

Galileo and GPS: From Competition to Cooperation
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We have succeeded in converting issues that could have driven a wedge between the United States and Europe into a situation where satellite navigation now clearly appears to be an area that is going to add to the strength of the transatlantic partnership.

Ralph Braibanti, Head of U.S. Delegation

A decision by European nations to move ahead with their own satellite navigation system, named Galileo, created a significant dispute with United States. As the outlines of the new system emerged, it was clear that it would compete with the U.S. Global Positioning System (GPS) rather than complement it. This engendered strong U.S. opposition that, over the course of four years of difficult negotiations, turned into an unexpected degree of compatibility. The successful framework agreement between the U.S. and Europe on the relationship between Galileo and GPS may suggest new models for cooperation in space for the provision of services and security, but also shows the limits of cooperation. Understanding the concerns of the U.S. government and industry over the proposed for Galileo and how these concerns have been addressed helps us assess whether the positive outcome is a precedent.

Success in the negotiations was not preordained, as Galileo, almost by design, had become yet another irritant in the transatlantic relationship. The fundamental reason for creating Galileo was political and, at some level, a distrust of the United States. A joint ESA/EC Report “A European Strategy for Space” (sometimes known as the Bildt report) had as a central conclusion that Europe should not become dependent on an external ‘space infrastructure’ for strategic or commercial applications.¹ This follows from the notion that space is an essential national infrastructure (a more compelling idea, perhaps, in the 1990s, before the commercial satellite market fell on hard times), and that it would be wrong to depend on foreign sources of supply. Satellite navigation services are clearly one such infrastructure, one that promises considerable commercial growth. France’s President Jacques Chirac went so far as to state that if Europe did not fund Galileo it would become an “American vassal.”²

Cast in the most positive light, the motivation for Galileo is to build a system that will allow Europe to continue to be an equal partner with the U.S. The U.S. did not gracefully accept this European need to demonstrate an autonomous space capability. Galileo seemed to U.S. observers to combine the commercial competition seen in earlier European initiatives, like Airbus or the Ariane space launch vehicle,³ with an unexpected risk to a key U.S. military resource.

Galileo was the target of considerable U.S. hostility and concern, exacerbated by remarks from EU officials. The dispute over Galileo was shaped by the politics of European integration and desire to demonstrate independence, and by the politics of American frustration with an Europe that was less deferential but also less militarily capable and

hence less capable of meaningful international engagement. The first phase of Galileo and the U.S. reaction to it are in part the story of a U.S. that was unwilling to accept the changes occurring in its European partners, and of European voices that called for an increasingly competitive transatlantic relationship.

Proponents of Galileo cite, as its primary *raison d'être* the need to end Europe reliance on a foreign system controlled by the military that could be shut off at will. That the likelihood of GPS being shut off for Europe was nil made it hard for the U.S. to accept European explanations. Public statements by European officials made it appear that Galileo was designed for a Europe that did not have an ally across the Atlantic. Since the announced motive was, for most Americans, unbelievable, there were strong suspicions that the true motive was commercial advantage or to gain a degree of control over U.S. military activity.

U.S. Concerns With Galileo

European complaints about GPS should not have been a surprise to the U.S. government, as many of them tracked its own review of the problems and future of GPS. This mid-1990s review raised the issues of civilian control, modernization and international participation as crucial for success. The conclusions of an influential commission led by former Secretary of Defense James Schlesinger ('The Global Positioning System: Charting the Future')⁴ on the international reaction to GPS was that the program would have a hard time winning acceptance "if the U.S. system was "perceived as chauvinistic or mercantilistic by foreign interests." Ironically, these comments could apply equally to U.S. perceptions of Galileo. Europeans should not have been surprised at the U.S. reaction. Many Americans perceived Galileo as 'chauvinistic or mercantilistic' and the EU was at first lax in its efforts to dispel this perception.

The U.S. itself had realized that military control of GPS would become a central issue as the potential for use by commercial and civilian users outgrew that of the military and that it was an anomaly for DOD to manage what is becoming an essential civilian service. Following the recommendations of the Schlesinger Report, it created a joint civil-military executive board to oversee GPS, called the 'Interagency GPS Executive Board.'

