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GLONASS

PROBLEMS AND CHALLENGES

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Russia's Global Orbiting Navigation Satellite System (GLONASS) is expected to become fully operational this year. Heavily endorsed in recent years by both members of the ruling tandem, it was designed to provide services similar to the U.S. Global Positioning System (GPS) and place Russia on technological par with the United States. In recent years, extraordinary efforts have been made to advance the system, including a big boost in funding, up to 70 billion rubles ($2.3 billion), in 2008-2010.

The GPS Role Model

At present, GPS enjoys a global monopoly in the field of geo-spacial positioning, navigation, and timing (PNT). GPS began as a military system that eventually branched out into the civilian sphere. In May 2000, U.S. President Bill Clinton announced that the United States was going to discontinue intentionally degrading the accuracy of non-military GPS signals to make the system "more responsive to civil and commercial users worldwide." The United States regards GPS as a "national asset" and funds it from the federal budget, providing free-of-charge signal access worldwide. With seemingly endless applications, GPS has a robust commercial dimension. From 2005-2010, sales of GPS receiver units averaged an annual revenue of $33.5 billion in North America alone. GPS technology has stimulated innovation and increased productivity across a wide range of industries from agriculture to construction and transportation. A recent estimate suggests that the productivity gains and cost reductions related to the use of GPS technology amount to 0.5 to 0.9 percent of the annual U.S. gross domestic product. Based on the overarching policy goal that "the United States must maintain its leadership in the service, provision, and use of global navigation satellite systems," the international dimension of U.S. GPS policy stresses competitiveness and interoperability with similar foreign systems. In the mid-2000s, the United States spurred cooperative agreements with countries that had been working on similar systems (China, India, Japan, Russia, and the EU).

GLONASS: A Showcase for Defense Technology Conversion?

With the Russian leadership struggling to identify entry points for innovation-driven economic development, there has long existed a view suggesting that the Russian defense industry's technological potential could become a driver of innovation in the economy. If anything, GLONASS is positioned to become a success story for the military-technology complex, breaking the path for cutting-edge civilian applications. Indigenous PNT capability would seal Russia's "navigation sovereignty" in the areas of security and defense, stimulate research and development and business activities, and open opportunities for international cooperation and integration. The GPS monopoly presents to GLONASS not only a challenge but an opportunity. A decade of GPS infrastructure development has established areas of application and optimal business models. Internationally, diversification in supply of navigation services is seen as being in the interest of many governments and commercial customers. From the individual end-user standpoint, devices with dual or multiple system receivers offer better performance, and manufacturers have already come up with modules that can receive signals from satellites of multiple navigation systems. Within Russia, GLONASS is a high-priority program that has had consistent funding and comprehensive administrative support.

Many indicators, however, have signaled that the program is far from a success. While a new federal program for GLONASS development is being drawn for the next ten-year period (with a budget request of 402 billion rubles), the previous program, running from 2002 through 2011, enjoyed three budget increases but failed to reach 10 out of 28 benchmarks. The date for achieving full operational capacity was moved back several times. The system was able to provide global coverage by the end of 2010, but only because it was decided to activate reserve satellites and thus reach the required minimal capacity of 24 operational satellites.

While no hard numbers exist, the product lines and sales of Russian-made GLONASS devices are running far lower than projected. The record of GLONASS implementation shows how difficult it is to realize a commercial promise out of military technology even with powerful resources committed. An analysis of GLONASS difficulties points to several problem areas.

Industry's Structural Constraints

The primary weak spot in the GLONASS program relates to the core aspect of the system: the space segment. At the root of the problem lies a long recognized but never adequately solved Russian lag in electronics. For many years, the short lifespan of GLONASS satellites (just three years for the first generation) dictated a heavy manufacturing and launching schedule to maintain the full capacity of the orbital group. In 2005, the second-generation GLONASS-M was introduced with a life span of seven years. Even now, however, the GLONASS program has been hallmarked by a race to replenish and increase the orbital group against a steady stream of worn-out satellites. In several cases, the need to maintain a minimal operational constellation has

