law overriding importance of territorial jurisdiction is also the rule.\textsuperscript{91}

On space station “Freedom,” however, that would not be the case to the same extent, as “[t]he exercise of [any] jurisdiction and control shall be subject to any relevant provisions of this Agreement, the MOUs and implementing arrangements.” What relevant provisions can be distinguished in the IGA? The special case created for criminal jurisdiction\textsuperscript{92} is the
most explicit exception to the general principles of Article 5 (2), but of little relevance for our subject.

More important for our purpose are Articles 7, 9 and 10 of the IGA. Article 7 provides for the system of management of the various programs to be conducted on board the space station. Responsibility for management and direction of the programmes of the United States and the planning for and direction of day-to-day-operation of the US registered modules (respectively in the line of some sort of personal jurisdiction over nationals, juridical or natural, and (quasi-)territorial jurisdiction) as well as for overall programme coordination, direction of the space station, and establishment of overall safety requirements and plans, is delegated to the United States.93

Subsidiarily to those provisions, the other partners shall each be responsible for management and direction of their own programmes and utilization activities94; which would suggest an element of personal jurisdiction as counterpart to such responsibility. Elements of (quasi-)territorial jurisdiction for the other partners are notably absent; they can only find some sort of a basis by going back to Article 5 (2), first part of the first sentence, and Article 6 — or by going on to the subsidiary Article 10.95

This construction seems to suggest that commercial activities on the space station are not simply dealt with by the law of the partner on whose registered space station-element that activity takes place. Even taking aside the problems in respect of ESA-registered-elements, where additional measures would be necessary to create applicability of certain legal rules of one national European legal system or another, and also taking aside the question of whether a partner’s domestic legal system provides for its own extension in a relevant measure to a piece of steel floating in outer space, the special responsibilities of the United States are worth nothing. Business on the Japanese Experiment Module would need to reckon with safety requirements with regard to the space station as a whole, as promulgated by the United States, which seems to possess thus, under certain circumstances, the power to overrule or nullify contracts when it comes to the crunch.

Article 9 provides for the basic legal framework for utilization in respect of the space station. It does, in the first instance, simply divide “the use” of the various modules between the space station’s partners by way of establishing fixed percentages.96 Especially relevant for enterprise interested in doing business is paragraph 8. It provides that basically each partner may use itself, or select users including of course private ones, for its allocations under the first six paragraphs and the related MOUs to its own discretion — but: subject to “the object of this Agreement and the provisions set forth in the MOUs and implementing arrangements.”

Two additional caveats are further made. The first means that a private entity under the jurisdiction of a non-partner to the space station (or that non-partner itself) proposing to use an element of “Freedom” will find that its proposal is dependent upon notification to all partners, and, more importantly, upon concurrence of the partner whose element is concerned and, as far as the Attached Pressurized Module of ESA or the Japanese Experiment Module are concerned, also of the United States.97 Which means for instance, that a Korean entity willing to do business on the JEM, even when its partner is a Japanese company, is dependent upon American consent to do so. In terms of our earthly parameters, this means that a certain module is considered to be quasi-American territory as well as quasi-Japanese or quasi-European,98 which once more reflects the basic caveats to the use of (quasi-) territorial jurisdiction in regard of space stations.

The second caveat deals with the interpretation of the peaceful purpose which is binding upon all space station users. It is the partner providing a certain element which determines whether a certain activity taking place on it is indeed for peaceful purposes.99 This means e.g. that a European weapons manufacturer has more chance to do business on the American module than on the European module, given the tendency on the American side to interpret peaceful purposes much more broadly.100

Then as to Article 10, it does to a certain extent elaborate upon Article 7’s provisions, focussing on the development and implementation of safety procedures as a consequence of the responsibilities which the partners have “in the operation of the elements they respectively provide.” Article 10, being much shorter than Article 7, is also much simpler: no specific case is created for the United States — however: Article 10 is subsidiary to Article 7.101 It effectively means that business enterprises should look at both the overall safety responsibilities of the United States, and the specific safety requirements
issued by the partner whose element is concerned, as those responsibilities may turn out to be matched by regulations providing for jurisdiction in rem as to contracts or products fabricated on board.

In conclusion, it can be said here that the basic legal framework for commercial activities on board space stations is in fact provided for by a quasi-territorial regime of jurisdiction by the registration state, if the space station is a one-nation undertaking (even if some international involvement is present), whereas the truly international example of “Freedom,” having a set of registration states (including even one international organization), by way of the IGA created an intricate system of both quasi-territorial and personal jurisdictions — the former however in general still being the more important ones.