However, day-to-day operations remained with the Air Force and GPS remained a military program. The Air Force had done a tremendous job in providing this global service, and there has been in the U.S. a disinclination to tamper with success. No other agency was prepared to manage or, more importantly, to fund GPS. The dilemma is that there is little real incentive for the U.S. Air Force to optimize GPS services for civilian and commercial use. The Air Force objective is a satellite navigation system that meets military needs. Surprisingly, these can be less demanding than civilian applications, which often require a higher degree of reliability and redundancy. In contrast to GPS, Galileo is a more modern system designed to meet civilian needs. Although a key part of the U.S. argument against Galileo was that a modernized GPS would make it unnecessary, the pace of GPS modernization was too slow and uncertain to make this claim credible.

President Clinton's March 1996 Presidential Decision Directive (PDD) on GPS identified greater civilian and commercial use and greater private investment in technologies and services as goals for GPS policy.⁵ To encourage this, the PDD committed the U.S. to end selective availability by 2006 and to engage in annual assessments of the use of selective availability until that time. Selective availability was an intentional degradation of the GPS signal that made it less precise for civilian users and was intended initially to ensure that the U.S. military obtained greater benefit from GPS than anyone else.

Well ahead of schedule, and in part in response to commercial users and to the threat of Galileo, the White House decided in May of 2000 to discontinue selective availability. This decision was part of a larger effort to make GPS more responsive to civil and commercial users around the globe. In good measure, this decision was driven by a fear that continuation of selective availability created doubts about the willingness of the U.S. to provide what had become a critical global infrastructure and acted as an incentive for other nations to build their own satellite navigation systems.

The Schlesinger Report also broached the issue of greater international involvement in the control of GPS. This, along with the end of selective availability, would help avoid a situation of multiple, incompatible global navigation satellite systems. U.S. reluctance to move in opening up GPS governance was matched by a European desire to maintain an independent space capability rather than accept dependence on the U.S. for access to space and space services.

This reflected a larger debate over the future of the American satellite industry after the Cold War. The White House, the Department of Defense and the Intelligence community realized that the U.S. would no longer be able to sustain the same satellite industrial base it had in the 1980s with its own military and intelligence expenditures. Some parts of the U.S. government were interested in new, more open policies for space and satellites that would have encouraged cooperation and interdependence by integrating foreign efforts into a larger, U.S.-led architecture (this was, for an example, an element of the 1994 Presidential Decision Directive-23 on Remote Sensing).⁶ The advocates of these policies believed that tight controls would only encourage other nations to pursue their own satellite programs. However, they faced opposition from more conservative elements of the national security community, who feared a leakage of technology and a diminution of U.S. control of space services.

U.S. space policy in the 1990s was also shaped to a considerable extent by nonproliferation goals and a tendency to define other nations' space programs as an undesirable 'proliferation' that should be opposed. The predominance of nonproliferation in the thinking about post-Cold War U.S. foreign and security policy hampered and distorted efforts at cooperation in space. The emphasis on nonproliferation also reinforced a U.S. predisposition to prevent others from acquiring advanced military capabilities, a predisposition that fit nicely into European concerns over 'monopolization.'

In any case, it is not clear that even if the U.S. had pursued greater international involvement in GPS it would have been enough to overcome the larger European political imperative for independence. Thus, although the enunciated policy of the U.S. by the mid-1990s was to seek cooperation with other nations in the peaceful use of global satellite navigation systems, this policy masked important internal debates as to the merits of co-opting or forestalling foreign programs rather than cooperating with them.

The chief dilemma for a policy of forestalling foreign programs is that it does not work. The U.S. underestimated the political commitment of foreign governments to create indigenous space programs. Europe, Japan, China, and India have decided to make the growth of national satellite capabilities a priority. These governments, and others, will continue to invest in space programs to enhance national pride and avoid a U.S. monopoly in space and satellites. The global spread of technology means that they can obtain the capability to build and satellites for navigation (as well as imagery and communications) without U.S. technology or support.

