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The Galileo Project Put to the Test of European Competition and Public Procurement Law

The following article throws some light on the (fragile) legal foundations of the Galileo Project, the European Satellite Navigation System, and gives an interpretation of the normative procurement rules of the EU. Additionally it tries to reveal the practical problems of upholding the principle of free competition and an open market in as much as the procurement of high technology concerns a highly olipolistic market.

Few projects undertaken by the European Union are based on such fragile legal authorisation yet have such great economic relevance as the Galileo project.

"Galileo" is the name given to the European satellite navigation system (GNSS)[1], a joint project of the European Union, ESA and the European aerospace industry. It is based on Art. 154 TEC (establishment and development of trans-European networks with regard to transport, telecommunication and energy infrastructure) and concerns itself exclusively with the civil use of navigation satellites.

The legal authorisation called upon for this large-scale project, Art. 154 TEC, would only be applicable if Galileo made a contribution to the realisation of the single market as well as to the strengthening of the economic and social solidarity of the Community as a whole, serving the establishment and development of trans-European networks with regard to traffic, telecommunication and energy infrastructure.[2] The European Union considers this enabling legislation applicable as a matter of course and claims it for all of its implementing legal acts under secondary law. However, the projected construction and operation of a system of navigation satellites intended to provide European independence from GPS[3] remains legally questionable, as the procurement of navigation satellites for the establishment of trans-European networks with regard to the realisation of the single market is not unambiguous. Furthermore, the European Community would appear to be obliged to observe the principle of subsidiarity in this field as well.[4]

Yet one cannot deny the economic benefits and the lack of technological and political alternatives to Galileo, irrespective of the legal objections to the Community's authorisation. The creation of a system of navigation satellites can neither be realised by the Community's separate member states nor by all 27 member states in the form of intergovernmental cooperation. According to general consensus, Galileo belongs to the category of those undertakings that are desired by all member states yet require a Community framework to enable their realisation.

It is a pity, though, that due to the marginal authority of the European Union in the field of military policy, the cardinal importance of a system of navigation satellites for Europe's autonomy in the command of its armies and its independence from the United States of America has not been mentioned in a single legal document with the necessary clarity.[5]

1 Global Navigation Satellite System.

2 Regulation (EC) No. 683/2008 of 9 July 2008 on the further implementation of the European satellite programmes (EGNOS and Galileo), (2) p. 1, Official Journal L 196, 24 July 2008, pp. 1-11 (hereinafter referred to as "Galileo Regulation").

3 Global Positioning System.

4 Thus argued by Voet van Vormizeele, in: J. Schwarze et al.: EU-Kommentar, Baden Baden 2009, Art. 154, RZ 9.

5 Potential military use requires corresponding constitutional terms of reference due to the principle of conferred competence in accordance with Art. 5 (1) TEC. Art. 17 TEU stipulates the European Union's collective authority for military politics in the context of common foreign and security policy; however, this procedurally designed authority is meant to be realised only gradually, yet by law it is possible to realise it any time through resolutions within the CFSP system; cf. Graf Kielmansegg: Die verteidigungspolitischen Kompetenzen der Europäischen Union EuR 2006, 182 (190), (200); for an in-depth discussion see: IVSG Memo No. 11/2008 Wesentlicher Fortschritt nicht erkennbar, Anmerkungen zu den verteidigungspolitischen Neuerungen des Lissabon-Vertrages; S. Dietrich: Die rechtlichen Grundlagen der Verteidigungspolitik der Europäischen Union, ZaöRV 66 (2006), pp. 663-697; and R. Schmidt-Radefeldt: Parlamentarische Kontrolle der internationalen Streitkräfteintegration, Schriften zum Völkerrecht Band 156, Duncker & Humboldt Berlin 2005.

Table 1
Updated Final Costs[1]
(€ million)

	Initial CAC	Updated	Comments
Phase CO	46	47	
GIOVE[2]	178	270	Launcher(+40)
			GIOVE B + GIOVE A2: +15
			Impl NSGU
			Extn GIOVE A
IOV[3]	1 003	1 424	€ 40m IOV delay
			€ 350m novation
			€ 33m other changes
2 IOV Launcher	75	176	Soyouz Fregat: € 38m
			launch service
			€ 64m/launch
TUS[4]	20	24	MBOC[5] implementation
Sites	16	20	
Miscelleanous (incl. GJU[6])	69	85	
ESA costs	150	344	Programme elongation
			Full recharge of GH C
			ESA as prime contractor
Total	1 557	2 391	

1 According to European Space Agency, Council Working Group for the preparation of the Council meeting at ministerial level: Financial situation of the GalileoSat Programme, ESA/C/WG-M(2008)28, 18 July 2008, p. 17.
2 Galileo In-Orbit Validation Element.
3 In-Orbit Validation.
4 Test User Segment.
5 New signal implemented on IOV at the Commission's request.
6 Galileo Joint Undertaking.