Thus, even leaving aside questions of liability, it seems to make sense also to adequately redefine Article VI of the Outer Space Treaty in the direction of general public international law, where the other side of the coin of territorial jurisdiction is provided for by the basic international responsibility of a state for everything happening on its territory which can potentially violate or harm interests or rights of other states.

7. Frendome to Damage? — Legal Aspects of Liability in Regard of the International Space Station

Finally, a few more words must be said on the issue of liability, as it specifically relates to “Freedom”; because it, among others, very well shows the logic of applying the principle of territoriality to space stations. The general liability regime for space activities has already been indicated, and to a certain extent also applies to the space station “Freedom.” Article 16 and 17 of the IGA provide for this regime in regard of our only example so far of an international space station. What they effectively do, is make a distinction in the sense of creating one regime for cases of damage arising where only partners to the space station (or their entities) are involved, which are dealt with by Article 16, and one regime for cases where damage caused to, or by, third parties is involved, which are dealt with by Article 17.

Article 16 provides for a cross waiver of liability, which amounts to a waiver of liability in case of claims involving more than one partner or its entities, including claims based on delict, tort and conduct. Thus, damage falling under the IGA caused by the US government to the Japanese government, or vice versa, can not entail liability for such damage. Neither, seemingly, can damage for instance caused by the US government to the Japanese Shimizu Corporation or vice versa, by Shimizu Corporation to a European, Canadian or US company involved in the space station undertaking or vice versa, or by the Canadian Ministry of State for Science and Technology to Shimizu or vice versa, entail such liability.

On the other hand, questions of liability ‘within one partner’ do not fall under Article 16. In respect of the US, Japanese and Canadian partners, this is logical, as such questions would seem to fall within one domestic jurisdiction or other. As to the European partner, ESA not being a sovereign international organization, by way of the IGA created an intricate system of both quasi-territorial and personal jurisdictions — the former however in general still being the more important ones.

Important furthermore in this respect is the definition of “damage” as provided for by the IGA, and the related notion of “Protected Space Operations.” “Damage” is defined very broadly, as it encompasses not merely every kind of personal injury and damage to, loss of, or loss of use of property, but also loss of revenue or profits and other direct, indirect or consequential damage. The cross waiver of Article 16 applies in rem to all these kinds of damage.

Moreover, these kinds of damage do not only relate to actual operation of the space station, even including the launching phase, but also to “research, design, development, test, manufacture, assembly, integration (. . .) of launch or transfer vehicles (. . .), the Space Station, or a payload, as well as related support equipment and facilities and services,” and moreover to “all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services,” as all these activities fall under the definition of “Protected Space Operations,” and thus under the cross waiver. 111

In conclusion as to this point, it may be said that as between partners to the undertaking of building and operating “Freedom,” and their entities, there is indeed to a large extent ‘freedom to damage.’ It goes
so far, that even a breach of contract between entities of different partners as to research or development can not entail liability, and damages can not be awarded. For entities, commercial or not, private or 'not, involved in any kind of space station-related activity, that will be a very important problem indeed.

One final point in this regard has to be elaborated upon a little further: the definition of "related entity." So far, it has been suggested that the relation between a partner and "its" entity hinges simply on nationality. An entity, whether corporate or institutional, having US nationality, is suggested to be an US entity for the purpose of the IGA automatically; claims against the US by such an entity would remain 'internal,' claims against e.g. Canada be 'international' in the sense of falling under the cross waiver.

Things are not really that simple however. In the IGA, "related entity" is defined as "a contractor or subcontractor of a Partner State at any tier," "a user or customer of a Partner State at any tier" or "a contractor or subcontractor of a user or customer of a Partner State at any tier" (emphasis added). The (repeated) use of the word "of" in fact points to a link between a partner state and its related entity existing through the partner state in question contracting the entity in question.

This does not sound as a territorial link (nor as a nationality-based one); seemingly, it is through the contract that the entity becomes an entity under the umbrella of a state for the purpose of the cross waiver, which would mean that Fokker, if contracted by the Japanese government, becomes a Japanese related entity to that extent, instead of a Dutch or ESA-related one. Potential damage to Fokker caused by Japan thus would not fall under the cross waiver but instead under the applicable national Japanese liability regime, whereas such damage caused by the Netherlands, alternatively ESA, would be covered by Article 16 of the IGA.

Likewise, a contract between two entities can be 'identified' in this regard. If Shimizu subcontracts General Dynamics for part of its contribution to the Japanese Experimental Module, General Dynamics would be a "related entity" of Japan through its being a subcontractor of Shimizu and the latter's contract with NASA. and claims for damages between Shimizu and General Dynamics would thus fall under Japanese law.