While the official U.S. policy was to pursue cooperation in satellite navigation, there were elements in the U.S. government that would have preferred not to see Galileo move forward. U.S. concerns with the proposed European system revolved around both security and commercial issues, but the security issues are more important for understanding the U.S. reaction to the European initiative.⁷ The fundamental reasons for this were concerns that Galileo would degrade U.S. military capabilities and provide improved capabilities to potential opponents. The goal of U.S. national space policy is to ensure that the United States continues to have capabilities in space that are superior to any potential opponent. Although U.S. spending on space and satellites dwarfs that of other nations, the Americans came to the uncomfortable realization that Galileo would provide services superior to GPS. The most important issues that threatened U.S. interests were:

Spectrum overlay: Initially, it appeared that GPS and Galileo would compete for spectrum. Galileo would use a frequency that would overlay the frequency the U.S. planned to use for its military signal. Since GPS signals are very low-powered, the effect could be to degrade GPS performance and reliability through unintentional interference. Deputy Secretary of Defense Paul Wolfowitz, in a letter to his 15 EU Defense counterparts, reportedly cited the overlay as one reason not to proceed with Galileo, as it could threaten to significantly degrade GPS performance.

The most immediate U.S. concern was the potential effect of Galileo transmissions on the effectiveness of GPS signals. GPS has become a critical element of American military operations. Locational data is crucial for understanding the position of both friend and foe and for providing the situational awareness that underpins information superiority. Navigational data is crucial to the operations of many precision-guided munitions that provide U.S. forces with unparalleled capabilities. Galileo, as originally envisioned would have put these capabilities at risk. Jamming GPS, a long-standing objective for America's military competitors, would be provided by Europe's civil satellite.

Some in the U.S. even speculated that the spectrum overlay envisioned for Galileo and the GPS military signal was intentional, to put the U.S. in the untenable position of having to jam its own signal if it wished to deny Galileo services to an opponent.

The seriousness of the issue led the U.S. to take an unusually intrusive step. In December of 2001, Deputy Secretary of Defense Paul Wolfowitz wrote to his European Defense counterparts to convey U.S. concerns over the potential overlay of Galileo signals with GPS M-code and the potential for damage to future NATO operations. Wolfowitz noted that the addition of any Galileo services in the same spectrum “will significantly complicate our ability to ensure availability of critical GPS services in time of crisis or conflict and at the same time assure that adversary forces are denied similar capabilities.” He stated that it was in the interest of NATO “to preclude future Galileo signal development in spectrum to be used by the GPS M-code.” Wolfowitz complained that the civilian agencies responsible for Galileo did not pay sufficient attention to these security concerns. He asked his counterparts to “convey these security concerns” to the civilian ministers and to also enquire about their intentions to build military features into Galileo.⁸

The U.S. has used this tactic of appealing to European defense counterparts to influence discussion among European civilian agencies on several occasions. This tactic rests on the mistaken assumption that the Department of Defense’s European counterparts have the same weight and influence in deliberations in areas outside of traditional military concerns as the Department of Defense has in U.S. policy debates. While this is true for some countries, such as France, it is not true for most. The tactic often backfires when it is perceived as heavy-handed, and press reports indicate that this may have occurred in the case of Galileo.

Ultimately, the solution to this problem was to trade protection of the GPS M-code for what was in effect adoption of the European signal structure as the de facto international standard. The United States proposed that if Europe would adopt the BOC (1,1) signal structure, it would adopt it as well for future GPS modernization.

Mandatory Use Requirements and Market Access: The potential for a mandatory requirement to use Galileo has been one of the greatest concerns for the U.S. The temptation to set standards or requirements in such a way to gain market advantage has been growing around the world. In part, this is a reaction to the success of the World Trade Organization (WTO). The standards process, if used astutely, can create a barrier to trade while avoiding potential WTO complications. Many Americans would ascribe this behavior, or at the least the temptation, to some European firms and governments.

Galileo will also offer a range of signals, providing different kinds of services. Its commercial service (CS) uses encrypted signals to provide a guaranteed service and, secondarily, a communications service. A decision to restrict access to or knowledge of this encrypted signal could be one way to exclude U.S. firms from the market for Galileo satellite navigation services and equipment. China’s recent efforts to impose its own wireless security standard (called WAPI), not share information on its encryption

mechanism, and force foreign companies to partner with Chinese firms is one example of how such restriction can be used to gain commercial advantage.

