

## In need of a European regulation for private human spaceflight

Julie ABOU YEHIA, Research Intern at ESPI

*Emerging European projects in the commercialisation of space activities through suborbital tourism highlight the need for regulation in this area. National space legislation already exists in a few EU countries (United Kingdom, Sweden, Belgium, the Netherlands and France), but it does not specifically cover private human spaceflight. Therefore, it is necessary to address this issue, which is best done at the European level. In this context, the establishment of a central, regulatory authority hosted by the European Aviation Safety Agency (EASA) could be a possible goal*

### The setting

The dream that an outer space experience could belong to everyone is close to become a reality. Space tourism is an emerging market that requires a new approach due to its specific nature. This private new space activity carries a risk factor and has been defined as “all commercial activities which offer to clients a direct or non-experience in the space transportation sector”<sup>1</sup>. The entirely commercial nature of these activities involving private-sector companies transporting private individuals is a paradigm shift with the traditional institutional character of space activities that have usually been linked to the State up-to-now.

Two different kinds of activities are identified: orbital tourism and suborbital tourism that imply different legal issues. This paper focuses on suborbital tourism that consists of flights at an altitude of up to around 100km above the Earth’s surface, with an experience of around five minutes of weightlessness. While orbital tourism involves mainly space law issues, suborbital tourism may touch on both air law and space law due to the absence of a definition of the suborbital engine, and the location and nature of the activity. There are two ways of suborbital flights: with a combined vehicle of the carrier aircraft and its attached spacecraft or with a vehicle using a propulsion

rocket.

On the one hand, with regard to the legal nature of the vehicle, Annexes of the Chicago Convention on International Civil Aviation of 1944 states that suborbital vehicles cannot be considered aircrafts that are “all machines which can derive support in the atmosphere from the reactions of the air”. This annex does not form part to the convention but this definition is sufficient for the purposes of the Chicago Convention and reflects a common understanding among States<sup>2</sup>. From a technical point of view, even if a vehicle could be considered as an aircraft during the first phase and the re-entry phase into the atmosphere, the suborbital vehicle used to reach outer space excludes this definition<sup>3</sup>. Nevertheless, despite an international definition of a space object it cannot be considered as such, because it does not reach a real orbit and the time spent in outer space is too short as compared to the whole trip.

**Suborbital tourism: A hybrid activity that requires a new regime with inputs from air law and space law.**

On the other hand, if were to focus on the activity to determine whether air or space law apply, two approaches can be proposed: The

<sup>1</sup> Hobe, Stephan and Jurgen Cloppenburg. «Toward a new aerospace Convention?- Selected legal issues of Space Tourism». IISL/ECSL Space Law Symposium 2004.

<sup>2</sup> Cloppenburg Jürgen. Legal Aspects of Space Tourism, in: Marietta Benkö and Kai-Uwe Schrogl (Editors): Space Law-Current Problems and Perspectives for Future Regulation. Utrecht 2005, eleven international publishing, Essential Air and Space Law, 2, 196.

<sup>3</sup> This study excludes parabolic flights in equipped aircrafts to experience short period of weightlessness.

“spatialist” approach that gives preference to the location of the activity, and the “functionalist” approach that concentrates on the nature of the activity. The “spatialist” approach does not provide any clarification, because there is no confirmed and recognized delimitation of the legal boundary separating airspace from outer space. According to the functionalist approach, suborbital tourism seems to be closer to air law as regards its development, and the management of its expected future status. Suborbital space tourism is somewhere between air and space activity, and requires the creation of a hybrid regime. The creation of this new regime has to be connected with the nature of the activity and according to the commercial and hybrid nature of suborbital activities, it has to reflect the space law and the air law. In this context, European regulation could be a good solution for the specific interest of harmonizing the laws of European countries at an international level, but also because European projects for any future commercialisation of suborbital spaceflights will increasingly involve different member states of the European Union (EU). Moreover, such regulation would guarantee safety in the execution of these spaceflights as well as for investors. The European regulation would be inspired by the US model of the Commercial Space Launch Act of 1984, as amended, in which the European Aviation Safety Agency EASA could play the same role as the American Federal Aviation Administration (FAA). EASA is the centrepiece of the European Union’s strategy for aviation safety, promoting the highest common standards of safety and environmental protection in civil aviation and even if it has exhaustive competences in air law, it is the best European institution that could host a space transportation office to deal with suborbital matters at the European level.