In practice, most related entities contracted by a partner, a state or its cooperating agency, as much as the entities subcontracted by the contractors, will be entities with the nationality of that state — usually, that is, registered and/or having their 'siège social' in that state. This means, that de facto perhaps it will usually still be a case of territoriality deciding on the applicable liability regime; the special IGA-regime becoming applicable as a kind of "astro-law" already, although not solely related to the realm of outer space, in case of more territorial jurisdictions than one being involved through the nationality of the entities concerned.

Furthermore, a contract between a state and a foreign entity may also be envisaged, and often is, under the terms of the contract or under private international law, as effectively being concluded on the territory of the state; thus territorial jurisdiction might be seen to be applicable, if not in personam, at least in rem, to this issue as well. Mutatis mutandis, the same applies to contracts between two entities. All this, however, does not derive from the fact that de jure the link seems still to be provided for by the contractual relation; this seems to be an important flaw in the logic of the legal framework of "Freedom." If the cooperation under the IGA is going to be truly international underneath the state-level as well, such cooperation among entities of different nationality has to face a serious obstacle here. It would mean namely, that in each case of an entity thus becoming involved with a foreign state, liability for damage would not be cross waived as far as the intercontractual relationship was concerned. On the other hand, however, the Japanese government for instance would thus not be able to issue a claim for damage incurred by Shimizu Corporation in the course of the latter's engagement by NASA, because for the purpose of that engagement Shimizu would be a related entity of the United States and not of Japan. Neither could the US government claim from Japan, if Shimizu damaged US property, for Japan is not the launching state in this respect and thus can never be held liable under the Liability Convention. Shimizu on the other hand could claim, but could most probably only do so under US legislation and jurisdiction, as the Liability Convention excludes from its own scope cases of damage occurring to foreign nationals involved in the launching. Under its own liability laws it is the US government...
which likewise could sue Shimizu, should the damage have been caused by the latter to the former. As to damage caused to, or by, third parties, things lie differently altogether. Article 17 of the IGA simply states that "[e]xcept as otherwise provided in Article 16, the Partner States, as well as ESA, shall remain liable in accordance with the Liability Convention."\(^{121}\) Furthermore, paragraphs 2 and 3 deal with the consequences of a third state claiming one or more partners to "Freedom" to be liable. Thus, as is logical, rights of third states as to forwarding claims for damage caused by activities related to the space station-undertaking, have not been abrogated by the IGA-structure, and consequently here no 'freedom to damage' has been allowed for. To what extent ‘freedom to damage’ remains for private entities, once more depends upon domestic legislation. This, of course, makes it quite interesting indeed for states to create or apply such legislation, and may convince them to do so.

In view of the jurisdictional question this leads us to the conclusion that the specific IGA-regime does not deviate from our analysis with regard to the importance of (quasi-)territoriality as the primary basis for jurisdiction to any great extent. In regard of damage caused by space station-activities to third parties as much as vice versa, the normal liability-regime as dealt with\(^{122}\) remains in force. This kind of damage will as a matter of fact also be of the traditional sort, external from a space station-point of view in the sense of that space object somehow damaging another space object. The fundamental weakness of the close link of liability to the (or a) launching state in view of the planned long lifetime of "Freedom" remains to the same extente. Once more it is worthwhile to ask in this respect whether it would not be better to change the structure of this regime in the direction of applying traditional (quasi-)territorial jurisdiction, and subsidiarily nationality-based jurisdiction, to space stations in respect of liability-problems as well.\(^{123}\)

A change has however on the contrary been achieved in regard of the other category of damage which can be imagined, that between partners and/or related entities. Both in a philosophical, and in a practical, and in a legal sense as well, such damage really is damage caused within the framework of the space station-agreements, and apart from the traditional kind of space object-to-space object damage can very well encompass what may be labelled 'internal damage.' Therefore it will only have consequences and be relevant within that framework. Most often, it even indeed will relate to damage occurring physically within the space station itself.\(^{124}\)

In the latter case, as alluded to, the damage can relate to all kinds of activities which are not specifically space activities in a legal sense, such as a research contract, or even have nothing to do with space law, such as the sale of a photo camera. Thus it is most logical indeed to apply liability regimes, as a specific field for exercising jurisdiction, on a quasi-territorial basis.