required the deployment of satellites that have not completed their testing phases. In a recent interview, the general designer of ISS-Reshetnev, Russia's leading space system developer and manufacturer, blamed the persisting lapse in the longevity of electronic components as a deficiency of domestic capability. He confirmed that they continued to use foreign-made electronic components, and he revealed that a faulty imported "radio element" used by one of their sub-contractors in 2009 led to a recall of three launch-ready satellites as well as a setback in the manufacturing of another three. In another interview, the deputy head of RosKosmos acknowledged that the designers of the latest-generation satellites, the GLONASS-K, with a design lifespan of ten years, were "faced with the necessity of using a number of radio electronic components, which, unfortunately, cannot be currently manufactured in Russia."

Problems with outdated base components pervades Russia's entire defense industry and stems from the structural deficiency of the defense sector, which is weakly integrated with civil industries and largely insulated from market mechanisms thanks to state patronage. The need to upgrade the domestic capacity of electronic components—starkly revealed by the GLONASS program—continues to be hampered by the fossilized nature of the defense sector.

Disconnected Policies

Another group of problems made apparent by the GLONASS program relates to the weakness of state policy planning. The GLONASS project has experienced alternating spans of state attention and neglect. Contrary to the set stereotype about the total downturn of the 1990s, the program actually stayed on track enough to put a partial 12-satellite group into orbit in 1993. It even achieved a full capacity of 24 satellites in 1995. After this high point, it degraded over five years to just six operational satellites. It is interesting that this period of inactivity with regard to existing material assets was also a period of intense state policy planning and program development. In 1995, the government issued a ruling for the further development of the system "in the interests of civil consumers." In 1997, it adopted a dedicated federal program for 1997-2001, remarkable for its surprising disengagement from reality. Precisely at a time when the orbital group was losing its operational satellites one by one, the program planned to launch a comprehensive GLONASS receiver service complete with land infrastructure and working industry applications as early as 2001. Specifically, the program planned to spend the years of 1997-1999 doing research and development, and the years of 1999-2001 deploying the land infrastructure, installing GLONASS devices on transport and other facilities and placing 10,000 personal navigation devices on the market.

Around the turn of the century, a new federal program was planned for an extended timeframe of ten years (2002-2011). It recognized the lack in a "concentration of effort by executive organs" and called for a "balanced development of all GLONASS segments." The program was uninspiring until a new spike of state interest occurred around 2007-2008, which lead to an accelerated implementation of it. As the system approached its planned operational capacity, it became apparent that its actual use in civil applications suddenly required unforeseen but essential resources such as digital

navigation maps and a manufacturing base for end-user devices. Work on digital maps was kickstarted in 2008 by RosKartografia, a federal agency, which projected obtaining full coverage of all "economically developed cities and regions" by 2011. Market players (small companies and startups) moved quickly to fulfill demand, but the state moved slowly—for example, a guideline of standards and regulations for the new geodesic sub-field of digital navigation mapping was not adopted until October 2010.

Even with the clear motivation and apparent political will to turn GLONASS into a full-fledged, commercially successful service utility, Russia's state leaders seemed at a loss in how to make it all actually happen. Prime Minister Vladimir Putin, GLONASS' principal champion, regularly goes on record with various recommendations, such as implementing the system on all new Russian-made road vehicles or in fishing vessels. State bureaucrats also often articulate ideas, such as installing GLONASS trackers on poll boxes or using it for waste management fleets. This kind of thinking, which confuses market viability with state-cultivated demand, is an inherent weakness of GLONASS policy planning.

Worn-Out Toolbox

So far, GLONASS is being implemented by wielding an old-fashioned administrative resource: a law adopted in February 2009 that prescribes the obligatory use of "navigation devices relying on Russian navigation systems" for transport and other technical assets, including armaments and military equipment, under federal, regional, and municipal ownership. Appropriate authorities at each level must determine the types of transport vehicles to be equipped with GLONASS or GLONASS/GPS modules. A 2008 government ruling established the "personal responsibility" of federal executives for the installation of the required equipment on their agencies' technical assets. (At the same time, no regulations enforcing its obligatory use through licensing or fines have been put into place).