### European projects for commercial sub-orbital spaceflight

It was a European company that pioneered space tourism. As early as 1954, Thomas Cook in Britain, the world’s oldest travel company, initiated the “Moon Register”, a list where enthusiasts can sign an option for a commercial trip to the Moon. The company guarantees to provide tickets at the earliest possible date. Despite the fact that Thomas Cook has not advertised the register, over 1000 people have enlisted to date<sup>4</sup>.

<sup>4</sup> Christiane Wronski (Marketing & Public Relations Representative of Thomas Cook Germany), Personal Communication, 6 March 1993. Mentioned in the website spacefuture.com. “Space tourism for Europe: A case Study”

Today, even if most of suborbital projects come from United States (Virgin Galactic, Space Adventures, Rocketplane), the European aerospace industry has a number of projects with increasing involvement in the private spaceflight industry that can be explain by the growing market<sup>5</sup>. There are numbers of European suborbital space tourism projects in progress. First, Talis Institute and a Swiss propulsion lab decided to develop “Project Enterprise”. Furthermore, the British Company Bristol Spaceplane Limited plans to develop the Ascender suborbital spaceplane that will operate like an aeroplane with rocket propulsion to 100km above the Earth and plans to offer customers a two-minute experience of weightlessness<sup>6</sup>. Four leading British aerospace companies took part in this study, Dowty Aerospace Limited, Dunlop Aerospace Limited, Pilkington Aerospace Limited and Ricardo Aerospace Limited. Another British company, Starchaser Industries, based in Manchester was awarded a study contract from the European Space Agency (ESA) in 2007 for a detailed assessment of the rocket group’s Thunderstar/Starchaser 5A public space travel vehicle that is currently under construction.

**Europe already has a number of companies developing vehicles for private spaceflights that are waiting for a legal framework in this field.**

Two European aerospace “giants”, EADS and Dassault are also involved in suborbital vehicle projects. Both are in a development phase. On 13 June 2007, EADS Astrium disclosed the basic design of its Tbn suborbital space plane project. The four-passenger plane aims to make one flight a week for ten years and EADS plans to attract as many as 45 000 paying customers per year by 2020 who will pay from €150 000 and €200 000 euros per person. Dassault is currently developing the VSH vehicle through the “Astronaute Club Européen” that is scheduled to be launched from a large carrier aircraft to an altitude of about 100km. Derived from previous studies like Hermes or the Dassault VEHÉRA project, the three to six-passenger vehicle will offer an experience of about three minutes of weightlessness. Other companies like Reaction Engines in the

<sup>5</sup> <[http://www.spacefuture.com/archive/space\\_tourism\\_for\\_europe\\_a\\_case\\_study.shtml](http://www.spacefuture.com/archive/space_tourism_for_europe_a_case_study.shtml)> visited 27 March 2007.

<sup>6</sup> Futron Corporation Study conducted in 2002: Prediction of 1000 sub-orbital passengers per year by the end of the decade and paying passengers generating a market for space tourism nearly \$1 billion by 2021.

<sup>6</sup> Official website < [www.bristolospaceplanes.com](http://www.bristolospaceplanes.com) > visited 27 March 2008.

UK (which was established to design and develop space transport and propulsion systems) and the Aeronautics and Cosmonautics Romanian Association (which intended to represent Romania in the Ansari X Prize competition) are working on European suborbital tourism project.

Finally, the US operator Virgin Galactic is interested in developing business in Europe, but it is still blocked by ITAR regulation. However, it aims to exploit its future suborbital vehicle Spaceship 2 in Kiruna (northern Sweden) that could begin as early as 2011.

In this context, European legislation governing private manned suborbital spaceflight should be created to support the industry in all of these developments, to make these European projects feasible, and, to ensure a certain harmonization at the European Level.

