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CORPORATE SECTOR IN SPACE

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Introduction

Modern space technology relies upon reliable space launch systems comprising in the main part of single use space launch rockets. Space launch rockets of today can be traced back to Nazi German's experiments with ballistic trajectory rockets for military use. This primarily wartime research in Germany resulted in the V-2 ballistic trajectory rocket that was used by the Nazi forces to launch attacks against Britain during World War-II (WW-II)[1]. Germany was the pioneer in developing practical rockets, a feat that the unusually talented Germans repeated in several other fields also[2]. Scientists and thinkers in many parts of the world, in the years prior to WW-II, had long conceptualised the concept of a space launch rocket without the wherewithal to realise such dreams being developed.

Space Technology Proliferation Since 1945

Developments in the years after WW-II saw the victors, mainly the US, USSR, and UK, pillaging through the ruins of Nazi Germany's advanced laboratories to take hold of surviving documentation, examples of Nazi rockets and to capture scientists and technicians involved in the development of advanced weapons such as rockets in Nazi Germany[3]. At that time rocket technology was the ultimate cutting edge of modern science. The resources required to research into rocket technology and to build practical rockets were available only with nation states. Hence research and development (R&D) into space launch rockets was the preserve of nation states alone. R&D into rockets moreover required the pooled capability of an entire country. Initial attempts at rocket development, as often happens in the world, were aimed at development of weapons of war in the form of ballistic missiles of ever more range and accuracy both in the US and the USSR. The USSR stole a march on the US through achieving the first successful launch of an artificial earth satellite in 1957[4] through use of a modified ballistic missile; followed by the first launch of a human into space in 1961.[5] This led to a frenzied US response.[6] The US made catching up with the USSR into a national mission and devoted

considerable resources into the endeavour. At the time the science behind development of rockets was considered to be very advanced, leading to the phrase "it is not rocket science" coming into use to describe a relatively easy or common level of science / engineering, or thought. For the next four decades till the end of the twentieth century space technology, including space launch technology remained the exclusive preserve of nation states with private industry participating only as contractors or sub-contractors to develop and build parts of space systems ordered by their national space agencies. Space programs in the US and USSR received military funding also as it became clear that space based assets could significantly enhance military capabilities. Technology and cost considerations led to national space programs in Japan, which formed the Japan Aerospace Exploration Agency (JAXA)[7], India with its Indian Space Research Organisation (ISRO) [8], America formed its National Aeronautics and Space Administration (NASA)[9] and the USSR's space agency has since 1991 been renamed the Russian Federal Space Agency (Roscosmos)[10]. Twenty two European countries, including powerhouses such as Germany, France and the UK, for reasons of costs and technology availability combined resources to form the European Space Agency (ESA)[11], China has the China National Space Administration (CNSA)[12]. The common point that emerges from a look at these space agencies mentioned above is that they are central government level endeavours in both the erstwhile and currently communist countries, the third world, and also in case of the liberal democratic west. An examination of the space industries in the west where capitalism is the main guiding principle, the socialist governance determined countries and the third world countries such as India brings out a few differences. In the socialist block of countries, such as the erstwhile USSR, and Communist China, as could be expected, in addition to the space agencies being state owned and operated entities, the industry supplying components and manufacturing space craft and associated systems is also state owned and operated for the most part. In capitalist countries, such as the USA, Europe and Japan, while the space agencies were and are state owned the suppliers of components and manufacturers of parts and even entire spacecraft were often private industries with private ownership. The third world countries, like India, a mix of publicly owned and private companies are found to be the suppliers of component parts and even entire assemblies to the state owned and operated space agencies[13].

To sum up, in all cases the system so far has involved a mixture of state owned or privately owned entities supplying component parts, sub-assemblies and even entire assemblies needed by the space program to the state owned space agency. The actual assembly of the final spacecraft for launch, its launch, subsequent operation, and ownership has so far been a state

monopoly in all space faring nations, irrespective of their political persuasion or governance system. In the capitalist countries as well as in several countries that follow a mix of a socialist and capitalist system, or "capitalism with social characteristics" method of organisation, since at least the late 1970s the basic science and technology required for developing space craft has been readily available to private sector engineering and industrial enterprises. This is shown most clearly by the US example where quite often entire space craft were designed and built / assembled by private industrial concerns on contract to NASA. However, despite this the national space agency, NASA, retained full control over the space program. A similar situation existed in Europe and Japan. Other countries' space agencies too have retained tight control over their countries' space programs despite capabilities in the private or non-government controlled and owned sectors of their economies. The reason for this could be possibly linked to the national security issues linked to space capability, much like the state control and monopoly over violence and armed orb military forces.

