EU and Russia: Lost in Space?

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Russia's involvement in the Ukraine crisis has turned much of public opinion in the West against that country, in particular souring the relationship between the European Union (EU) and Russia. And, while the ceasefire signed in September technically is still in force, the EU-Russia rift is far from smoothed over.

Among the possible casualties of this distemper is the cooperation in space that the two sides have laboriously built up since the fall of the Soviet Union and the end of the (first) Cold War. And, as Europe looks once more west for increased GNSS opportunities, Russia is looking east to China.

The flawed launch of the first two full operational capability (FOC) Galileo satellites in August, which put the spacecraft into incorrect orbits, did nothing to improve the situation. In announcing its conclusions in October, an independent board of inquiry formed to analyze the causes of the anomaly — which occurred during the orbital injection of the satellites by a Russian Soyuz rocket — pointed the finger at a curious "design ambiguity" in the launcher's Fregat module.

The incident has raised new doubts about Russia's dependability as a supplier and EU reliance on Russian resources for its space program.

All summer long, while the Russians were lashing out with strong anti-Western messages in response to EU and U.S. sanctions, the European and American space communities were busy downplaying the potential collateral effects of souring political relations over the Ukraine crisis.

With billions invested in high-profile space programs like Galileo and Copernicus, however, and with EU public and politicians already fed up with delays and excuses, the Union's flagship space programs appeared vulnerable.

Speaking in Brussels, one unnamed European official said, "The situation in Ukraine is very tense indeed, with many obvious consequences on the relationship between Russia and Europe."

Russia Brandishes Verbal Sword

According to a story reported by Voice of Russia radio last May, Russian newsmakers at that time were only too eager to use their Soyuz rockets to whop Europeans upside the head in retaliation for the EU's Ukraine-related sanctions. "EU sanction logic does not fit modern reality", Russia's Minister of Foreign Affairs, Sergei Lavrov, is reported to have said. "Russia's relations with the EU require a rethinking, a reassessment is needed."

According to Voice of Russia, a government-financed broadcasting company combined with the RIA Novosti news agency earlier this year into a single Russian government-owned entity, Rossiya Segodnya, the reassessment resulted in a decision to withdraw from the International Space Station (ISS) in 2020. Russian Soyuz rockets, it said, will no longer serve as a "space taxi" to transport Western cosmonauts from the Baikonur Cosmodrome in Kazakhstan to the ISS.

Meanwhile, Russia's deputy prime minister, the usually charming Dmitry Rogozin, mixed mockery, politics, and space affairs when he famously suggesting via Twitter that the Americans "use a trampoline" to get to the International Space Station.

Coincidentally — or perhaps not, another Russian company manufactured the engine used in the unmanned U.S. supply rocket destined for the ISS that exploded after liftoff in October.

As the standard Western argument goes, Russia's aggressive and mocking rhetoric are only meant for the consumption of its own public, but this does not lend much comfort for European officials trying to keep (or get) its GNSS program on track.

The Commission Says Nothing

Inmaculada Martinez Garcia, press assistant working under outgoing European Commission (EC) Vice-President Antonio Tajani and Commissioner Máire Geoghegan-Quinn, issued a noncommittal answer when, last April, a month after Russia's Crimea annexation, we asked about how the Commission was handling its contacts with Russian partners: "There is no standard rule as to the frequency of contacts with Russian authorities in the area of space. The frequency very much depends on the business at hand."

This of course would be the case under any circumstances, normal or extraordinary.

"In the framework of a space dialogue," Mar-

Peter Gutierrez

Space business as usual — ESA Director-General Jean-Jaques Dordain addressing Munich Satellite Navigation Summit 2014 earlier this year.

tinez continued, "both sides consult each other to meet as deemed appropriate, in principle once a year. As to the EU's space programs Galileo and Copernicus, there are currently no Russian technologies involved with the exception of the use of Soyuz launchers by both the Galileo and Copernicus programs."

That's a pretty important exception, if the object is to get those programs off the ground and into space, at least until the new Ariane 5 launcher is ready to take over.

We understand that ESA expects to be capable of launching four Galileo satellites at once on board the Ariane 5, "allowing the completion of the fully operational constellation, independently from possible problems with Russia," said one unnamed source close to the program.

