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GALILEO AND GPS: COOPERATION OR COMPETITION?

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This past March, the European Union Council of Transport Ministers agreed to fund a European satellite navigation system called Galileo. This decision put an end to long-running debates on the advisability of the project. As with other European cooperative industrial programs, one purpose of the Galileo project is to facilitate the entry of European firms into a new and important market. As a result, the U.S. government and U.S. firms have been wary of a European undertaking that they consider likely to compete with the Global Positioning System (GPS), an equivalent U.S. navigation system. Despite U.S. hostility, the Galileo project will go ahead, but that need not mean that U.S. fears will be realized. There is ample room for cooperation between Galileo and GPS that would make both systems more effective. Now that the EU has decided to fund Galileo, the time is right to assess the best way to realize that cooperative potential.

Navigation's role in the economy and civil society

Satellite navigation systems bring tremendous benefits. By informing ground-based receivers of their exact location, these systems help manage movements of airplanes, ships and trains. Hikers and sailors already rely on hand-held receivers so that rescuers can find them in case of emergency. Geo-positioning services are also becoming increasingly available in passenger cars to provide automated directions and to facilitate emergency services.

Navigation satellites also feature atomic clocks that offer very high precision timing services, in the range of a billionth of a second. This function is less well known, but also of great importance to the economy. Precise orbiting clocks allow cellular phone companies to distribute radio frequencies among their users and computer networks to synchronize their encryption systems so that transactions between banks are secure. U.S. electricity companies also use them to ensure that their power lines are functioning smoothly.

New applications for navigational satellites seem to emerge almost monthly. The market for satellite navigation applications will likely experience very strong growth in the near future, similar perhaps to the explosion of the personal computer market twenty years ago.

Depending on a single system is dangerous

Russia began deploying its own satellite navigation system called GLONASS in 1982, but it can no longer maintain the system properly. Now down to 5 or 6 operational satellites, GLONASS is no longer useful for most applications. As a result, the only truly operational satellite navigation system in existence today is the U.S. government-owned GPS. It makes little sense that so many critical services and economic activity throughout the world should rely on a single system.

The refusal of Europe to be dependent on a U.S.-controlled system is often cited as the origin of the Galileo project. Indeed, the French government in particular doesn't like the idea that the U.S. can theoretically turn off the system at any time. But it is highly unlikely that the U.S. would do such a thing, even in a crisis situation. Navigation satellites form a network above the entire Earth. It is therefore impossible to turn the system off over a limited area. As a result, if the system were to be turned off, the U.S. economy would suffer along with its intended victim.

Degrading the precision of the signal would also be difficult. GPS used to offer two different levels of precision: a high-precision one for military use and a low-precision one for other users. This feature, called Selective Availability (SA), was turned off when non-military users started to use terrestrial relays to re-establish higher precision of the data (called Differential GPS). Nowadays, too many institutional users in the U.S. depend on the highest accuracy available to permit any sort of intentional degradation. For instance, the Federal Aviation Administration could not do its job effectively and efficiently if it were to receive less accurate data. The next generation of GPS satellites, GPS III, will not even have the technical capability to degrade the signal. The military signal will differ from the civilian only in its enhanced protection against jamming.

On the other hand, a system crash is always possible and would have terrible consequences for public safety and the economy. Deploying a European system will therefore ensure back-up access to positioning, navigation and timing services.

Galileo's commercial viability

It is difficult, however, to discern the economic rationale for Galileo. The U.S. system, which was originally deployed for military users, was funded by the U.S. Air Force and remains free by law to all users. In contrast, Galileo is intended to generate a profit. The deployment of 30 satellites and the construction of related ground systems are expected to cost between 3 and 3.5 billion euros.

The varying assessments of the business case for Galileo make it hard to know whether that investment can generate a reasonable return. Development of Galileo is to be jointly funded by the European Space Agency and the European Union (a sign of the increased interest of the EU in space activities). Private sector funding will be added during the deployment phase and should eventually become the main source of funding. A report prepared for the EU by PriceWaterhouseCoopers in November 2001 asserted that an adequate return on investment in Galileo is very unlikely and that therefore public funding will remain necessary for longer than previously planned.