Source: European Space Agency, Council Working Group for the preparation of the Council meeting at ministerial level, Financial situation of the GalileoSat Programme, ESA/C/WG-M(2008)28, 18 July 2008, p. 17.

For years the European Union had tried to implement the project within the framework of a so-called public private partnership (PPP).[6] It eventually became apparent that the private business enterprises involved were not willing to bear the risks involved in the project during the construction and operation stages. In addition, the in-orbit validation activities proved extremely difficult to execute. All time and cost estimates were exceeded. The extent of the budget overrun can be seen in Table 1.

6 See S. Hobe, O. Heinrich, I. Kerner, B. Schmidt-Tedd: Zeitschrift für Luft- und Weltraumrecht, No. 1, 2009, pp. 48 ff.

The GIOVE and IOV phases alone are responsible for more than € 500 million of additional costs.[7] Technical specifications had to be adapted, resulting in delays and additional expenditure, a development that should have been anticipated. Indeed, "the Galileo budget for development and validation, as presented to the Council[8], was incomplete. It did not contain any explicit contingency budget or reserve. It was lower, at € 1.1 billion, than the cost estimates resulting from the definition phase."[9]

The programme's restructuring in 2007 also forced ESA to double the size of its Galileo team for 2008/2009. This resulted in additional costs of € 32 million.[10]

Following this sobering experience, which became the subject of a report prepared by the European Court of Auditors[11] and was given attention in law journals,[12] the European Union decided to implement the Galileo project without a PPP. This political intention contrasted with a lack of actual experience with a procurement undertaking of this size and nature. It was therefore an obvious step to commission the European Space Agency (ESA), whose members do not all belong to the EU, as the project's procurement agency.[13] But despite ESA's undeniable expertise and experience in this field, this decision was also not trouble-free, as ESA had never dealt with a procurement project of this scale.[14] Furthermore, ESA had thus far never engaged in an undertaking according to the procurement principles of the European Community.

7 As shown by Table 1, GIOVE are accountable for € 92 million and IOV for € 421 million of additional costs.
8 COM(2000) 750, 22 November 2000.
9 Cf. ECA: Special Report No. 7/2009 The Management of the Galileo Programme's Development and Validation Phase, with the Commission's replies, History of Galileo, p. 27.
10 European Space Agency, Council Working Group for the preparation of the Council meeting at ministerial level: Financial situation of the GalileoSat Programme, ESA/C/WG-M(2008)28, 18 July 2008, p. 7.
11 ECA: Special Report No. 7/2009, The Management of the Galileo Programme's Development and Validation Phase, with the Commission's replies, History of Galileo, p. 6.
12 S. Hobe, O. Heinrich, I. Kerner, B. Schmidt-Tedd, op. cit., p. 48 ff.
13 Cf. Art. 18 (1) Regulation (EC) No. 683/2008 of 9 July 2008 on the further implementation of the European satellite programmes (EGNOS and Galileo): "On the basis of the principles set out in Article 17, the Community, represented by the Commission, shall conclude a multi-annual delegation agreement with ESA, on the basis of a delegation decision adopted by the Commission in accordance with Article 54 (2) of the Financial Regulation […]"
14 For 2008 ESA had a budget of € 3,028 billion, http://www.esa.int/SPECIALS/Ministerial_Council/SEMPIR4N0MF_0.html.

Table 2
The Updated Cost Estimate for the Galileo Programme

	Original cost estimate (in € million) (COM(2000)750)	Updated cost estimate (in € million) (COM(2007) 261 and ESA documents)
Definition phase	80	80
Development and validation phase	1,100	2,100
Deployment	2,150	3,400
Total	3,330	5,580
	of which 1,800 million to be borne by the public sector[1]	all to be borne by the public sector[2]

1 Annual operating costs, including constellation replacement, were estimated at € 220 million.
2 Availability payments (fixed part) for operating cost, maintenance and replenishment debt interest until 2030 are estimated at € 5,300 million.

Source: ECA: Special Report No. 7/2009 The Management of the Galileo Programme's Development and Validation Phase, with the Commission's replies, History of Galileo, p. 19.