"Soyuz rockets are bought and operated by Arianespace, a French company," Martinez goes on, "and launched from the European Spaceport in Kourou, French Guiana. A few launches of the Copernicus satellites are also foreseen to take place from the cosmodrome in Plesetsk, Russia. Finally, we are not in a position to make any speculations at this stage about future evolutions as regards relations with Russia."

So, nothing we didn't already know. The EC has maintained a prudent distance from the question of its relations with Russia. Our inside source says one senses two qualities never in short supply within EC circles — "embarrassment and worry" — when questions of collaborative obligations with Russia are raised.

"ESA operators, on the other hand," said our source, "are more likely to ignore such questions altogether. After all, the EC is more driven by politics, ESA by business."

About that 'Anomaly'

When a Soyuz launcher released two Galileo navigation satellites into the wrong orbit in August, EC insiders were quick to discount as ridiculous any suggestion of deliberate sabotage.

While Russian ground crews managed the launch preparations and the final countdown, Arianespace immediately did the right thing by claiming full responsibility for the launch failure.

That didn't stop speculation about possible foul play as retribution for European sanctions over Ukraine — a theory pooh-poohed by our EU inside experts, who categorically rejected it as laughable.

At the same time, most EU officials are convinced, rightly or wrongly, that the current Russian regime has acted and continues to act in underhanded ways in the Ukraine and beyond. Just not in space.

The Independent Inquiry Board formed to analyze the causes of the anomaly announced its definitive conclusions in a press release on October 7, following a meeting at Arianespace headquarters near Paris.

The Board, chaired by Peter Dubock, former inspector-general of ESA, confirmed what most already knew. First, what didn't cause the failure: "The Board's conclusions confirm that the first part of the mission proceeded nominally, which means that the three-stage Soyuz launcher was not at fault.

"The Inquiry Board also eliminated the hypothesis that the anomaly could have been caused by the abnormal behavior of the Galileo satellites."

Then — the interesting part — what did cause the failure: "The anomaly occurred during the flight of the launcher's fourth stage, Fregat, designed and produced by NPO Lavochkin. It occurred about 35 minutes after liftoff. . . ."

The announcement goes on to explain that, essentially, someone at Lavochkin (Moscow) had attached both a critical hydrazine fuel line and a super-cold helium pressurization line to the same metal support structure. This support acted as a "thermal bridge," i.e., the super-cold helium line made the nearby metal support super cold, which in turn made the liquid in the nearby fuel line super cold — as in freezing — which, in a nutshell, turned the mission into a mix-up.

Furthermore, the board concluded, "Ambigui-

ties in the design documents allowed the installation of this type of thermal bridge between the two lines. In fact, such bridges have also been seen on other Fregat stages now under production at NPO Lavochkin."

Funny that, with all those other Fregat stages being assembled the wrong way, this was the only one that actually malfunctioned on a mission.

The press release goes on to say, "The design ambiguity is the result of not taking into account the relevant thermal transfers during the thermal analyses of the stage system design."

It's not hard to understand how some might find this hard to understand. We're talking about the Russians. The Sputnik, Laika-the-dog, Yuri-Gagarin Russians. Some world-class, history-making, space-pioneering Russian didn't take into account the relevant thermal transfers during the analyses of the stage system design?

But the board believes it; so, we believe it. After all, the Russian launch program *has* been a little spotty in recent years.

So far, we have no word on the identity of the particular individuals who attached the offending lines, or who prepared and approved the guilty production manual, or why the first and only Fregat insertion "anomaly" occurred when it did.

According to the board's press release, the inquiry — with "the support of Russian partners" — had enabled the rapid identification of the root cause and the corrective measures to be applied.

As reported by *Space News*, at the press conference Dubock and Stéphane Israël, Chairman and CEO of Arianespace,both stressed that the error should be viewed as a "design omission" and "not a problem of Russian workmanship or quality control." Dubock added that the inquiry board had had no issues with Russian cooperation during the investigation.

None of this, of course, puts to bed conspiracy theories about Russia sabotaging Galileo, nor the mounting trepidation about what Russia could, might, or would do to get even with the sanctioning EU.

Dordain Says No Problem

At the height of the bloodletting in eastern Ukraine last June, ESA Director-General Jean-Jaques Dordain stated that, as far as he was concerned, all major cooperative endeavors between ESA and Russian partners would proceed as planned. As reported in *Space News,* Dordain said, "The European Space Agency has seen no signs that its relations with Russia will be curtailed as a result of the confrontation between Russia and the West concerning Russia's actions in Ukraine."