### **The growing need to have a regulation which guarantees the safe use and execution of Suborbital spaceflights**

National legal frameworks regulating private space activities already exist in European countries. Norway (Act on launching objects from Norwegian territory etc. into outer space of 1969), Sweden (Act on space activities of 1982 and its decree), United Kingdom (Outer Space Act 1986), Belgium (Belgian space law of 2005), The Netherlands (The Netherlands Space Activities Act of the 13 June 2006) and France (French law on space operations published the 4 June 2008). These legislations aim to give a legal framework to private space activities, particularly, to establish licensing rules, and launch and control rules for space objects. None of these regulations however govern commercial human spaceflight. Consequently, suborbital tourism requires a set of new regulations that combine air law and space law elements. European regulation could solve the lack of uniformity across European States and would ensure a clear regime for this specific activity, which in few years could become a crucial market for the European aerospace industry. Such a regulation would be made to ensure paying passengers compliance with safety requirements without stifling the industry engaged in such investments.

The areas that these European regulations should regulate are mainly certification, crew and training qualifications, insurance issues, authorization regime for launch and re-entry to Earth, registration, liability issues, and environmental rules.

**Creating a harmonised European regulation on suborbital tourism that would solve the lack of existing national regulations in Europe has to be addressed.**

According to the certification of suborbital vehicles, air law rules are more appropriate than space law rules. The certification of space objects is not an obligation in space law. The Outer Space Treaty of 1967 only deals with the authorization of space activities for non-governmental organizations<sup>7</sup>. Air law rules for the approval of airworthiness are thus more suitable to the nature of suborbital vehicles. It does not have the main goal of delivering a payload into outer space, but its purpose is to carry the spaceflight passenger and operate in the atmosphere mostly like a classical aircraft. At the European level, EASA should create a space transportation department like in United States with FAA. This department would work with its counterparts at the international level within the International Civil Aviation Organisation (ICAO), and at the national level, based on the General Directions of Civil Aviation.

Moreover, rules for the conformity control of the suborbital vehicle have to be created at the European level in order to harmonize and create a set of European references. These European standards could be developed taking into account the international level. In the short term, for experimental flights and the first commercial flight, a pass issued by the General Direction of Civil Aviation of each country could be delivered in accordance with European standards. Nevertheless, the creation of a navigability certificate for a hybrid craft is necessary using European standards. Finally, a license for the operator of this vehicle should be created combining the obligations of air transportation and space transportation.

<sup>7</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Art VI: "States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization."

The space transportation department of EASA could elaborate jointly with experts and qualified doctors rules for the training and the qualification of the crew like it is organized in the United States. The § 460 subpart A of the Human Spaceflight Requirements elaborated in 2006 (amending the Commercial Space Launch Act), impose crews' obligations on the applicant for the license, the operator licensed and the crew itself<sup>8</sup>. According to Article 460.5, the crew members have to "Complete training on how to carry out his or her role on board or on the ground so that the vehicle will not harm the public" and "demonstrate an ability to withstand the stresses of space flight, which may include high acceleration or deceleration, microgravity, and vibration, in sufficient condition to safely carry out his or her duties". FAA issues a license to the pilots ensuring their ability to operate the vehicle, also creating an obligation on the operator, and creates a cross-waiver of liability between the crew and FAA. European legislation could be inspired by FAA rules in the creation of a specific pilot license for hybrid craft.

**American legislation as enforced by FAA could serve as the basis for European regulation taking into account the specific conditions for Europe.**

In space activities, the principle applied is the cross-waiver of liability to avoid the establishing of cross-waiver of liability in chain. Currently, the space tourism is still in development phase and therefore this practice is necessary to help the development of the industry and investments by private entities. The mechanism of a cross-waiver of liability between the constructor and the subcontractors has to be established in European regulation, to ensure with a legal basis this common practice in the space sector in Europe, in the case of failure of a vehicle. The insurances issues rely on the presence of waivers of recourses in the space sector.

Moreover, with respect to insurances issues, some suborbital vehicles are planned to be

launched from a "carrier plane". This plane that brings the vehicle into the air will be insured and the suborbital vehicle itself will also be insured. The insurance will have to be related with the aeronautical insurance regime. However, due to the specific risk created by the carry of the vehicle, a more important ratio to this aeronautical insurance will be applied. For the SpaceShip 2 launch, the carrier plane (White Knight 2) will be insured at a higher ratio than the classical aeronautical insurance. The suborbital vehicle would also be insured by an aeronautical insurance with a higher ratio due to the functional aspect of the activity and because it is not feasible to apply two different insurance regimes in separated phases. Some difficulties will remain for companies on how to determine the value of the vehicle, the risks of the carrier plane and the vehicle, which can only be solved after gaining experience.