This, for instance, in regard of purely earth-based commercial activities, by not touching upon them as long as remaining within one territorial jurisdiction, and by using territorial jurisdiction as the basic criterion in case more than one is involved. This, also, in regard of the whole space station and all activities exclusively taking place on board, by creating essentially a specific liability-regime for the total of those activities, whereby the whole of the space station for the purpose of liability, even in respect of its physical presence in outer space, turns out to be some sort of internationalized quasi-territory. The concrete filling-in of this liability-regime, in the sense of the creation of a comprehensive crosswaiver for liability, is not important in this respect — although, of course, for commercial enterprise willing to step on board, it is highly relevant indeed. The fact however that the liability regime on board "Freedom" is not in line with the remaining jurisdictional issues, and not in line with the responsibility-question either, makes a safe comprehensive legal evaluation very difficult, if not impossible.

8. Pioneers vs. Profiteers — The Special Issue of Intellectual Property Rights

There is one special issue which has been left out of the foregoing analysis, because it does not solely relate to what is happening on board of a space station, and as matter of fact even effectively tries to equate for its purpose activities on the space station to activities on earth: that of the regime of intellectual property rights.\(^{125}\) Any such regime has as its basic tenet the protection of someone's pioneering and inventing work against potential parasites prying on his or her inventions without any accompanying
trouble, and thereby the stimulation of pioneering and inventing efforts in the first place. On the other hand, a pioneer or inventor is not seen as having an inherent right to an eternal monopoly once having pioneered or invented something; and the regime is also in place to strike a balance in this respect.\footnote{126}

All this means, that for the regime to be comprehensively effective, it should apply both to inventions on space stations, in order not to discourage pioneers on board, and to mimicry on space stations, in order not to encourage profiteers to dodge earthly restrictions by moving their mimicry to outer space. Although the latter possibility is perhaps for the time being, due to the cost of producing anything on board, not really a feasible one, together with its much more practical complement it underscores the point that to maximize effectiveness of an intellectual property rights regime, space stations should be equated in essence to pieces of territory, and a quasi-territorial approach to its legal framework seems inescapable.

In regard to one-nation space stations, the solution is simply to apply, whether by amendment or by implication, existing intellectual property rights law to space objects such as the one in question. Thus, any company interested in becoming active on board, whether with the nationality of that nation or not, should figure out whether such a law indeed applies to the space station. If it does not, a large problem looms ahead; basically, mimicry would be given free play.\footnote{127}

In regard to the really international undertaking of the space station “Freedom,” the above conclusions have been confirmed to a large extent. Article 21 of the IGA deals with these questions,\footnote{128} and the quasi-territorial approach is very prominent again here. Thus, according to paragraph 2, for the purpose of Article 21 “an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the Partner State of that element’s registry” (emphasis added). A special provision even pertains to ESA-registered elements to the effect that the combined territory of the European participating states is to be viewed, at their discretion, as a kind of ESA-territory.\footnote{129} Other provisions of Article 21, going more into detail as to the application of patent laws and the like to non-nationals or non-residents, and the specific problems concerning the many European states together forming “Partner ESA,” do not detract from the conclusion that, as to intellectual property rights, the legal framework with regard to “Freedom” is a quasi-territorial one.

It does effectively partition the possibility of application of the various domestic laws of the states involved in a manner quite analogous to private international law, the main difference being that in the case of space stations the basically appropriate national law does not apply automatically but has to provide for its own extension, either explicit or implicit, either in itself or by amendment, to the realm of outer space or at least space stations therein. And indeed, the United States for one have already amended their domestic intellectual property legislation to the extent of incorporating inventions made on board of the American-registered elements of the space station.\footnote{131}

As to the European situation, already in the ESA Convention it was stated as to the subject of intellectual property rights in general that “the Agency shall, with regard to the resulting inventions and technical data, secure such rights as may be appropriate for the protection of its interests, of those of the Member States participating in the relevant programme, and of those of persons and bodies under their jurisdiction.”\footnote{132} Apparently this resulted in a system, applicable to space station inventions and data, which made of Europe (read: the Europe of the European Space Agency’s member states) one territory for the purpose of intellectual property rights, also dubbed “royalty-free licensing rights for space applications in Europe,”\footnote{133} excluding from this sector applicability of any specific national intellectual property rights regime which, if applied on their own, might risk being circumvented or made useless through their limited territorial coverage, and otherwise would confuse the issue.

As to data rights and technology transfer impediments, likewise a quasi-territorial extension of national legislations is, if not as of yet provided for, at least sought after.\footnote{134} Related issues of import and export regulations are even intrinsically linked to “territory” in one form or another.\footnote{135} And, as was shown, the registration system of space stations, whether in general or with regard to “Freedom” in particular, through its apportionment of jurisdiction allows indeed for such possibilities.