Nonetheless, proponents of the system also hope that European companies will successfully enter the application market, so far dominated by U.S. and Japanese companies. For instance, Thalès, a French electronics company, wishes to become one of the major players in this market.

The EU might also decide to impose the use of Galileo signal and receivers on European users, such as truck drivers or airlines, as a way to make the system more profitable. However, this would be contrary to the free-market stance of most European governments and as such remains unlikely. In any case, the enhanced use of navigation systems will certainly provide larger-scale social and economic benefits, such as smoother road traffic, fewer delays in air traffic, and better search and rescue operations, among other benefits.

Galileo's guarantees

Galileo also provides an important improvement on its American counterpart, that could further its hold on the market. The European system will guarantee undisrupted service and liability insurance to its paying customers. Because GPS is free, its users do not sign a contract when accessing the data. There is therefore no liability on the part of the system operator. If an airline were to stop receiving GPS signals, it would not be able to turn to the U.S. government for compensation. With more and more airlines coming to rely on orbital rather than terrestrial relays, insurance companies are starting to demand that navigation system operators be held responsible for any damages caused by system failures.

According to its anticipated *modus operandi*, Galileo services will be free for basic uses. Hand-held receivers will get positioning data free of charge. Alternatively, Galileo concession-holders will charge for those services that offer a guarantee of continuity of service and will assume liability for damages in case of failure. Commercial users and insurance companies are likely to be very interested in this new feature.

Do U.S. companies have to choose between cooperation and competition?

Many Americans have been critical of the Galileo project, repeatedly advising Europeans to spend their money on something new, rather than duplicating an already existing system. The arguments echo those heard when the Ariane satellite launcher was developed in the 1970's. In the 1960's, NASA and the Pentagon routinely offered Europeans use of their launchers. However, when they conditioned the launch of a European satellite on its not being a commercial venture, European governments decided to build their own system, which ultimately became a success. Another claim, namely that Galileo would use bandwidth used by U.S. military systems, also seems *passé*. Transatlantic discussions on this topic have already established security for U.S. military systems.

The degree of cooperation that must be established between the two systems is a more pressing topic for transatlantic discussions. Cooperation agreements could range from compatibility of the signals and receivers to interoperability of the orbiting systems, or even to joint monitoring of the two systems.

Some degree of interaction between the two systems would be beneficial to all. When a higher number of satellites are operating, the precision of the system improves. Galileo and GPS working together would bring higher accuracies to the users, while retaining a more secure, redundant configuration.

Such an endeavor could allow U.S. and European companies to demonstrate something different than the model of aggressive transatlantic competition embodied by Ariane and Airbus. It would prove that complex technologies could be interoperable in a U.S.-European framework, be it industrial or governmental. In turn, military programs or operations could be inspired by the Galileo/GPS example and explore new venues of cooperation. Galileo and GPS provide an opportunity for innovative transatlantic relations that could have a constructive impact on our security framework and on force projection operations in the future.

It seems however, that American companies will have to meet their European partners more than halfway. In the short-term, Europeans have a lot to lose if they agree to use compatible application systems. American and Japanese companies are far ahead in the field of navigation applications and European companies will have a hard time becoming major players without technical help from their foreign counterparts.

If discussions go nowhere, the Europeans might choose to implement technical features in Galileo that are not compatible with GPS or to endorse protective regulations in order to develop an indigenous market for navigation applications. This would effectively foreclose U.S. companies' access to the European market. Despite the possibility of a protected market, European companies still have incentives to enter into some sort of cooperative agreement. Protectionist measures are frowned upon in Europe these days. They always have to be paid for somehow, be it in the loss of technology transfer or in retaliatory measures.

Transatlantic discussions on navigation systems have not yet reached any final stage. It is therefore important that American companies that might wish to cooperate and to compromise enough so that Europe does not choose to set up a system that is shut off from GPS.