Dordain was speaking after having just returned from a meeting at Russia's Baikonur Cosmodrome with the head of Russia's Roscosmos space agency, Oleg Ostapenko. The two had watched as ESA astronaut Alexander Gerst blasted off, along with NASA and Russian astronauts, on a mission to the ISS.

One source in Brussels contrasts the cool attitude of mature and space-savvy ESA to the nervousness at the European Commission, still a relative youngster in the space business: "In the space context, the time scale of all activities and programs tends to smooth down negative peaks and tensions. I do not have evidence of immediate impacts on the policy of ESA. Just the contrary."

Is this another example of long-standing differences of opinion, perspective, and approach between the EU and ESA? The two have drawn closer in the years since their historic space cooperation agreement, but they still come from different places and see things in different ways.

Whatever Dordain says, dependency on Russian launchers remains a vulnerability for both Europe and the United States, in particular with respect to manned missions.

Another Brussels insider acknowledges, "Should the relationship with Russia further deteriorate, Europe and US would be virtually banned from accessing the International Space Station. But a similar argument can be made about getting key infrastructure, such as Galileo satellites, into orbit."

Cool War?

In April, the United States officially pulled the plug on almost all space cooperation with Russia as a result of the latter nation's intervention in Ukraine. A memo to NASA staff from Michael F. O'Brien, NASA associate administrator for international and interagency relations, said, "Given Russia's ongoing violation of Ukraine's sovereignty and territorial integrity, until further notice, the U.S. Government has determined that all NASA contacts with Russian Government representatives are suspended, unless the activity has been specifically excepted."

The suspension includes NASA travel to Russia and visits by Russian government representatives to NASA facilities, bilateral meetings, email, and teleconferences or video conferences. "At the present time, only operational International Space Station activities have been excepted," O'Brien said. "In addition, multilateral meetings held outside of Russia that may include Russian participation are not precluded under the present guidance."

Among those meetings are gatherings of the International Committee on GNSS (ICG), the most recent of which took place November 10–14 in Prague, Czech Republic, with Russian delegates in attendance.

Back in March, however, just days after the annexation of Crimea by Russia, one Federal Aviation Administration official told *Inside GNSS* that they had received specific instructions to "hold off" on any cooperative activities with Russian partners in the areas of aviation and space.

We met that official, by the way, at a high-profile space-related "summit" habitually attended by high-ranking Russian officials and at which, this year, not a one could be found. A paral-

lel "cool it" request seems to have been circulated within certain EU institutions. Knowledgeable sources reported last April that at least one prominent EU agency head had chosen to send a subordinate in his place to convene with Russian counterparts at a Galileo/GLONASS meeting, apparently heeding guidance issued by the EU External Action Service (EEAS) in the wake Russia's Crimea takeover.

Insiders reported the EEAS had sent around an e-mail encouraging EU staff to play it cool when it came to cooperative meetings with Russian counterparts.

Although the precise wording of the EEAS memo remains a highly guarded secret, the gist, we understand, was that officials might still undertake unavoidable meetings but that their profiles should be kept low while doing so.

Eamonn Prendergast, EEAS press officer who handled EU-Russia matters under outgoing foreign affairs representative and EC Vice-President Catherine Ashton, confirmed that memos were circulated instructing EC officials on how to behave vis-à-vis their Russian partners. While he also declined to provide the specific wording of the memos, the simple fact that instructions were sent out, in itself, means that business is no longer being carried out "as usual".

Despite U.S. and European space officials more recent efforts to downplay the ruckus *a la mode Dordain,* no one is arguing that the situation has improved since last summer. So, at least several months' worth of "icing" can be said to have encrusted itself over the arena of EU-Russia space cooperation.

Silver Lining?

As far as the Galileo program is concerned, the only way to put satellites in orbit thus far has been with Soyuz launchers from Kourou. So, much like the matter of energy supply, Europe has not had the option of immediately suspending cooperative activities with Russia in space, even if it wanted to.

The good news is that, starting next year, ESA should be capable of launching four Galileo satellites together onboard the new Ariane 5 launcher, making the completion of the Galileo operational constellation possible without Russia. So, soon enough, the EU won't need her any more, right?

Meanwhile, tension between the United States and Russia, if it remains high, will encourage closer ties between Russia and China, including more of the kind of joint GNSS activities announced at the two countries' first summit on satellite navigation in Harbin, China, last June.