In conclusion, it may be said that both as to national and as to international space stations, the
best way to deal with intellectual property rights and
the road indeed followed in practice, basically would
be and is to follow along the lines of (quasi-) ter­
ritoriality and private international law as it func­tions on earth. In any given example, that is where to
look for when worrying about investments of time
and money in inventions being protected against
profiteers.

9. The Territorial Approach, Domestic Legislation
and Private International Law — A Pandora’s Box

With the help of the territoriality-approach as
applied in the foregoing analysis, finally perhaps a
provisional conclusion may be formulated as to the
legal aspects of commercialization in respect of space
stations, or rather the basic legal framework for such
commercialization, clarifying to what extent the
Journey into the Unknown for a commercial enter­
prise, whether private or public, risks opening a
Pandora’s Box.

The first important distinction is that between
what basically is a one-nation-space station, with
“Mir” as its prominent example, and a truly inter­
national station, of which “Freedom” should be­
come the prime example. The one-nation-stations
will usually be registered by one state and thus fall
under one jurisdiction, which quasi-territorially over­
rules any other jurisdiction possibly applicable.
Whether it concerns taxation, import and export
legislation, liability or intellectual property rights
regimes, tort or contract law, an entity planning to do
business will need to take a look at one national legal
system only, and consequently plan its actions,
including perhaps negotiating specific arrangements
on specific points. It does not really matter whether
the pre-operational phase or the operational phase is
concerned; only as to the liability regime existing
international space law can become directly relevant,
somewhat in deviation of the territorial approach.

As to international space stations, the sole
example currently existing bodies ill. The specific
regime created does in some instances half-heartedly
apply quasi-territoriality to space stations. It will be
clear that a quasi-territorial approach, if comprehen­sively applied, would have many advantages, espe­
cially as to legal clarity in respect of those willing to
do business. The fact however that precisely such
comprehensiveness is missing, wherefore the quasi-
territorial approach becomes mixed with other ap­
proaches to a different extent in regard of different
issues such as liability and intellectual property
rights, and of different phases of space station-
undertakings, makes business indeed a risky affair in
legal terms — and this holds good, to be sure, to a
certain extent already in the only phase so far realized,
that of construction and development.

For each issue and each phase, a different legal
framework arises, pieces of public international law,
present or absent national legislation, both in direct
and in indirect ways relevant for space activities, and
so-called private international law mixing in con­
tantly changing fashion. For lawyers perhaps this is
paradise, for the entities who have to pay them
however it will be much less so — but can they go
ahead regardless, without those lawyers.

Thus the question remains: Pandora’s Box? In
respect of the international space station, it may well
seem to be. Although the launching phase has not
even started yet, the undertaking is already in severe
danger of being restructured to smallness, or perhaps
to oblivion; whereas the billions of dollars, yen,
marks and guilders already invested in research and
development have already begun to hurt more than
one entity involved — both states and companies.
Thus, already some disease seem to have escaped
from the box.

The only, radical, solution in my opinion would be
the legal vaccination of application of quasi-territori­
ality, because this would make clear internationally
speaking where responsibility and liability in what­
ever sense are to be found. Thus it would of itself
necessitate the states involved to take care of their
own interests in those respects by creating domestic
legislation to fill in the framework, thus making outer
space into an environment for commercial enter­
prise legally similar to their own respective territories.

The approach of “astro-law,” of creating a specific
kind of private international law for the interna­
tionalized area of outer space is the only alternative
medicine, but has the disadvantage of being not
comprehensive to begin with. More importantly, due
to the inescapable influence of concepts of territorial
and national jurisdictions which already exist and
which will certainly remain if not indeed grow more
dense in application, the result would probably be an
even greater patchwork than that currently existing.
The effort to create something like a specific body of
private law for "Freedom" seems a case in point.

In view of the fact finally, that Pandora's Box has already been opened, despite sincere warnings to the contrary, it is not useful any longer to merely recognize the fact and keep cursing it; cursing has never cured disease. What may help, however, is analysis and diagnosis, and start developing legal medicines for those diseases that are with us now, and start thinking about potential future diseases. If that is done properly, even Pandora's Box may in the end have been worth opening.

NOTES


3) Manned Space Stations, pp.78-80; Cambridge Encyclopedia, pp.262-265; Space News, Jan. 21-Feb. 3, 1991, on p.36 mentions July 1979 as re-entry date!