These universally valid procurement principles[15] that are subject to review by the European Court of Justice have been specified decisively by Regulation (EC) No. 683/2008 of 9 July 2008.[16] The specified secondary-law definition abides by those principles claimed by the European Community ever since its foundation, i.e. the creation of a system of undistorted competition for the purpose of the implementation of the single market.[17]

Recital 25 of said Regulation thus reads as follows:[18] "Open access and fair competition throughout the industrial supply chain and the balanced offering of participation opportunities to industry at all levels, including, in particular, to small and medium-sized enterprises (SMEs), should be pursued across Member States. Possible abuse of dominance or long-term reliance on single suppliers should be avoided. In order to mitigate programme risks, to avoid reliance on single suppliers and to ensure better overall control of the programmes and their costs and schedules, dual sourcing should be pursued, wherever appropriate."

This passage describes the essential underlying principle of the EU policy with respect to public procurement, but it does not sufficiently define it. Art. 17 (3) of the "Galileo Regulation" specifies the standards for awarding contracts during the deployment phase of the Galileo programme as follows:

a. the procurement of the infrastructure shall be split into a set of six main work packages (system engineering support, ground mission infrastructure completion, ground control infrastructure completion, satellites, launchers and operations), as well as a number of additional work packages, through a comprehensive overall procurement break-down; this does not rule out the prospect of multiple simultaneous procurement strands for individual work packages, including for satellites;

b. competitive tendering shall be ensured for all packages and, for the six main work packages, a single procedure shall be applied whereby any one independent legal entity, or a group represented for this purpose by a legal entity belonging to that group, may bid for the role of prime contractor for a maximum of two of the six main work packages;

c. at least 40% of the aggregate value of the activities shall be subcontracted by competitive tendering at various levels to companies other than those belonging to groups of entities that are prime contractors for any of the main work packages; the Commission shall, on a regular basis, report to the Committee on the fulfilment of this principle. In the event that projections establish that it may not be possible to reach the 40% threshold, the Commission shall, in accordance with the management procedure referred to in Article 19(3), take the appropriate measures;

d. dual sourcing shall be pursued wherever appropriate in order to ensure better overall control of the programme, its costs and schedule.

For security reasons, however, the European enterprise Arianespace was selected for the launching of satellites into space. In the following sections, this paper deals with the question of whether and how the principles of the Regulation of 24 July 2008 (Recital 25 and Article 17 (3)) can be achieved at least for procurement during the deployment phase.

15 Cf. Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts; cp. Council Regulation (EC) No. 1605/2002 on the Financial Regulation applicable to the general budget of the European Communities.
16 Official Journal of the European Union, 24 July 2008, L 196.
17 Official Journal of the European Union, 24 July 2008, L 196/3, Recital 25.
18 Regulation (EC) No. 683/2008 of 9 July 2008 on the further implementation of the European satellite programmes (EGNOS and Galileo).

Project Structure

The Galileo project represents one of the two satellite navigation systems promoted by the European Commission.[19] Following its completion, it is intended to provide five main services.[20] The Galileo programme is divided into several phases. The initial definition phase is followed by the development and validation phase, a deployment phase and finally the operation phase. Furthermore, the navigation system is meant to have trans-European relevance in that even non-member states will be allowed to make use of it upon the conclusion of corresponding agreements.[21]

In the context of the project management, the competence is divided between the Commission, the European GNSS Supervisory Authority[22] and ESA[23] as follows:

The European Community, as represented by the Commission, is the owner of the Galileo Navigation Satellite System and the programme assets.[24] Because of the importance and complexity with regard to financing, the three main institutions, the European Parliament, the Council and the Commission, cooperate in the Galileo Inter-Institutional Panel (GIP) according to the joint declaration on the GIP of 9 July 2008.

The Commission is the programme manager and, as such, assumes the overall responsibility for the management of the programmes, including the security-related aspects.[25]

The GNSS Supervisory Authority[26] has to safeguard the system's security domain accreditation and the operation of the Galileo Security Centre according to the guidelines determined by the Commission.

The full Galileo constellation consists of 32 satellites[27] with their respective launchers, ground infrastructures and initial operations.[28] Two years ago, contracts for the construction of the first four Galileo satellites were already awarded to the company Astrium, a 100% EADS subsidiary,[29] with business sites in Germany, France, Spain and the UK.[30]

The procurement tender for the remaining 28 satellites was launched on 1 July 2008. Within the framework of the pre-selection phase, a tender information package was released, containing a number of general specifications and contractual guidelines in addition to the description of the tender procedure. The procurement of the Galileo infrastructure was divided into six main work packages. Each bidding entity was allowed to bid for the role of prime contractor for a maximum of two of these work packages.

