

PRIZES AS A DRIVER OF COMMERCIAL SPACE INNOVATION, CASE STUDY:
THE BUSINESS PLAN COMPETITION

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ABSTRACT: In 2004, when Scaled Composites won the US\$10 million Ansari XPrize, prizes could celebrate a 100-year history driving innovation in aviation and space. This strategy, however, is not without its cost, as far more money is spent in pursuit of the prize than the prize's cash value. A new strategy has now emerged in hopes of stimulating further commercial space technology development all the way down to the startup level - the Business Plan Competition. Entrepreneurs compete to present their ideas in front of Judges panels composed of angel investors, venture capitalists, and business development leaders. While prizes range as high as US\$100,000 for first place, the opportunity to make contact with a room full of interested investors is in and of itself a victory. The author, a veteran project manager of several such competitions, explains how BPCs are the next wave in developing NewSpace commercial technologies.

100 YEARS OF PRIZES

For over a century, now, cash prizes, offered by either wealthy individuals or corporate media chains, have been a prime motivator of innovation and invention in the history of aviation and aerospace development. These awards were offered from the earliest days of aviation. Initially they involved key technology demonstrations, like the first figure-8, going a specified distance and return, or simply for speed and altitude. As aviation capability grew, more ambitious feats were sought, both by a hungry public, and news media eager to open their wallets in the hopes of selling more papers.

Among the most notable prizes from that era were the GB£1,000 for the first cross-channel flight (awarded to Louis Blériot in 1909), the GB£10,000 given in 1919 to Alcock and Brown for the first transatlantic flight between North

America and Ireland, and the US\$25,000 Orteig Prize for the first American to fly across the Atlantic Ocean from New York to Paris. Charles Lindbergh claimed this prize in 1927, in his single-engine monoplane, "The Spirit of St. Louis". In 1930, a prize of GB£10,000 for the first solo flight from England to Australia was claimed by Amy Johnson, also the first female pilot to perform such a feat. That same year, Clyde Pangborn and Hugh Herndon, Jr. claimed a \$25,000 prize from the Japanese *Asahi Shimbun* newspaper for the first flight across the Pacific.

As has been the case with many aerospace prizes in the 20th, and now 21st centuries, more was collectively spent in the attempt to win the award than the cash value of the award itself. For example, the US\$25,000 Orteig prize inspired nine contestant teams, spending collectively US\$400,000 between 1919

and 1927. This is a unique quality of the “prize” system – it inspires people to do whatever it takes to be the first to perform a feat of both technological and human determination. It is as much the human spirit itself that is inspired, as it is technological creativity and prowess. In American culture, this is often referred to as “bragging rights”. But Lindbergh’s feat in particular, left its mark in many other ways. Within a year of crossing the Atlantic, applications for US pilot’s licenses had jumped over 300%, and the US Postal Service inaugurated AirMail services.

A TRULY “SPACE” PRIZE

Prizes as drivers of invention came once again to the forefront of our collective consciousness in 1996, when the XPrize was announced, by Peter Diamandis, and the XPrize Foundation. The first of its kind true “space” prize, the XPrize was a US\$10M award for the first private firm to develop a sub-orbital, human piloted craft that could rocket to the internationally-recognized “edge of space” (100km/62mi), return safely, and repeat the feat within a period of two consecutive weeks. There was a time limit of exactly a decade imposed as a focal point for results.

There were 27 formal entries to this contest. US\$100-\$400¹ million was collectively raised and spent by these teams in pursuit of this goal.

It was considered a very risky venture by many space advocacy insiders, as at the time of the initial announcement, it had been speculated that the XPrize Foundation had not secured an

underwriter for the XPrize. As things unfolded, both an underwriter - and a winner – arrived at virtually the 11th hour. The Ansari family, highly successful immigrant entrepreneurs from Iran, agreed to underwrite the XPrize in May of 2004. In October of that year, a team led by legendary aviation designer Burt Rutan, who founded a company called Scaled Composites in 1982, achieved the goal and claimed the XPrize. Their craft, dubbed “SpaceShipOne”, was a single-seat design powered by a solid rocket motor built by SpaceDev, in Poway, CA. Tim Pickens of Orion Propulsion in Huntsville, AL assisted with motor development. The craft was air dropped from 50,000 feet (15,240m), the engine fired, and the craft went into a steep vertical ascent to 100km, at which point the wings cantilevered approx 90 degrees with respect to the fuselage to offer additional drag on the descent. As the flight was straight up and down, little in the way of thermal shielding was necessary. Once back in the troposphere, SS1 would swing the wings back into launch position, where the ship would glide to a deadstick landing at the Mojave, CA, airport.