The project of the international space station "Freedom" is legally based in the first place upon the 27-Article Intergovernmental Agreement (IGA), made on Sept. 29 1988. The IGA has not yet entered into force, as only Japan, Germany, Denmark, Norway and the Netherlands, out of 13 signatory states, have ratified (see for the rules regarding entry into force Art. 25). Secondly, therefore, the 7-Paragraph Interim Agreement of Sept. 29, 1988, which is in force, is legally relevant, providing for the legal regime applicable prior to entry into force of the IGA. This especially, since, thirdly, three Memoranda of Understanding (MOU's) are already in place and in force between NASA on the one hand, and ESA, STA (the Japanese Space and Technology Agency) and MOSST (the Canadian Ministry of State for Science and technology) respectively on the other hand.

For the technical and operational framework, see further Artt. 1, 6-10 and the Annex of the IGA; Manned Space Stations, pp.99-114; Cambridge Encyclopedia, pp.306-312; A.J. Young, Law and Policy in the Space Stations' Era, DOredrecht etc., 1989, pp.18-63. Basically, for the space station itself, as opposed to free flying elements, the United States were to provide the habitation module and a laboratory module, ESA's contribution dubbed "Columbus" was to consist of another laboratory, sometimes called the Attached Pressurized Module (APM), Japan was also to contribute its own laboratory, called Japanese Experiment Module (JEM), whereas Canada does not provide part of the station's space but a Mobile Servicing System including a Remote Manipulator System.

7) See e.g. Space News, June 10-16, 1991, p.11, Also Manned Space Stations, pp.81-88; Cambridge Encyclopedia, pp.296-298; Young, pp.13-18. "Mir," however, is not untroubled as an environment for commercial activities either: since the recent developments in the Soviet Union have already lead to a demise of that Soviet Union, problems arise on the horizon as to what republic(s) or state(s) will take over, and consequently what (as of yet most probably non-existent) law system will apply to "Mir." On the one hand, a Commonwealth of Independent States (CIS) has taken the place of the Soviet Union in international politics as of December 1991, encompassing 11 of the 15 republics of the latter including all the important ones from the point of view of space activities (Russia, Ukraine, Byelorussia and Kazakhstan).

On the other hand, this Commonwealth clearly is no sovereign state, at least not as of yet: it has no constitution, no international legal personality and almost no central organs, it merely consists of a set of different agreements between the sovereign republics who are the ones with real international legal personality. One of these agreements, the most important for our purpose, is the Minsk Space Agreement (see Aerospace Daily, Jan. 7, 1992, pp.31-32, for the English text) signed on December 30, 1991, and in force as of that date. In this Agreement, to which only 9 republics are a party (amongst others, the Ukraine abstained), it was agreed to continue the former Soviet Union's space efforts in more or less unchanged fashion, while taking into account the changed political structure. No specific
arrangements however have been made as of yet, not with respect to “Mir” and not in other fields, and it still remains to be seen therefore how for instance jurisdictional, liability — and registration — problems are going to be solved.


9) Thus, in respect specifically of “Freedom,” Ahearn, after optimistically stating that “[s]ome time near the turn of the century, Space Station Freedom (the “Station”) will finally be in business,” rightly remarks: “[t]he very real question, however, is whether business will be in the Station (…) [in other words,] whether private enterprises who are not Government Contractors will find the Station a hospitable business environment in which to conduct the new business operations that so many people are hoping will finally make space “just another place to do business.” At his point in time, the prognosis is guarded, at best.” C.D. Ahearn, “Legal Aspects of Operating a Commercial Business on the Space Station,” Space Commerce 1 (1990), p.55.


11) As to space law, see e.g. Tatsuzawa, Proceedings 31st, p.341; Bourdely, Annales, pp.171-172.

12) See once more e.g. Tatsuzawa, Proceedings 31st, p.341, speaking of “the transition of government owned and operated civilian space activities to strictly private ownership and operation, or civilian space activities originating through private initiative;” Bourdely, Annales, p.173, focussing on the “quality of the seller,” where it must be added that as to legal implications of privatization in connection with commercialization the quality of the buyer should also be taken into account. Also: He Qizhi, Annales, p.334, focussing on “strictly private ownership and operation,” which should thus be interpreted as applying to a product or service both before its sale (i.e.: pointing to the seller) and after (i.e.: pointing to the buyer); Silvestrov, p.91, who even states that “[p]rivatization itself does not create something new in principle.”

13) Cf. also Ahearn, pp.55-57.


15) See the discussion supra, at note 12.

16) See the efforts at defining the notion of “space station,” sometimes very tentatively indeed, in e.g. C.Q. Christol, The Modern International Law of Outer Space, New York etc., 1982, p.6; Zhukov & Kolosov, p.154, quoting the Final Acts of the 1971 WARC which however at the most provide for a partial definition (and an obvious one
17) “Mir” had a core configuration which was launched in February 1986, while later elements such as “Kvant” were added by later launches, making “Mir” by 1990 with some 90 tons more than three times as heavy as the core configuration in itself; Manned Space Stations, pp.81-83; Cambridge Encyclopedia, pp.296-298.