After a pre-selection of bidding entities that appeared, to be qualified by the EU Commission, all selected candidates submitted preliminary proposals in November 2008. This was followed by "competitive dialogue" meetings between the candidates and the European Union, represented by ESA. The procurement tender procedure was scheduled to be completed by the end of 2009, following the submission of best and final offers and concluding contracts upon tender acceptance.[31] The entire procurement procedure must comply with the European tender and procurement regulations.[32]

19 The second system is represented by the EGNOS project (European Geostationary Navigation Overlay Service).

20 Open Service = OS, Safety of Life = SoL, Commercial Service = CS, Public Regulated Service = PRS, Search and Rescue = SAR; ECA: Special Report No. 7/2009, The Management of the Galileo Programme's Development and Validation Phase, with the Commission's replies, History of Galileo, p. 6, Galileo, p. 11.

21 Cooperation agreements have been concluded with the United States of America (2004), Russia (2006), China (2003) and Israel (2004), and the NRSCC (National Remote Sensing Centre of China) and MATIMOP (the Israeli Industry Centre for Research & Development) have become members of the GJU (Galileo Joint Undertaking). With Ukraine (2005), India (2005), Morocco (2005) and South Korea (2006), general cooperation agreements were concluded that never resulted in actual participation or even membership in the GJU. Negotiations on cooperation with further countries such as Brazil, Mexico, Chile, Canada, Argentina and Australia were not continued after the dissolution of the GJU: Special Report No. 7/2009, The Management of the Galileo Programme's Development and Validation Phase, with the Commission's replies, Annex III International Cooperation on Galileo, p. 62.

22 GNSS Supervisory Authority = GSA = a European Union Regulatory Authority that provides support to the European Commission with regard to issues of satellite-based navigation.

23 ESA = European Space Agency.

24 Report from the Commission to the European Parliament and the Council on the implementation of the GNSS programmes and on future challenges pursuant to Article 22 of Regulation (EC) No. 683/2008, 2.2 Legal framework, p. 4.

25 Ibid.

26 Heike Wieland: Europäische GNSS Programme. Rechtliche Struktur und Governance, Symposium Rechtsfragen der Satellitennavigation, 8 October 2008, DLR Oberpfaffenhofen.

27 28 operational satellites and 4 backup satellites.

28 Report from the Commission to the European Parliament and the Council on the implementation of the GNSS programmes and on future challenges pursuant to Article 22 of Regulation (EC) No. 683/2008, 2.4. Launch of the procurement for the full Galileo constellation, p. 6.

29 http://www.astrium.eads.net/en/press-center/press-releases/2009/galileo-satellite-giove-b-marks-its-first-year-in-orbit.

30 The core business is divided into three segments: Astrium Space Transportation for launchers, carrier rockets and aerospace infrastructures, Astrium Satellites for satellites and ground infrastructure segments and Astrium Services for the development and supply of satellite-based services.

31 This article was elaborated before some relevant procurement decisions within the Galileo Project had been taken.

32 Report from the Commission to the European Parliament and the Council on the implementation of the GNSS programmes and on future challenges pursuant to Article 22 of Regulation (EC) No. 683/2008, 2.2 Legal framework, p. 4, Art. 17 (1) of Regulation 683/2008.

Box 1

Status Quo under Procurement Law

1. After testing four satellites[1], the contract award process for the 28 satellites in the deployment phase of the Galileo project is structured in two stages. It seems likely that a total of 16 satellites were intended to be constructed in the first stage. In the second stage, final construction contracts for the remaining number of satellites, probably 12, will be awarded to the bidder that achieves the most cost-effective[2] result.

The question arises if a tenderer has a claim against the European Union, represented by the European Commission as central contracting authority, entitling him to the awarding of a contract of a specific volume even though other competitors have submitted technically equivalent proposals.