The experience of almost all space programs has been that they have required a greater commitment of resources than was originally budgeted, and this remains one of the greatest risks for Galileo. The risk is not in the building or launch of the system, expensive as that will be, but in its operation. Galileo will be operated by a private concessionaire that will recoup its expenses through the sale of commercial services and through partial subsidies from the EU. A study on Galileo by Pricewaterhouse Coopers commissioned by the European Union estimates that the Galileo project will yield about \$13 billion from its inception in 2008 through 2020 and that the concessionaire will achieve a positive cash flow three years after Galileo enters into operation.⁹ If Galileo's operational costs are similar to GPS, which take about \$750 million a year to operate,¹⁰ this should leave the operator with a comfortable margin of profit (assuming that the PricewaterhouseCoopers estimates hold and that the GPS operational costs are not an underestimate).

If the concessionaire cannot cover its costs, it will turn to the EU for a greater subsidy or, possibly, for some mandatory requirement to purchase its services. For example, it could be asserted that since Galileo is more accurate than the current GPS civil signal, safety of flight requires that Galileo be used by commercial air traffic. We do not know how competition between a precise, pay-for-use signal and a less precise free signal will play out. Over the long term, market access and mandatory use requirement may well return if the financial pressures for Galileo's operations grow too strong.

To avoid these trade problems, the U.S. sought the equivalent of 'most-favored nation status' and 'national treatment' for its firms to ensure that there were no tariffs or other barriers to trade (such as not giving U.S. manufacturers the information needed to build equipment that could receive Galileo's commercial signal). Agreement by Europe to a principle of non-discrimination in trade in the February discussions has resolved these concerns.

Potential Military Use: the U.S. was also concerned that potential military opponents could avail themselves of Galileo services. Galileo's Public Regulated Service (PRS) is an encrypted signal designed for security and intelligence applications and could conceivably be used to provide secure location data to militaries outside of the U.S. and Europe.

The Galileo has a number of foreign partners, including China, India, Brazil, and Israel. Foreign participation provides some part of the funds required for Galileo (perhaps \$600 million). More importantly, the involvement of foreign participants is a means to demonstrate European leadership in space activities. However, foreign participation, particularly that of China, is troubling for the U.S. As part of a larger program of military modernization, China has sought satellite navigation services for its armed forces. While technology transfer from Europe to China and input from China into Galileo's design and operation will be limited, this cooperation will allow China to develop a more

sophisticated understanding of navigational satellites. China has used foreign partnerships to speed its indigenous space effort – not through the theft of technology, but by participating in and learning from the experience of other programs – and the U.S. has a reasonable concern that it will attempt to do the same with Galileo. Press reports have also noted that China has expressed interest in Galileo’s ‘Public Regulated Service,’ which is intended for use by security services.¹¹

One of the tasks for the working groups created to implement the framework agreement on Galileo/GPS is to look at security issues, including how Galileo’s operators will ensure that Galileo services do not become a tool for potential opponents in times of crisis. The work of this group is classified, but a failure to successfully resolve this issue would torpedo the larger agreement.

European Defense Spending: A broader concern for the U.S. was the implication of the Galileo program for European defense spending. European nations, with the exception of Britain, do not spend enough to maintain credible military forces for the post cold-war security environment, or forces that can interoperate with the U.S. Not only do most EU nations not spend enough on defense, what is spent is often fragmented among many duplicative and underfunded national programs Galileo, in the U.S. view, was an expenditure of funds for a military service already provided by the U.S., funds that could be better spent addressing more pressing shortfalls in European military capabilities.

This reaction to Galileo was tied to U.S. surprise in the Kosovo campaign upon discovering the low level of capability possessed by many European militaries. Galileo became a symbol of U.S. dissatisfaction with European defense spending, declining military capabilities, and unwillingness to modernize. The U.S. at least initially, would have preferred that the EU spend its funds on a program or equipment that did not duplicate existing satellite navigation capabilities and which yielded a greater return for military capabilities, especially those capabilities that would contribute to Europe’s ability to participating in joint operations. Money spent on Galileo, in the U.S. view, was wasted and could have been spent on other programs.