“Freedom” was, before the current budget and restructuring plans, planned to be assembled in space. The first element’s launch was due in March 1995 and through some further twenty or so US Space Shuttle flights, each adding their own piece of the ultimate 200 tons which the station was supposed to weigh, complete assembly was supposed to take place in August 1999. Planned launch date for the first element and planned date for final assembly at the moment are still uncertain; cf. also Manned Space Stations, pp.111-113.


21) Sometimes for instance specific treaties can be concluded arranging for these problems; cf. e.g. the air law conventions dealing with jurisdiction in respect of hijacking and sabotage acts. See e.g. Shaw, pp.363-364.


25) See e.g. Gorove, Manned Space Stations-Legal Issues, p.28.

26) Cf. Outer Space Treaty, Art. VIII; Registration Convention, e.g. Art. II (2). See also Gorove, Manned Space Stations-Legal Aspects, pp.29-31.


28) Cf. e.g. Artt. 5 and 22, IGA.

29) Cf. e.g. Brownlie, pp.305-306; Shaw, pp.346-352; 367-370; Akehurst, Modern Introduction, pp.49-50.

30) See e.g. text at notes 18 and 19.

31) See literature at note 18.


33) See further infra, Chapter 5.

34) Art. VI, Outer Space Treaty.

35) See supra, literature at note 29.

36) See for an extensive survey of problems and risks confronting as an example US enterprise in terms of US government legislation and policy: Ahearn, pp.56-66.

37) See infra, Chapter 7.

38) Art. I (a), Liability Convention.


40) See supra, text at note 23.

41) See Art. 16, IGA; also discussion, infra, Chapter 7.


43) On the issue as to what extent “nature” respectively “purpose” of an act are relevant for its qualification as an act “jure gestionis,” see e.g. Sinclair, pp.210-213; Higgins, pp.267-269; Steinberger, pp.438-439.

44) See e.g. He Qizhi, “Legal Aspects of Commercialization


46) Art. I (c), Liability Convention, and Art. I (a), Registration Convention, provide for a fourfold definition: the state which launches, or procures the launching, or from whose territory or facility the space object is launched.

47) See for an analysis of Art. 16, IGA, infra, Chapter 7.

48) See once more infra, Chapter 7.

49) Thus, US anti-trust law would apply to contracts and the like between two or more US entities, see Dal Bello; White, p.24; whereas Art. 85, 86 and 90 of the EEC Treaty would apply to entities in EC member states; Treaty Establishing the European Community (EEC Treaty), done March 25, 1957, entered into force Jan. 1, 1958, text in 298 UNTS 11.

50) Liability can also apply e.g. to stations already orbiting for a long time; see discussion infra.

51) See on liability and the role of damage in this respect in general e.g. the author’s paper presented at the IISL Colloquium of October 1991, Montreal, to be published in the Proceedings, 1992. Also, specifically as to “Freedom,” Ahearn, p.62.


53) In respect of the moon and other celestial bodies, a particular treaty has been concluded: the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (hereafter Moon Agreement), done Dec. 18, 1979, entered into force July 11, 1984, text in Annals of Air and Space Law XV (1990), pp.334-335.

54) See Art. I (b), Liability Convention.

55) See e.g. Robinson & Meredith, pp.2 ff.; G.C. Raclin, “Going to Work in Space: a Survey of Presently Availble Launch Systems,” American Enterprise, the

The moon and other celestial bodies and their resources are, on the contrary, explicitly stated to be "common heritage of mankind"; Art. II (1) (j); Art. I (1), Moon Agreement; on the other hand course of so far only few states, and none of the larger space powers, have ratified the Moon Agreement, wherefore its legal value may be sincerely doubted.