2. Each short-listed, technically qualified bidder is entitled to a contract award based on parity in compliance with Art. 17 (3) c and Art. 17 (3) d "Galileo Regulation"[3] read in conjunction with applicable "Financial Regulations".[4]

a. These rules provide subjective legal status particularly to small and medium-sized enterprises due to the "*effet utile*" and specific individualisation: the Commission is obliged to transact the contract award for the initial number of satellites according to the dual sourcing procurement model. This obligation is a consequence of the normative preference for dual sourcing according to Art. 17 (3) d "Galileo Convention" on the one hand and of the rationale that the presumption favouring dual sourcing cannot be rebutted "in concreto" by arguing for better cost-effectiveness of single sourcing on the other hand. Only dual sourcing guarantees sufficient competition throughout the entire life cycle of the long-term Galileo project and prevents the formation of a monopoly in the satellite segment.[5] Development in the form of single sourcing, however, carries the risk of technical delays and time delays effecting the schedule. As a case in point, the construction of the IOV test satellites has shown that single sourcing leads to a multiplication of costs as well as to delays.

b. With respect to content, each tenderer may claim that the contracting authority will adhere to the procurement criteria, according to the pre-defined proportionate emphasis placed on each of them, and award the contract according to the best cost-benefit ratio. As the results of the first satellite batch will presumably prove decisive for the further procurement process, the tenderer shall be *entitled to contract award without abuse of discretion* even during the first stage. As any comparison presupposes identical conditions regarding the number of objects of comparison and cost calculation, this claim with respect to content is directed towards a *contract award based on quantitative parity*. Each qualified candidate is thus *entitled to be awarded a contract for the construction of 50% of satellites* from the first batch.

3. If the European Commission awards contracts contrary to these standards, each tenderer may file an action for annulment in the form of a third-party appeal against a decision in accordance with Art. 230 TEC on grounds of the infringement of a secondary right. According to Art. 233 TEC, the contracting authority will then be committed to annul its flawed award decision and make a new decision. If the tenderer has already sustained actual losses, he may file an action for damages. Insofar as there is special reason for urgency, the tenderer may resort to provisional legal protection in accordance with Art. 242 TEC.

1 During the IOV phase.
2 The best cost-benefit ratio.
3 Regulation No. 683/2008.
4 Regulation No. 1605/2002 and Regulation No. 1995/2006.
5 Recital 25, reasons for the enactment of the "Galileo Regulation"; Art. 17 (2) "Galileo Regulation".

This final phase of the competitive dialogue and the conclusion of concession contracts precede the finalisation of the validation phase IOV.[33] Starting series production without waiting for the results of the IOV phase would represent a risk for the phase of operations with regard to costs and schedules.

33 The contract on the launch of 4 test satellites was not signed by ESA and Arianespace until 16 June 2009. The satellites are scheduled to be put into orbit at the end of 2010, http://www.esa.int.

Procurement Conditions Regarding Navigation Satellite Systems

GPS

Procurement transactions comparable to Galileo and documented in publicly accessible sources can only be found in the USA. Taking a look at NAVSTAR GPS III (Global Positioning System III) proves instructive in this regard. Altogether, 32 satellites will be tendered in three

blocks. The contract for the first two satellites, with an option for another ten, was already awarded to Lockheed Martin in May 2008.[34] The contracts for the second and third blocks of satellites (most likely 8 and 16 respectively) have yet to be awarded.

Contract awarding in blocks is justified according to the reasoning that block delivery or block procurement meets military requirements best. In consideration of military requirements, corresponding technological adjustments can be made to the relevant number of satellites in a timely manner.[35]

GPS III began as early as November 2000 with the award of a contract for system architecture and the definition of requirements. For this purpose, two contracts for 12-month studies worth US$ 16 million each were awarded to Lockheed Martin and Boeing. The same applied to the "System Requirements Review" (SRR). Lockheed Martin and Boeing were awarded contracts for studies valued at approx. US$ 20 million each. For the next step of procurement, "System Design Review", Lockheed Martin and Boeing were awarded contracts worth US$ 50 million each. Upon the request for the development and production of GPS III satellites in July 2007 (request for proposal), Lockheed Martin alone was awarded the US$ 1.46 billion contract in May 2008.

There are different explanations for the reasons why Lockheed Martin secured the proposal. According to well-informed sources, Lockheed Martin performed better than Boeing did in completing the order for GPS II.[36] For GPS I and II, Boeing and Lockheed Martin had been awarded contracts within the framework of the development and production module on the basis of virtual parity.[37]

In the principles of the national US security and space acquisition policy of 27 December 2004[38], neither a preference for single sourcing nor for dual sourcing was given as a basis of procurement procedure. However, the guidance does provide highly sophisticated criteria for the decision-making in the acquisition of navigation systems.[39] The considerations of the US Department of Defense for the justification of an acquisition with respect to cost and cost risks remain to be seen. For this purpose, an independent entity conducts ongoing cost analysis with respect to life cycle costs. In the application of these aspects, the question as to why Lockheed Martin was awarded the contract for two GPS III satellites in May 2008 with an option on ten more satellites – leaving open the mere possibility of being awarded a contract of unequal lots for the competing bidder – has not been elaborated by the Air Force.[40]