Accustomed to relying on a monopolist state agent, the government instituted a "National Navigation Service Provider" personified by the company Navigation-Information Systems (NIS), one of the newly-sprung commercial units in the RosKosmos domain. Its multiple roles, most importantly, include international representation of the GLONASS program and streamlining the host of federally-funded GLONASS implementation projects. It comes as no surprise that a parent company, M2M Telematics, closely affiliated with NIS, runs the navigation services' most developed regional network, and enjoys over a 40 percent market share for on-board vehicle modules for both corporate and state clients. Regional governments have been assigned with drawing up their own GLONASS implementation programs. Guaranteed federal funding for these programs provides a good stimulus for building mutually beneficial partnerships with large federal-level integrators. In a telling example, the Altai regional branch of M2M Telematics is headed by the 25-year-old son of an Altai government official. State corporations like Gazprom and state-favored private companies like Norilsk Nickel are another group of clients for the state-recommended GLONASS application projects.

The personal device market has proven to be a far more challenging one. Several GLONASS officials floated ideas of imposing prohibitive custom tariffs for imported mono-chip GPS devices, but it soon became apparent that all major device manufacturers were ready to introduce dual GLONASS/GPS chips as soon as the GLONASS commercial-grade signal went online.

Mission Endangered by Bureaucratic Idiocy

At least for the present, it is fair to say that heavy state protectionism is playing against the market robustness of GLONASS. The classic bureaucratic ways of building demonstration-size Potemkin villages and presenting upbeat reports in place of critical analysis creates skeptical public attitudes and ironic perceptions of a system that has genuine value and potential. In a skewed bureaucratic perspective, the October 2008 presentation of a GLONASS-tracker collar to Putin's Labrador retriever, Koni, became the event that made the most memorable GLONASS news of the season. The following grotesque dialogue between Putin and Deputy Prime Minister Sergei Ivanov was reported by the mass media:

> VP: "Come, Koni, you have a present here."
> SI: "We alone in the world were able to make this; no one else has anything similar. When the dog stays put and does not move, say, she lies down in a puddle..."
> VP: "Hey, my dog is not a pig, she does not lie in puddles."
> SI: "OK, say she's in a forest. [When she does not move], then the battery is off, which saves energy."
> VP: "Do you like it? Yes, she likes it. Wagging her tail…means she likes it."

After a Russian-made, GLONASS-capable smartphone was introduced to President Dmitry Medvedev as a "Russian iPhone" on television, public comments took a distinctly derisive tone. The Chinese-manufactured unit with below-average specifications and an older-generation Android platform was set by default to GPS navigation and was found to contain no easily recognizable option to enable navigation by GLONASS. The culture of *pokazukha* (i.e., show rather than substance) unfortunately extends to applications that are supposed to create added value in the real-life economy. A report published by the authoritative GLONASS/GNSS Forum Association contains this finding: "The presence of a GLONASS/GPS chipset does not guarantee the actual possibility of the equipment working with the GLONASS signal." In other words, the nominal dual GLONASS/GPS devices in many cases are programmed to run on GPS signal alone and simply do not allow integration with the GLONASS signal. Based on its own research in the absence of systematized information, the report concludes that "a significant share of GLONASS terminals installed in 2010 do not meet their declared specifications."

Future Still Undecided

The ubiquitous and reliable GPS service presents GLONASS with an uphill task, not so much in the realm of technical specifications, but in successful market strategies. In its stated goal of "commercializing" the world's second satellite global navigation system, Russia's policy has been the weakest—less in the management of the system's physical assets than in the market—governed domains of mass production, competitiveness, and integration into a dynamic economy. The GLONASS program can play a stimulating role for the Russian economy, and benefit not only privileged state-connected actors but also agile and competent market-based entrepreneurs seeking to expand their businesses. In the realm of policymaking, the aforementioned non-governmental GLONASS/GNSS Forum association has come out as an effective entity for vision and planning, more so than any of the state structures. The state plays a positive role by providing funding and encouraging the market, but in its present state of stagnation, it simultaneously undermines the program through ineffective and poorly implemented policies.