**Aeronautical insurance with a higher ratio would be a good solution for insuring suborbital vehicles.**

According to the authorization regime for the launch and re-entry into the Earth's atmosphere, the suborbital vehicle uses rocket technology and the suborbital space tourism activity is exceptional, so the regime used for launching a space object could be used as a model. Considering Article VI of the Outer Space Treaty, an authorization has to be delivered by a national authority of the State responsible for this activity. However, suborbital vehicles are not yet defined as a space object. A specific authorisation for these flights could be issued by the space transport office of the General Direction of the Civil Aviation mandated by a specific national regulation. The authorization could also be granted at the European level by the Space Transportation Office in EASA. Such a European regulation would create harmonized procedures for all EU levels and give a specific mandate to each national authority for execution. A specific European authorization regime for the launch phase and the re-entry phase could be based on the American one, taking in account the European specificities.

As regards the US regime, the Act of 1998 that amends the Commercial Space Launch Act of 1984 introduces the concept of the re-entry of a space vehicle into the legislation. It is the first text that mentions the concept of Reusable Launch Vehicle (RLV) in Article 450.3 that deals with the definition of the Launch re-entry activities. This Act specifically takes into

<sup>8</sup> United States. FAA. Commercial Space Launch Act amended by the Human space Flight Requirements in 2006.

Subpart A. Art 460.3: " This subpart applies to:

(1) An applicant for a license or permit under this chapter who proposes to have flight crew on board a vehicle or proposes to employ a remote operator of a vehicle with a human on board.

(2) An operator licensed or permitted under this chapter who has flight crew on board a vehicle or who employs a remote operator of a vehicle with a human on board.

(3) "A crew member participating in an activity authorized under this chapter."

account the future suborbital flights of RLV. The Commercial Space Launch Amendment Act (CSLAA) of 2004 also defines a specific regime for the flying licence for Reusable Suborbital rockets. The FAA's department of space transportation is in charge of the licenses, the authorizations and the regulation of the launch and re-entry phases for commercial space activities<sup>9</sup>. The EASA Space Transportation Office could play the same role as the FAA in this field and an international space transportation office could be made in the ICAO structure. This European framework could create a harmonised regime for suborbital tourism that has an international nature and could permit to avoid "forum shopping".

Furthermore, for the registration of the vehicle it is important to determine the nationality of the firm in charge of the exploitation of the suborbital vehicle, which can be used as criterion to determine the law applicable to the space tourists on board. If registration under air law seems more appropriate due to the functional aspect of the activity, registration under space law could also be justified despite the new private aspect of the activity. A new system of registration of this specific vehicle could be created that would be governed by EASA through a special office in charge of the registration of "aerospace" objects like suborbital vehicles. The country of registration would permit to determinate the nationality of the vehicle and the law applicable on board.

Private spaceflight activities are already a new sector, with new borders and new challenges that need to be supported by new rules according to the liability regime. The first element concerns with regards to the case of damages to a spaceflight participant during a suborbital flight. According to air law, the Warsaw Convention<sup>10</sup> would apply with its specific limitation of liability in the case of corporal damage to a space tourist during the flight. According to space law, there is no liability regime in the case of damages caused to persons or products transported. The main reason for this lack is the fact that commercial space transportation of passengers is not currently commonplace. With the emergence of the new sector of suborbital space tourism, a radical change will therefore take place in space transportation. Previously, States were

the source of funding for all space flights, but now space flights will increasingly be a private sector undertaking.

According to US law, a "fly-at-your-own-risk" liability regime applies to space flight participants; it requires that they mutually waive the liability of the launch provider with FAA<sup>11</sup> like any other payload operator. The European framework could extend the liability of the operator with a certain ceiling. Passengers could be insured with a possible cross waiver of liability if the operator has not committed a fault. For liability regarding third parties, Europe could establish an objective liability like in the United States with a ceiling and a guarantee by the launching state that goes beyond the ceiling for a limited period. This mechanism would make it possible to give a certain sense of responsibility to the operator and reparation to the victims, while stimulating private companies to join the sector. Over the long term, the amount of the ceiling would increase in order to raise the operator's liability. Finally, a cross waiver of liability between the operator, its contracting parties and its sub-contracting parties must be organised in order to ensure the involvement of all the actors, suborbital tourism is a sensitive market where different actors can not take the risk to be liable.