Towards Compromise

An iterative process led to compromise on Galileo. First, the U.S. recognized in 2003 that it could not stop the Europeans from moving ahead on Galileo if they were determined to do so. Prior to this, the U.S. sought to persuade the EU that a modernized GPS was sufficient and Galileo was unnecessary. Then the U.S. argued that if Europe went ahead with Galileo, it should be a sub-constellation of GPS. Finally, the U.S. accepted that there would be to independent systems and that national interests were best served by making them compatible. Statements by U.S. officials to this effect led to positive responses from EU officials, indicating to the U.S. that the EU would address seriously U.S. security and trade concerns.

This evolution reflected a shift in U.S. thinking on how to approach the satellite navigation systems being developed by its allies, as these now seemed inevitable. The

U.S. began by calling for other nations to adopt GPS as a global standard for navigation services. In the course of the discussion this changed to a more cooperative set of principles that now guide the U.S. position. These are that GPS would interoperate with other satellites services; that there should be no charges or user fees for critical safety operations; that users should have free choice among global navigation services; that there should be an open, competitive markets for the provision of these services; and that U.S. national security interests (such as GPS radio spectrum use) should be protected. The gradual dominance of these principles in interagency debates created the basis for reaching agreement with Europe over Galileo.

The fundamental compromise behind the U.S.-EU agreement is U.S. acceptance of Galileo as an independent satellite navigation system in exchange for EU acceptance of US security and commercial concerns. If the U.S. goal was to see GPS adopted as a global standard, it did not obtain this. It did attain, however, the more reasonable goals of preserving GPS's military utility and ensuring a level playing field for U.S. manufacturers and service providers.¹² Each of the U.S. concerns has been addressed in the framework agreement and the most likely outcome is that formal agreement codifying the principles of the framework will be reached at the June 2004 U.S.-EU Summit.

An earlier agreement with Japan (embodied in a 1998 Joint Statement from President Clinton and Prime Minister Obuchi) provided a partial precedent for the U.S.-EU discussions. The Japanese system was not a global system but instead a regional augmentation of GPS, designed to provide an enhanced signal to areas in Japan and Asia where GPS signal reception was poor or 'masked.' There were no issues of spectrum incompatibility and, thus no market access issues. Japanese systems would offer services that would be fully compatible with GPS, would not provide military services, and would be a partnership governed by a bilateral agreement.

Many of the goals and commitments in the U.S.-Japan bilateral agreement foreshadow those found in the US-EU understanding. This suggests continuity in U.S. concerns about foreign navigational satellite systems. Japan and the U.S. agreed to cooperate on security, the promotion of compatibility of operating standards; developing common approaches to radio frequency allocations; identification of potential barriers to the growth of commercial applications; and encouragement of trade and investment. Working groups were established, as part of a larger mechanism for cooperation and coordination, to discuss these topics.¹³

Like the earlier agreement with Japan, the U.S. EU agreement on Galileo-GPS used two mechanisms to reach agreement. There are binding commitments on specific principles and the creation of working groups to reach further agreement, on the basis of those principles, on specific issues or on new issues that arise as Galileo moves forward. The four working groups will look at:

- Interoperability, including current interoperability issues between the two systems.
- Future system design and future modernization for both systems.
- Trade, and how WTO rules will be applied when Galileo becomes operational and

whether existing WTO rules are sufficient for satellite navigation services or whether additional bilateral understandings are needed to ensure a strong commitment to non-discrimination.

- Security, to develop national security criteria for satellite navigation, address U.S. concerns over Galileo's potential military role and how the EU will prevent hostile use of Galileo signals, how the different civil and military signals will work together, guarantees to keep sensitive information relating the PRS confidential and to develop the consultation process for radio frequency compatibility of the future military GPS signals.