EUTELSAT

The intergovernmental organisation EUTELSAT[41] was founded in 1977 to provide Europe with a system of telecommunications satellites.[42] The contractual Convention of 1982 specifies the objectives of this organisation.[43] The organisation itself boasts 47 member states, including 25 of the 27 member states of the European Community.[44] In 2001, the public limited company Eutelsat was established, consistent with the Cardiff resolution of 28 May 1999, in order to "operate a system of satellites and to provide satellite services".[45] For this purpose all assets and activities of EUTELSAT were supposed to be transferred to the new company. However, the intergovernmental organisation EUTELSAT still exists today and sees to it that the public limited company Eutelsat complies

34 Press release No. 419-08, 15 May 2008, US Department of Defense: "The Contract acquires two GPSIIIA research and development satellite[s,] a capability risk reduction and maturation effort to evolve capabilities for GPS IIIB and GPS IIIC, a GPS satellite simulator, and a bus real time simulator. It also includes options for ten additional GPS IIIA production satellites".

35 Thus Gary Payton, Deputy Under Secretary of the Air Force for Space Programs: "One of the advantages of a block delivery is, depending on warfighter needs, and on demonstrated technology maturity, we can modify the number of spacecraft in each block as we need them in the future. If the technology maturity is promising and is successful, we could transition earlier to GPS IIIB", press release, Los Angeles Air Force Base, 17 June 2008.

36 Boeing won the contract for GPS IIF in 1996. This programme carried several technical problems. The consequence was a delay of more than 3 years and additional costs of US$ 870 million. On this consult "Global Positioning System – Significant challenges in sustaining and upgrading widely used capabilities", Statement of Cristina T. Chaplain, United States Government Accountability Office, 7 May 2009; see also the point of view of Lauren Thompson, analyst in the Lexington Institute.

37 GPS I Boeing, GPS II A Boeing, GPS II R Lockheed Martin, GPS II RM Lockheed Martin, GPS II F Boeing.

38 National Security Space Acquisition Policy, Guidance for DoD Space System Acquisition Process, Number 03-01, 27 December 2004.

39 Nine different "principles" are identified in this regard: "Mission Success; Accountability; Streamlined/Agile; Inclusive; Flexible; Stable; Disciplined; Credible; Cost Realism". Cf. National Security Space Acquisition Policy, op.cit., p. 3 .

40 "The Air Force planned to use a single prime contractor for 8 GPS IIB spacecraft and 16 GPS IIIC space vehicles". GPS III / GPS Block III, Globalsecurity.org, 3 April 2009. "Our primary intent is to establish a long-term contract relationship with one prime. However, we kept our options open. If we have poor execution performance in IIIA or we have a need to increase the industrial base for GPS development capability, we could go to someone else for IIIB development. We structured the contract to give us that option when we move forward in time, that way we'll be able to make that decision if required." Colonel Dave Madden, Space and Missile System Center's Global Positioning Systems, press release, Los Angeles Air Force Base, 17 June 2008.

41 European Telecommunications Satellite Organisation.

42 See the Preamble to the Convention of 14 May 1982.

43 Convention of 14 May 1982.

44 Only Estonia and Slovakia do not participate.

45 Article II of the Convention of 14 May 1982 in the version of the Cardiff agreement of 20 May 1999.

with the basic principles of the Convention: the commitment to universal service, i.e. satellite services coverage beyond Europe, the rules of non-discrimination and of fair competition.[46]

According to an agreement made in the year 1979, the first five satellites were constructed under ESA supervision. Upon completion they were transferred to EUTELSAT for operation purposes. Subsequently, EUTELSAT has launched invitations for tenders for follow-up satellite generations on its own. Tenders submitted are assessed according to the usual criteria: quality of the proposal, price and compliance with schedule. Even before the formation of the public limited company Eutelsat in the year 2001, the organisation EUTELSAT had always transacted the procurement of satellites as well as space launch vehicles, through dual sourcing with several suppliers (Alcatel, Space Industries, EADS Astrium, Matra Marconi Space, Arianespace). In this way, it was assured that the existence of no single product line of satellites became dependent on the monopoly of one single supplier. This dual sourcing policy had another reason: EUTELSAT wanted to benefit from the most competitive proposal and the most innovative technology each time.