**The liability regime is influenced by space law in the early phase of the activity.**

Many other areas need to be regulated such as passenger training and flights obligations or issues relating to the protection of the environment. As regards the protection of the environment, activities will have to respect the environmental rules of ICAO, EASA and national rules. Regulations to institutionalize impact studies, itinerary flights in desert and sea zones and to limit the ejection of solid debris in outer space would be required. Such regulations could also impose the requirement to meet the criteria of being classified as a "clean vehicle".

### **Regulations to provide a sound basis for safe investments**

A general harmonised legal framework for

<sup>9</sup> The bill H.R. 3752 of the CSLAA of 2004 gives to the FAA authority to license commercial suborbital launches.

<sup>10</sup> Convention for the Unification of Certain Rules Relating to International Carriage by Air, Signed at Warsaw on 12 October 1929, amended in 1955 at The Hague and in 1975 in Montreal.

<sup>11</sup> United States. FAA. Human Space Flight Requirements of 2006. § 460.49. Space flight participant waiver of claims against U.S. Government. "Each space flight participant must execute a reciprocal waiver of claims with the Federal Aviation Administration of the Department of Transportation in accordance with the requirements of part 440 of this chapter".

space activities in Europe would promote private sector activities and space utilisation while strengthening the European position in this sector. Therefore, harmonising national space laws is a requirement for strategic autonomy<sup>12</sup>. Small innovative European enterprises could have a great impact on this industry, but the legal and financial environment needs to be made more attractive for them. The US regime was designed to promote lively experimentation and to make sure that entrepreneurs and inventors can pursue their ideas. Europe cannot afford to ignore this new market and has to become competitive.

In the current context, suborbital tourism is not governed by space law or air law, but the development of this commercial activity needs to be given a clear legal framework, which does not exist in current national legislation in Europe. However, private investors will be afraid to invest in the long term if there is no legal framework to define this type of activity or, for example, the insurances system. Investors need a firm legal framework to realize their project in safe conditions. Consequently, as regards foreign investment in this sector, an advantageous economical, financial and legal framework is highly recommended to attract private companies that are considering the exploitation of their suborbital vehicles in Europe (like the exploitation of the Virgin Galactic SpaceShip 2 at the spaceport of Kiruna in Sweden). According to the senior advisor to the Swedish Space Corp, Sven Grahn, which operates the ESRANGE launch facility in Kiruna, the regulatory regime in Sweden to cover third party liability could apply to virgin Galactic operations. Moreover, Swedish Space Corp. is investing whether the suborbital tourism activity could be fitted into the same low-tax regime that covers the operations of hot-air balloons. He also mentioned that it remains unclear whether European or Swedish aviation regulations will apply to space tourism from Swedish territory<sup>13</sup>.

**Regulations should be designed primarily to encourage innovation and entrepreneurship in this future market.**

Moreover, as regards future customers interested in these activities, one of their primary concerns is to be able to rely on rules

<sup>12</sup> Schmidt-Tedd, Bernhard. Proceedings of the workshop «Towards a harmonised approach for national space legislation in Europe». 29-30 January 2004. Berlin, Germany.

<sup>13</sup> Space News. De Selding Peter B. "Swedish Authorities Look To Ease Way for Virgin Galactic". 7 April 2008, 16.

that define applicable statutes and the liability regime. Due to the high costs of the activity, a firm legal framework is needed to ensure a clear regime. Strong European legislation supported by national regulations and organised under a European authority could therefore give Europe the opportunity to become attractive and competitive in this sector that will represent a growing segment of space activities in the near future.