One expert in Brussels says she believes GLONASS is no longer a reliable partner for GPS, as far as civilian applications are concerned. And this means, she added, "Galileo has got a chance to tighten its links with GPS for both civilian and military uses, becoming the first trustworthy partner of choice, fully interoperable and compatible."

Westward Ho!

The U.S. president's National Space Policy, updated in 2010, supports a closer alignment of Galileo and GPS. That policy now encourages international cooperation between GPS and other GNSSs, directing the United States to: "Engage with foreign GNSS providers to encourage compatibility and interoperability, promote transparency in civil service provision, and enable market access for US industry."

The United States, the EU, and its member states have been close partners in the area of satellite navigation since 2004, when the parties signed a historic agreement establishing cooperation between GPS and Europe's emerging Galileo system. The agreement aims to ensure that the two systems's modernized civil signals will be interoperable at the user level, for the benefit of users around the world.

The GPS-Galileo agreement established four working groups for cooperation on: radio frequency compatibility and interoperability; trade and civil applications; design and development of the next generation of systems; and, importantly, security issues related to GPS and Galileo.

The situation in the Ukraine and with Russian relations generally has probably increased Galileo's appeal to the United States, which reportedly was among the first non-European governments to request access to PRS.

In response to a question from the Spanish defense attaché at a July 22 event sponsored by the Atlantic Council, Gen. William L. Shelton, then-commander of U.S. Air Force Space Command, said, "Galileo represents an opportunity for Europe and the United States to cooperate."

"In fact," Shelton continued, "receivers are already being built that will receive the Galileo signal and the GPS signal and integrate both. So, in times of GPS outages or perhaps localized GPS jamming, maybe Galileo gives you different geometries. . . . And I think you will see us eventually go to receivers that are both Galileo- and GPS-capable."

Earlier in the year, in testimony to the U.S. Senate Armed Services strategic forces subcommittee last March, Doug Loverro, a deputy assistant secretary of defense for space policy, expressed the U.S. Defense Department's interest in using multiple GNSS systems, with Galileo and Japan's QZSS system at the top of the list.

"While it may be possible for an adversary to deny GPS signals through jamming, physical anti-satellite attacks, or a cyber-attack on a ground control network, it is much more difficult to eliminate multiple services at the same time," " said Loverro, a former director of the GPS Joint Program Office, the forerunner to the U.S. Air Force's GPS Directorate.

"Assuring U.S. warfighters have access to the bulk of these systems is a very powerful way to make sure no warfighter will ever have to face battle without the incredible benefit of space-enabled positioning, navigation, and timing (PNT)," Loverro continued. "To

that end, we have begun negotiations with like-minded PNT owner/operators to ensure the United States has that access. We must likewise ensure our equipment is capable of receiving these different signals — just as is already happening in commercial applications."

Another EU expert, however, is not sure that Europe is ready to step through the opening door: "Is this opportunity perceived by the European Member States and European Commission? I doubt it, as they are taken by all their economic and internal political problems."

New Beginning or Just the End?

Months later, Russia continues to make provocative gestures beyond its borders, including high numbers of incursions by military planes into and near European and U.S. airspace and, some suspect, clandestine submarine missions off the Swedish coast.

On November 5, the heads of the International Space Station (ISS) agencies from Canada, Europe, Japan, Russia and the United States issued a joint statement — a rather understated affair — without much substance and nothing of a binding nature, after a meeting in Paris.

There is a lot in the statement about technology development, benefits to humanity, cooperation, and understanding. Some will translate that as, "Whatever we were here to talk about, we couldn't agree on anything and our meeting was a complete failure."

Perhaps slightly more significantly, the statement reads, "the agency heads reaffirmed their support for continued ISS operations." It goes on, cheerfully: "The ISS partner agencies are working through their respective governmental procedures for continued ISS utilization through at least 2020," thus confirming that Russia probably still intends to pull out after that.

On the same day, the BBC reported on the situation in Ukraine ". . . [the] fragile ceasefire with government forces could end at any time and return the region to deadly conflict."

If it is just a pause and heavy fighting, death, and destruction, East-West recriminations, and half-baked paranoia resume in force, then EU-Russian cooperation is space is sure to remain at least a question mark, and a potentially continuing source of embarrassment for the EC.

Even if this round of bad blood should blow over, no one can now fail to recognize it for what it is: the razor's edge of ongoing European dependence on Russia, in space or anywhere else.