

February 16, 2015

YAKUNIN FROM PAGE 15

more likely as the sector develops. While Teflon, for example, is not a NASA product (contrary to popular belief), thousands of other technologies used on Earth have sprung directly from aerospace companies. As entities with business and market sense get involved in the industry, such innovations are only likely to increase.

All of this points to an exciting future for the Russian space industry, and it is one that the Russian government appears to recognize and wants to encourage. Roscosmos itself has long since stated its intention to transfer responsibility for putting the innovative outcomes of space activity into private hands, while Vasily Belov, senior vice president for innovations at the Skolkovo Foundation, has said that Russian startups are likely to be especially sought-after in the space sector. Skolkovo's aerospace

cluster, which currently has over 100 companies present, gives Russia a strong presence in what will increasingly become the normal model for progress in the industry.

Competition between states drove innovation during the previous century, but the "new space economy" is likely to see similarly rapid progress driven by commercial competition, a fact that will greatly interest investors. As the number of those involved around Skolkovo increases, a whole pool of investment-worthy Russian companies is likely to form.

With increasing global interest in the space industry and appetite for private investment growing, not only for space exploration but for innovation in space-related products and services, this industry is one to watch.

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RUMPF FROM PAGE 15

efficiency becomes the primary driver for awarding space contracts because private investment makes up an increasing portion of the space economy. The established system of how space works in Europe is thrown off balance.

In an attempt to design Ariane 6 rocket to launch cost standards set by SpaceX's Falcon 9, ESA has scrapped its fundamental principle of geographic return for the production of the new launcher. The significance of this step cannot be overstated. It is the realization that ESA has to draw every register, even altering one of its core principles, in hopes of maintaining Europe's competitiveness in space.

For now, the disregard of geographic return is limited to the big but singular launcher sector, and ESA would like to reinforce this impression. However, the decision was fueled by increased competition in the launcher sector. What happens if competition increases significantly in other sectors, such as the satellite manufacturing industry?

In January, news surfaced that Elon Musk, working with and funded by Google, wants to create a constellation of about 4,000 small satellites to provide global Internet access. A new SpaceX factory dedicated to manufacturing satellites will be created as part of that effort. The Virgin Group, together with OneWeb, has similar ambitions. It is very likely that this development will challenge the next major sector in space: satellite manufacturing. It is easy to imagine that Europe's satellite manufacturing industry will experience a shock similar to what the launcher industry is experiencing now. It is also possible that ESA will again try to increase efficiency by disregarding the geographic return principle.

How would such a move affect the desire of smaller European nations to be members of ESA in the long run? Geographic return is a major incentive for these nations to be a member of ESA.

If the policy does not exist, it is questionable if these countries want to continue to pay membership fees that benefit industries in more-competitive countries. A decline in the number of ESA members is the likely consequence. The very existence of ESA would be called into question.

The EU does not have this dilemma to begin with because contracts from the EU are awarded on a competitive basis. The EU therefore has a strong case to increase its authority in European space since its infrastructure is already set up to meet a competitive market.

But will geographic return really become obsolete? In all areas where commercial interests are the primary incentive (for example, Ariane and the European Data Relay System), this outcome is the most likely one. However, there are other areas where commercial considerations are not decisive. Science and exploration missions as well as human spaceflight are examples. These areas have a good chance to experience a continuation of the ESA principles because they strengthen Europe as a whole.

In the end, ESA could remain intact but lose many of its responsibilities. By refocusing ESA on space science and human spaceflight, ESA has a strong case to reassert its raison d'être since ESA is already established in these fields, in contrast to the EU. A second option is to allow ESA to apply geographic return to some projects and disregard it for others. Thus, less-competitive member nations could still hope to receive a return on their investment in ESA.

In 2016, the current agreement for cooperation between the EU and ESA expires. It remains to be seen what the new agreement will look like. The current signs point at a shift in power toward the EU.

Clemens Rumpf is a researcher at the University of Southampton in the U.K. on the topic of planetary defense. He has previously worked at DLR and Airbus DS in Germany as well as ESA in the Netherlands. This article originally appeared in The Space Review, a SpaceNews affiliate.

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1st International Academy of Astronautics and International Institute of Space Law Conference on Climate Change and Disaster Management
Kovalam, Thiruvananthapuram, India
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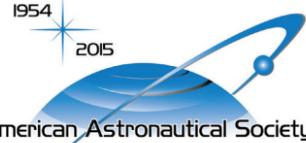
MARCH

March 3-4

SMI's 10th annual Military Space conference
London, UK
www.smi-online.co.uk/2015military-space21.asp

March 10-12

CABSAT 2015
Dubai, UAE
www.cabsat.com

1954 2015

American Astronautical Society

March 10-12

AAS 53rd Goddard Symposium "On the Cusp: What's Next?"
Greenbelt Marriott, Greenbelt, MD
Mar 10: Evening reception. Mar 11: NASA Administrator and Associate Administrators; Bob Rogers; Awards Luncheon; Cutting-Edge Technologies.
Mar 12: Global Exploration; Mars; Astronomy; Commercial Ventures. Register online at www.astronautical.org or phone 703-866-0020

March 16-19

Satellite 2015
Washington, DC
www.satshow.com

APRIL

April 11-16

National Association of Broadcasters (NAB)
Las Vegas, NV
www.nabshow.com

April 13

Cyber 1.5 Classified
U.S. citizenship and a TS/SCI security clearance are required.
Colorado Springs, CO
www.spacesymposium.org

April 13-16

31st Space Symposium
Colorado Springs, CO
www.spacesymposium.org

April 13-17

4th Planetary Defense Conference
Frascati, Roma, Italy
<http://iaaweb.org>

April 20-24

10th International Academy of Astronautics Symposium on Small Satellites for Earth Observation
Berlin, Germany
<http://iaaweb.org>

MAY

May 13-14

MilSatCom Asia-Pacific
Singapore
www.smi-online.co.uk/2015milsatcom-asia23.asp

May 19-21

5th IAA Conference on Space Technologies: the Present and Future
Dnepropetrovsk, Ukraine
<http://iaaweb.org>

May 19-21

Space Tech Expo
Long Beach, CA
www.spacetecheexpo.com

May 20-24

International Space Development Conference (ISDC)
Toronto, Ontario, Canada
<http://isdc.nssc.org/>

May 25-26

SATCOM Africa 2015
Johannesburg, South Africa
www.terrapinn.com/exhibition/satcom-africa/

JUNE

June 9-11

11th International Academy of Astronautics Low-Cost Planetary Missions Conference
Berlin, Germany
<http://iaaweb.org>

June 15-21

Paris Air Show
Paris, France
www.paris-air-show.com

June 21-24

GEOINT 2015
Washington, DC
www.geoint2015.com

June 29 - July 3

20th International Academy of Astronautics Human in Space Symposium
Prague, Czech Republic
<http://iaaweb.org>

JULY

July 7-9

AAS ISS Research and Development Conference
Boston, MA
www.astronautical.org