### **Towards the establishment of a joint European legislation and the organisation of regulation by a European authority**

The current progress of the implementation of European space policy provides the legal basis and the political will to achieve European regulation in this field. The definition of European space policy by the Space Policy Communication<sup>14</sup> and its endorsement by the joint European Space Council<sup>15</sup> in spring 2007 demonstrate that the space sector is strategic for Europe. Furthermore, space policy has been proposed as a shared competence since the adoption of the EU Lisbon Treaty on 13 December 2007<sup>16</sup>. Private space activities like suborbital tourism are becoming an important part of the space sector and it is necessary for the EU to be competitive in this future market. Europe with these new developments and its attraction for some projects has the opportunity to capture increasing market share in the space tourism industry and to develop expertise. Europe would be intellectually and technically engaged in an area which might have a large influence over the future aerospace sector (like in the employment sector).

The European regulation on suborbital private spaceflight could fall under the jurisdiction of EASA before being harmonized at the international level. EASA, which was created by a European Parliament and Council regulation 1592/2002 in 2003, is now under the new regulation 216/2008 that entered into force the 20 April 2008. It is the centrepiece of the European Union's strategy for aviation safety, promoting the highest common standards of safety and environmental protection in civil aviation. It monitors the implementation of standards by inspections in the Member States

<sup>14</sup> EU. Communication from the Commission to the Council and the European Parliament. European Space Council. COM(2007)212 final. Brussels, 26 April 2007.

<sup>15</sup> EU Council. Resolution on the European Space Policy 10037/07. Brussels, 25 May 2007.

<sup>16</sup> Art 172 bis of the Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007.

and provides the necessary technical expertise, training and research. It also deals with the supervision of the harmonisation of national legislation with regards to approvals of maintenance stations, certifying staff and training organisation, as well with regard to individual airworthiness. EASA works together with national authorities with executive responsibilities in the area of certification.

The main executive and regulatory tasks of this Agency are drafting aviation safety legislation and providing technical advice to the European Commission and the member states, delivering safety and environmental type-certification of aircrafts and granting authorization to non-EU operators in aviation. It is the European equivalent of the US FAA, which is the authority in charge of issuing licenses and authorizations for private suborbital spaceflights through the Office of Space Transportation.

The main tasks of this office are to issue licenses and to regulate the launch and the re-entry of commercial vehicles. The scope of competence of the Office of Space Transportation is defined by Executive Order 12465 (Commercial Expandable Launch Activities) and 49 US Code Subtitle IX, Chapter 701 (old Commercial Space launch Act of 1984). Its main objectives are the protection of public health, security, national security and US foreign political interests. Chapter 701 and the US Transport Policy of 2004 mandate the Office of Space Transportation to encourage, facilitate and promote commercial launching activities.

The European regulation on commercial suborbital activities could create a space transportation department, similar to FAA, branching out its competences for suborbital flights. It would be in charge of the European framework for commercial suborbital activities, granting authorization at the European level and serving as the direct European connection for all topics of relevance for the regulation of activities and their success in practice.

**Three levels of cooperation to implement the regulations: International level through ICAO; the regional level through a Space Transportation Department of EASA, and a national level in the form of national general directorates of civil aviation authorities**

In the future, EASA could develop cooperation with the FAA in this field at the international level, and at the European level, it could ensure close relations with the national offices for commercial suborbital activities created under each National General Direction of Civil Aviation. At the international level, an international regulation establishing a specific office within ICAO could be set up to guarantee international harmonization, covering the international, the national and the regional levels.



Palais Fanto  
Schwarzenbergplatz 6  
(Entrance: Zaunergasse 1-3)  
A-1030 Vienna, Austria  
Tel +43 1 718 1118 -0 / Fax -99

[www.espi.or.at](http://www.espi.or.at)

The mission of the European Space Policy Institute (ESPI) is to provide decision-makers with an independent view and analysis on mid- to long-term issues relevant to the use of space.

Through its activities, ESPI contributes to facilitate the decision-making process, increases awareness of space technologies and applications with the user communities, opinion leaders and the public at large, and supports researchers and students in their space-related work.

To fulfil these objectives, the Institute supports a network of experts and centres of excellence working with ESPI in-house analysts.

ESPI Perspectives are short and concise thought or position papers prepared by ESPI staff as well as external researchers.

**Available for free download from the ESPI website**  
[www.espi.or.at](http://www.espi.or.at)

© ESPI 2008