Potential for the Optimisation of Procurement

The effort towards optimising procurement within the various Galileo procurement procedures does not take place in an area unregulated by law. The procedures accepted under microeconomic aspects for the determination of the best quality equipment at the lowest price[47] are applied in accordance with the applicable legal provisions of the European Community. These are, as has already been discussed, the general rules of procurement, stipulating for the procurement decision or the acceptance of a tender that among all proposals, the most economical one with the best quality will be chosen. With regard to Galileo, this principle of cost effectiveness has been specified and qualified in a normative framework. It follows from Recital 25 of Regulation No. 683/2008 of 9 July 2008 that the European Community intends to make this undertaking a prime example for the system of undistorted competition. This *telos*, i.e. the objective of open access and fair competition for the entire industrial supply chain, has been condensed to an operating procurement principle according to which, in Art. 17 (3) d of Regulation No. 683/2008, a *normative preference* for dual sourcing has been laid down in writing. This normative preference for dual sourcing, however, bears the proviso that it assures better overall control of the programmes, their costs and their schedules. This decision implies that the risks and costs carried by single sourcing and dual sourcing can be compared with each other. Yet it would normally be necessary to evaluate the navigation system *in toto*, i.e. even after operation commences, under life cycle aspects[48] with respect to different procurement methods. However, this is not possible for the Galileo procedure because the project as a whole is divided into six main work packages, each one representing a legally independent entity:

- system support
- ground mission system
- ground control system
- space segment
- launch services
- operations.

As has been pointed out, only one tenderer (Arianespace) was considered sufficiently qualified for providing services for the segment "launch services", while in all other segments several candidates are competing with one another. Taking the two main work packages "ground mission system" and "space segment" as an example, it cannot be dismissed that dual sourcing of services will result in doubling certain costs (research and design expenses). However, according to Recital 25 of the Regulation of 2008, the legislator unambiguously emphasised that the procurement markets for the separate segments may *under no circumstances* be made subject to the *dominance* of single suppliers and that medium-term reliance and therefore market dominating positions must be avoided *by all means*. In view of the experiences made with the awarding of the contract for IOV satellites to a single supplier and due to the corresponding cost increase and delays, it becomes apparent why legislators decided in favour of dual sourcing as a rule. Another relevant aspect is engineering security; this viewpoint makes more than one supplier imperative.

Therefore, there is a "legal presumption" in favour of the application of dual sourcing for substantial work packages. However, the question remains how dual sourcing is to be organised. Much can be said

46 Article III of the Convention of 14 May 1982 in the version of the Cardiff agreement of 20 May 1999.

47 Cf. Box 2: Keyword: Dual sourcing and life cycle costing – cost optimisation through dual sourcing; and Stefan Schweiger (ed.): Lebenszykluskosten optimieren, Paradigmenwechsel für Anbieter und Nutzer von Investitionsgütern, 1st edition 2009.

48 Ibid., p. 42.

Box 2

Keyword: Dual Sourcing and Life Cycle Costing - Cost Optimisation Through Dual Sourcing

Dual sourcing can avoid the dependence on a single contractor and the consequences for the enterprise's pricing power by a systematic comparison of two manufacturers. Furthermore, costs can be compared and saved, if possible, by means of a design-to-cost procedure[1] based on life cycle costing.[2] Dual sourcing allows the entire Galileo project to be put into operation earlier, avoiding opportunity costs[3] that arise due to delays.

The simultaneous deployment of satellites by two manufacturers requires half the time one manufacturer would require for the same number of satellites via single sourcing procurement. At this point it must determined whether an early start of operation of the Galileo satellite navigation system economically compensates the amount of additional development expenditure.[4] Delays affecting projects of this size result in considerable opportunity costs.

Another disadvantage of single sourcing results from the satellites' follow-up costs.[5] Maintenance and other services must be procured from the original manufacturer because of its specific expert knowledge. The amount of costs incurred for such services therefore depends on the manufacturer's pricing power. In this scenario, there are no options for comparison and no alternatives.

In order to avoid high follow-up costs, early identification of the life cycle cost drivers[6] is mandatory. The "rule of ten" illustrates the context of exponential growth over the life cycles of all products or projects. A change or adjustment costs e.g. one euro in the planning stage, ten euros in the construction and design stage, 100 euros during the pre-production phase (C0 phase), 1 000 euros during deployment and 10 000 euros after delivery.[7]

In the design-to-cost procedure, the satellites' life cycle phases are divided into cost pools prior to the contract award for development and deployment, and binding cost targets are defined for each cost pool. The sum of all cost pools equals the satellites' total life cycle costs. Upon divergences within one cost pool, causes of error are analysed and controlled cost-effectively if possible during the (pre-)stage that encounters the error. Thus the effects of the "rule of ten" can be reduced, and avoidable follow-up costs can be controlled early on.