Of late, however, a trend towards the corporatisation of space capabilities appears to be gaining ground. The US was the first country to operationalise a reusable space access system in form of the space shuttle. This craft was launched from a launch pad in a vertical position in a way similar to the launch of conventional space launch rockets. After launch into space the space shuttle behaved like a high speed glider. After re-entering the atmosphere the space shuttle glided down like an aircraft in unpowered flight and landed at a specially prepared flat landing surface much like an aircraft would land[14]. The craft could be, after servicing and a refit, be coupled to booster rockets and used for more missions[15]. Once the space shuttle entered service the US allowed its earlier "use and discard" single launch rocket capability to wither away[16]. It was apparently assumed that space shuttle technology had made these earlier single use rockets obsolete. Soviet efforts to develop a similar space shuttle were in progress when the Soviet Union was dismantled and so were incomplete[17]. The political and economic chaos in the former Soviet political area subsequent to dismantling of the USSR resulted in the "Buran"[18], the Soviet analogue of the US space shuttle remaining only partly developed. Other space agencies continued to work on refining their single use rocket systems with only the Chinese progressing towards building a reusable space craft that has been tested, though of a smaller scale than the space shuttle. In recent months news articles have reported that the ESA and India are independently working on developing a reusable space launch system. Since retirement of the US space shuttle the US has been forced to rely upon old Soviet era rocket engines imported from Russia to launch its rockets to place satellites in orbit[19]. US astronauts going to the international space

station are carried there on board Russian rockets and space craft at a payment of $81 million per seat.[20] Currently the only other space agency with a current and ongoing manned space flight capability and program is CNSA.

An interesting development in the US in the past few years has been the offer from the US Government to its private industry to supply space capabilities that the Government itself has allowed to decay. Thus the company SpaceX developed its 'Dragon' space craft to ferry supplies to the international space station and did carry out such supply missions on US government contract. Likewise several other private companies have been involved in developing space technologies since the US Government opened up the field for private company activity [21]. These developments apparently have two motivators for private industry. The first is the winning of government contracts for space services linked to the country's security interests in space. The second incentive is the opportunities in terms of resources and value added service that could lead to new and independent revenue streams for the private companies.

(Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position of the Centre for Air Power Studies [CAPS])

Notes

[1] J Marrs, " German Wonder Weapons", http://www.bibliotecapleyades.net/ciencia/ciencia_flyingobjects77.htm, accessed on September 22, 2015

[2] Ibid.

[3] David Nye, "6 things the US stole from the Germans during WWII", http://www.wearethemighty.com/german-tech-ww2-2015-05#ixzz3mXBZ77wn, accessed on September 22, 2015.

[4] History.com, "1957 Soviet Union launches Sputnik I", http://www.history.com/this-day-in-history/soviet-union-launches-sputnik-i, accessed on September 22, 2015.

[5] Nola Taylor Redd & Robert Roy Britt, "Yuri Gagarin: First Man in Space | The Greatest Moments in Flight", http://www.space.com/16159-first-man-in-space.html, accessed on September 22, 2015.

[6] historyandtheheadlines.abc-clio.com, "Sputnik Escalates the Cold War", http://www.historyandtheheadlines.abc-clio.com/contentpages/ContentPage.aspx?entryId=1130227, accessed on September 22, 2015.

[7] jaxa.jp, "About JAXA", http://global.jaxa.jp/about/, accessed on September 22, 2015.

[8] Indian Space Research Organisation, "About ISRO", http://www.isro.gov.in/about-isro, accessed on September 22, 2015.

[9] nasa.gov, "About NASA", https://www.nasa.gov/about/index.html, accessed on September 22, 2015.

[10] en.federalspace.ru, "What Roscosmos ", http://en.federalspace.ru/20268/, accessed on September 22, 2015.

[11] esa.int, "What is ESA", http://www.esa.int/About_Us/Welcome_to_ESA, accessed on September 22, 2015.

[12] CNSA. gov.cn, "Policies and Legislation", http://www.cnsa.gov.cn/n615709/n620681/n639461/index.html, accessed on September 22, 2015.

[13] Roger Moser, Heiko A. von der Gracht, and Tobias Gnatzy, "The Indian Aerospace Industry 2019", https://www.kpmg.com/DE/de/Documents/brainnet-Indian-Aerospace-2019-20121206-kpmg.pdf, accessed on September 22, 2015.

[14] Nasa.gov, "The Shuttle", http://www.nasa.gov/externalflash/the_shuttle/, accessed on September 22, 2015.

[15] Ibid.

[16] P.J. O'Rourke, "Why Does the USA Depend on Russian Rockets to Get Us Into Space?", http://www.thedailybeast.com/articles/2014/06/22/why

-does-the-usa-depend-on-russian-rockets-to-get-us-into-space.html, accessed on September 22, 2015.

[17] russianspaceweb.com, "Spacecraft: Manned: Buran", http://www.russianspaceweb.com/buran.html, accessed on September 22, 2015.

[18] Ibid.

[19] N-16, P. J. O'Rourke.

[20] Brian Lufkin, "Head of NASA: Congress, Stop Paying Russia to Send Americans to Space", http://gizmodo.com/head-of-nasa-congress-stop-paying-russia-to-send-amer-1727293604, accessed on September 22, 2015.

[21] Gabe Bergado, "NASA Invites Private Companies To The Moon The space agency is looking for partners to develop technologies for commercial lunar cargo transportation. What this means, exactly, is unclear", http://www.popsci.com/article/science/nasa-invites-private-companies-moon, accessed on September 22, 2015.