74) Cf. also White, p.28.
75) See e.g. Brownlie, pp.242-243, 254-255, 319-320, 424-426; Shaw, pp.317-319. Up to a certain extent it would also hold good in respect of ships in territorial waters; e.g. Brownlie, pp.203-209; Shaw, pp.307-308.
76) See e.g. Brownlie, pp.426-428; Akehurst, Modern Introduction, p.288. Up to a certain extent it would also apply to airplanes in foreign airspace; e.g. Brownlie, pp.121-122, 319-320; Akehurst, Modern Introduction, p.288.
77) See also Young, pp.152-153.
78) The link is provided for by registration in both cases; see citations notes 75 and 76.
79) Art. II (1) and (2), Registration Convention, respectively.
80) See on the issue of these two notions e.g. Tatsuzawa, Proceedings 31St, pp.343-345; Dal Bello, p.58.
81) See Art. II (2), Registration Convention.
82) See e.g. Akehurst, British Yearbook, pp.179-212; Bowett, p.1; Mann, pp.3-18; also White, p.28; Dal Bello, pp.42-46, 50-52; Gorove, Manned Space Stations-Legal Issues, p.30; Ahearn, pp.63-65.
84) Cf. Akehurst, British Yearbook, pp.190-206; also White, p.36.
86) See my suggestions on this point, supra, Chapter 5.
87) See discussion supra, Chapter 5, esp. text at notes 65 and 66.
88) See e.g. Dal Bello, pp.46-49.
89) See infra, Chapter 7.
90) Cf. once more Art. II (2), Registration Convention. So far, to my knowledge they have not yet taken measures to deal with these problems.
91) See Akehurst, British Yearbook, pp.145-257; Bowett, pp.1-26; Mann, pp.3-83.
92) See Art. 22, IGA. Also Gorove, Manned Space Stations-Legal Issues, pp.30-31.
93) Art. 7 (1), IGA.
94) Art. 7 (2), IGA.
95) See infra.
96) Those are, according to the original plans: for the NASA Laboratory Module USA 97%, Canada 3%; for the ESA Laboratory Module USA 46%, ESA 51%, Canada 3%; for the Japanese Laboratory Module USA 46%, Canada 3%, Japan 51%; for extra NASA equipment USA 97%, Canada 3%; giving a total of USA 71,4%, ESA 12,8%, Canada 3%, Japan 12,8%, which reflects the budget ratio's; Manned Space Stations, p.101.
97) Art. 9 (8.a), IGA.
98) Canada of course does not have a module; its contribution to "Freedom" consists of the Mobile Servicing System; see supra, note 6.
99) Art. 9 (8.b), IGA.
101) Art. 10 reads: "(...) in accordance with Article 7 ( ... )"
102) As mentioned, these questions form a special regime even in regard of "Freedom"; see for their discussion infra, Chapter 7.
103) See supra, Chapter 5.
104) See e.g. M.G. bourély, "La Responsabilité pour Dommages dans le Cas des Stations Spatiales," Manned Space Stations-Legal Issues, pp.35-42; T.L. Zwaan &

105 See the definitions in this regard provided for by Art. 16 (2.a) and (2.b), IGA.
106 Art. 16 (3.a), IGA.
107 See Art. 16 (3.d.1), IGA.
108 Cf. e.g. Ahearn on the US situation, p.63.
109 See Zwaan & De Vries, p.448.
110 Art. 16 (2.c), IGA.
111 Art. 16 (2.f), IGA.
112 Art. 16 (3.a), IGA.
113 Art. 16 (2.b), IGA.
114 See also Zwaan & De Vries, p.448.
115 See the discussion on this issue at Zwaan & De Vries, p.448, Also Young, pp.160-162, discussing the NASA-ESA, NASA-STA and NASA-MOSST MOUs and their respective Artt. 12 in this respect.
116 Cf. Art. 16 (2.b.1) alternatively (2.b.3), in combination with Art. 16 (3.a.2) and (3.d.1), IGA.
117 See e.g. Brownlie, pp.421-423, 485-494; Shaw, pp.422-423.
118 See supra, text at note 23.
119 See Artt. I (c), II, III and IV, Liability Convention.
120 See Art. VII (b), Liability Convention.
121 Art. 17 (1), IGA. See also Bourvé, *Manned Space Stations-Legal Aspects*, pp.39-41; Young, pp.156-158.
122 See supra, Chapter 5.
123 Efforts are necessary; however, so far are being made only in a haphazard way, cf. e.g. Young, p.157.
124 See e.g. Ahearn, pp.62-64.
125 See for the US example: Ahearn, pp.64-65.
126 See e.g. Young, pp.164-171; He Qizhi, *Proceedings 33rd*, pp.59-60.
127 See once more Ahearn, pp.64-65.
129 Paragraph 2 states in this respect: “that for ESA-registered elements any European Partner State may deem the activity [concerned] to have occurred within its territory.”
130 See Art. 3 (b), IGA, defining “the European Governments listed in the Preamble which become parties to this Agreement, as well as any other European Government that may accede to this Agreement in accordance with Article 25 (3), acting collectively as one Partner.”
133 Young, p.176.
135 See e.g. Ahearn, pp.65-66; Wirin, pp.120-130.