Dual sourcing can ensure comparability and control of the separate manufacturers and prevent manipulation from happening. The overall concept of the life cycle cost-oriented development and construction of satellites can be reused for future space projects. The access to historically valid data provides fundamental decision support for future procurement action.[8]

In summary the following can be said: Through an application of dual sourcing procedures:

- one single manufacturer's opportunist advantages and pricing power are avoidable;
- target achievement will be strengthened and promoted by a competitive environment;
- the entire life cycle of all satellites can be more properly identified with regard to quality and quantity, and a continuous improvement process is made possible;
- total costs are optimised on the basis of life cycle consideration, high cost transparency and the comparability of two manufacturers;
- compliance with cost and time schedules is assured, which encourages the satellites' early readiness for operation and avoids high opportunity cost.

1 A procedure of product development according to which the most cost-effective solution for individual components is consistently searched for even during the development stage. In determining costs, follow-up costs (e.g. marketing expenses, service costs) are, in particular, taken into consideration.
2 Life cycle costs are the total costs of a product, system or project incurred over its entire life, including the costs it produces for other business divisions. The concept of life cycle costs is of relevance especially for the adequate assessment of the appeal of (investment) projects as decision-making is often based only on a comparison of acquisition costs, disregarding follow-up costs.
3 Opportunity cost means the cost of the alternative utilisation of a scarce factor. Opportunity cost is also defined as loss of use. The term "loss of use" must be specified content-wise in the individual case: "sales loss, loss of earnings, interest loss or profit margin loss."
4 Development expenses are costs of the implementation of new or further developments incurred for plans or samples prior to the start of marketable production.
5 Follow-up costs are, among others, costs of operation, maintenance and other services.
6 Cost drivers are influencing factors that represent the change or increase in structure costs. The greater the complexity, the higher the structure costs.
7 Heiko Noske, Christos Kalogerakis: Design-to-Life-Cycle-Cost bei Investitionsgütern am Beispiel von Werkzeugmaschinen, in: Stefan Schweiger (ed.): Lebenszykluskosten optimieren, Paradigmenwechsel für Anbieter und Nutzer von Investitionsgütern, 1st edition 2009, pp. 135 ff.
8 Cf. National Research Council (US), Committee on Technology for Space Science and Applications of the Aeronautics and Space Engineering Board: Reducing the costs of space science research missions: proceedings of a workshop, 1997, pp. 49 ff.; Heiko Noske, Christos Kalogerakis, op. cit.; Robert Schwarz et al.: A Probabilistic Model for the Determination of the Effects of Automation of Satellite Operations on Life Cycle Costs, 1996, pp. 956 ff.

in favour of a solution in which each work package is divided into two or three partial packages and the short-listed candidates are accepted for the first partial batch based on *quantitative parity*. Only in this way can it be assured that experience collected during this initial phase of procurement justifies assessments and conclusions that can be analysed for use in the second phase of the procurement procedure. If no equal-lot contract awarding is carried out during the initial phase of the batch, experiences made with the two tenderers are not necessarily comparable. The tenderer who was awarded the larger portion of the batch will claim other necessities with regard to scheduling and cost levels than the bidder who was responsible for a smaller batch size. If it comes to cost overruns or noncompliance with the time schedule, definitive conclusions can be derived only from comparable batch sizes. These conclusions can then be taken into consideration during the second phase of the procurement procedure for the final batch by adapting new contractual terms for both tenderers. It is also conceivable that compliance with cost limits and time schedules for the first part of the batch is rewarded in such a way that the top performing tenderer of the first phase is *automatically* granted approval for the second phase of the procedure. However, this latter approach (i.e. foregoing dual sourcing in the final phase) would always be exposed to the risk that the public sector would be confronted – probably even over the long term – with a single private contractor.

It is surprising that neither the European Commission nor the European Parliament's Budget Committee have ever taken a closer look at this issue. It would appear that these institutions should engage in the long-term control of the development of costs *ex officio*.

Conclusion

In the procurement of products within the framework of the Galileo project that involve relatively large batch sizes (ground mission infrastructure/satellites), the European Community is not only bound by law but also prompted by the consideration of microeconomic aspects to conduct the procurement procedure in two phases. For the first batch, contracts should be awarded to at least two tenderers based on quantitative parity. In view of the experiences made during the first batch, the second batch will be awarded after deliberating whether the original procurement conditions will merely be adapted and dual sourcing will still be applied or whether the second part of the batch shall be awarded to the best performing bidder during the first phase.