Complementary Galileo and GPS systems would open a new chapter in transatlantic cooperation. There would be real benefit to users of satellite navigation services if Galileo and GPS could be made compatible enough to provide the benefits of a single large network. This approach would let both systems purchase fewer satellites but still provide better service. Treating Galileo and GPS as a single 'virtual' architecture, however, would require both the U.S. and Europe to change their current planning and policies. To achieve the benefits of true interdependence, there would need to be a further evolution in both European and U.S. thinking on cooperation in satellite navigation from the current neutral, noninterference approach to active collaboration.

This is unlikely. Several factors limit the ability to move to greater cooperation now. The European plan to finance and operate Galileo through a concessionaire may create pressure for the kind of economic restriction feared by the U.S. Continuing suspicion by the U.S. Department of Defense that Galileo will damage the operation of GPS could undermine the agreement, and there are reports that the Defense Science Board will undertake a new review in 2004 of the risks posed to the U.S. military by Galileo.¹⁴

The success in the framework negotiation did not achieve the maximum in terms of cooperation. The maximum would have been a common governance structure. Galileo and GPS will be two compatible systems rather than a single network run by two different operators. This is, of course, better than two incompatible systems, but a single network composed of a constellation of Galileo and GPS satellites would require fewer satellites, saving money for both Europe and the U.S., and could offer better performance. This level of cooperation is for now, however, not possible. The underlying concerns are that despite success, the agreement was only a tactical shift in U.S. attitudes and that Galileo is the harbinger of a new kind of partnership with a more independent Europe that is less capable of its own defense and at times much more oppositional towards the U.S.

Galileo/GPS As A Model for Transatlantic Cooperation

Can the Galileo/GPS negotiations serve as a model for transatlantic cooperation, either in space or in other security-related areas, as an integrated Europe slowly emerges? Europe and the U.S. share common values, but we are in a period of strong dissonance. On the political level, relations remain strained. The recent G-8 meeting suggests that leaders recognize the need to repair relations, but don't really have any good ideas on how to go

about doing this. Washington has not done a good job of managing relations, and the problems over Iraq are a symptom of larger tensions. Neither side has done an adequate job of addressing how to redefine transatlantic relations for a very different kind of world. There are new tensions as Europe pursues integration, and these will continue as Europe moves ahead with its great project of integration.

On the industry-to-industry level, more cooperative arrangements would be in everyone's economic, political and strategic interest. In an ideal situation, the governments of the United States and Europe would work together to preserve and nurture a transatlantic technology and industrial base capable of meeting twenty-first century challenges. In practice, however, this turns out to be very difficult to achieve. There are some difficult problems, including budget disparities and competitive industry restructuring. There is also a long-standing and apparently irresolvable problem with U.S. export controls on technology transfers. The American emphasis on homeland security does not help matters, as it makes it difficult for foreign scientists to get visas, or for U.S. companies to work across international borders.

The positive note here is that on the level of space policy, on the level of cooperation between space agencies and scientific communities, we have a very strong foundation on which to build. There is a long history of joint programs in the peaceful exploration of space, both with the International Space Station and with the many unmanned missions. Galileo/GPS extend this cooperation into new commercial and security areas. Space exploration could be an area that we can use to build a new kind of transatlantic partnership. The U.S. was able to partner with the Soviets in space exploration at the height of the cold war, so it should be able to partner with Europe now.

In June, the President's Commission on Implementation of United States Space Exploration Policy (the Aldridge Commission) recommended that NASA build international partnerships. International cooperation is an integral part of the new American thinking for civil space. However, the terms of the Commission's recommendation are different from the Galileo/GPS model for cooperation. The Commission suggested that cooperation will depend on how well partners fit in to the larger U.S. space plans and missions. Galileo/GPS was a negotiation among equals. Europe wants to be an equal partner, but Americans ask whether it is willing to spend the money to do this in areas other than satellite navigation.

Old models for partnership in space, like the International Space Station, will no longer work. The U.S., while still predominant, can no longer assume that this predominance confers leadership. Europe, on the other hand, cannot simply assert that it should be treated as an equal, but must be willing to demonstrate equality by the commitment of adequate resources.

The U.S. (most recently in the Aldridge commission Report) holds up the Joint Strike Fighter (JSF) as the preferred model. Joint Strike Fighter is the old model for cooperation – Americans develop and own a plan, Europeans can pay for it and participate. Some European speakers have said that 'shared autonomy' should be the

new model for cooperation. Shared autonomy implies much less than partnership, however, and would be a considerable diminution in transatlantic relations. Neither approach will produce full cooperation.

Europe and the U.S. are at a decision point for activity in space. The evolution of a common European security and defense identity creates both challenges and opportunities. Absent a clear vision on how to move ahead, a diminution in transatlantic cooperation is possible. This outcome would not serve the interest of either Europe or the U.S. It is still unclear if the agreement on Galileo/GPS compatibility was a last gesture of a declining transatlantic partnership or the beginning of a new model for cooperation, but Galileo/GPS shows that partnership remains possible. The habit of cooperation remains strong and the political and diplomatic structure is there to build it, if certain conditions can be met. Continued progress requires a better recognition by both sides of the value of partnership and a political decision in both Brussels and Washington to pursue it.

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² Steven Kettmen, "Europe Gives Go-ahead to Galileo," March 18, 2002, Wired Magazine, <http://www.wired.com/news/politics/0,1283,51130,00.html>; Luca De Biase, "Galileo, chi era costui?" http://europa.tiscali.it/futuro/inchieste/200112/21/europa_minima.html

³ European Space Agency, "Why Europe Need Galileo," August 22, 2003, http://www.esa.int/export/esaSA/GGG0H750NDC_navigation_0.html

⁴ "The Global Positioning System: Charting the Future, Summary Report by a Panel of the National Academy of Public Administration and by a Committee of the National Research Council," James R. Schlesinger and Laurence J. Adams, Chairs, May 1995, <http://www.navcen.uscg.gov/pubs/gps/gpsfuture/GPSfuture.doc>

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⁶ The White House, Office of the Press Secretary, "Fact Sheet: Foreign Access To Remote Sensing Space Capabilities," March 10, 1994, <http://www.fas.org/irp/offdocs/pdd23-2.htm>

⁷ Office of the Spokesman, U.S. Department of State, "U.S. Global Positioning System and European Galileo System," March 7, 2002, <http://www.state.gov/r/pa/prs/ps/2002/8673.htm>

⁸ Agence France-Presse, US Warns EU About Galileo's Possible Military Conflicts, Space Daily, December 18, 2001, <http://www.spacedaily.com/news/gps-euro-01g.html>

⁹ Price Waterhouse Coopers, Price Waterhouse Coopers has Developed a Business Plan for Galileo," www.pwcglobal.com/uk/eng/about/svcs/pfp/pwc_Galileo_Information.pdf

¹⁰ Navstar Global Positioning System Joint Program Office, "GPS Overview," March 2003, <https://gps.losangeles.af.mil/jpo/gpsoverview.htm>

¹¹ European Union Press Release, "Galileo: Loyola de Palacio Welcomes the Green Light for an EU-China Agreement," October 27, 2003, <http://www.eurunion.org/news/press/2003/2003065.htm>, BBC, "China Joins EU Satellite Network," <http://news.bbc.co.uk/2/hi/business/3121682.stm>; European Commission, Directorate General for Energy and Transportation, "Galileo: European Satellite Navigation System: Public Regulated Services," http://europa.eu.int/comm/dgs/energy_transport/galileo/programme/service_prs_en.htm

¹² Directorate General Energy and Transportation, "Loyola de Palacio welcomes the outcome of EU/US discussions on GALILEO," 25 February 2004, U.S. Department of State, "U.S., EU Announce GPS/Galileo Agreement," February 26, 2004, <http://www.useu.be/Galileo/Feb2604JointUSEUGalileo.html> <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/264&format=HTML&aged=0&language=EN&guiLanguage=fr>

¹³ Joint Statement by the Government of the United States of America and the Government of Japan on Cooperation in the Use of the Global Positioning System, September 22, 1998, <http://www.igeb.gov/japan-statement.shtml>

¹⁴ Cynthia Di Pasquale, "DSB To Study Galileo's Impact On Commercial, Military, Civil Sectors," Inside the Air Force, May 28, 2004 Page 12