The development of SS1 was underwritten by Microsoft co-founder Paul Allen, who invested US\$25M. After Scaled won the XPrize, Sir Richard Branson, founder of Virgin Group, took serious interest in commercializing the technology, and invested over US\$30M in the development of SpaceShipTwo, a larger passenger-carrying vehicle, founding a new company, Virgin Galactic, to sell tickets to space at approx. US\$225,000 per seat. As of 2012, engine problems is keeping SS2 still in development, although its carrier vehicle,

¹ Spending estimates vary widely. XPrize foundation estimated \$100M, but the 2004 Aldridge Commission report (Moon, Mars, and Beyond) estimated \$400M.

WhiteKnightTwo, is complete and undergoing trials. In the meantime, Scaled Composites was acquired by Northrup-Grumman.

Prizes continue to be offered to drive innovation. In 2007, the XPrize Foundation partnered with underwriter Google to fund a US\$20M Google Lunar XPrize for the first group to land a robotic craft on the Moon, send back images, and be driven remotely across the lunar landscape for at least 500 meters. As of publication date, the Prize has yet to be claimed.

NASA has, in recent years, sponsored events such as two space glove design competitions (both won by Peter Homer at Flagsuit LLC), and a US\$1M Lunar Lander Challenge (won by Masten in 2009), as part of its Centennial Challenges initiative.

THE BPC – PRIZE MODEL 2.0

While prizes in general were extremely encouraging to innovation and development, it still to a large extent depended on individuals/groups with deep pockets to make any headway. Virtually no prize winner in the last 100 years spent less to achieve any particular feat than the prize value itself. Paul Allen spent US\$25 million for a US\$10 million prize. This was typical. And there was no guarantee that technology crafted by also-rans in any particular prize-competition would in any way be commercially viable in the future. There were many dead-end roads. Could aerospace innovation be driven by a more cost-effective model, and in so doing, encourage more entrepreneurs and capital funding players to step in?

Until recent years, Business Plan Competitions (BPCs) were primarily

limited to business schools at universities throughout the US and the western world. Thousands of them are held each year, globally, usually with modest prizes in the form of cash and/or scholarships. The most notable of these is the Rice University BPC, where in 2012, 42 teams from around the world competed for more than \$1.3 million in cash and prizes awarded over a variety of categories, from every kind of technology innovation to new compelling types of services.

“Professional” BPCs are a relatively new phenomenon. According to the aggregator site *bizplancompetitions.com*, there are only nine “pro” competitions in the US. Of those nine, only five offer prizes of US\$100,000 or more. Of those five, four are tied at the US\$100k level, while one offers a top award of US\$500,000 (Accelerate Michigan Innovation). Of the four tied for 2nd place above, only one is specifically dedicated to space entrepreneurial startup companies. This is the *NewSpace Business Plan Competition*, hosted by the Space Frontier Foundation at its annual Conference in late July of each year. It is this specific event that shall be the remaining focus of this report.

The NewSpace BPC had its humble beginnings in the early 2000’s. Of all the space advocacy organizations, the Space Frontier Foundation (SFF) was unique in its promotion of entrepreneurial, market-focused solutions to the challenges of exploring the space frontier, exploiting its resources, and ultimately leading to a goal of permanent human settlement, expanding the next wave of civilization ever outward.

Since its founding over twenty years ago, this relatively small but determined

group not only “changed the conversation” regarding space policy, both in and out of the US, it succeeded in helping establish a new regulatory environment that the burgeoning NewSpace sector of the economy could live with, grow, and prosper, culminating in the establishment of the FAA’s Office of Commercial Space Transportation in 2004, in the wake of Scaled Composites winning the Ansari XPrize.

With those successes, it seemed a natural extension for the SFF to promote other business development initiatives, in an attempt to attract media attention and potential investors. The first BPC was held in 2007, as a part of the NewSpace conference. In these early BPCs, there was only US\$2000 in total prizes, sponsored by the Heinlein Prize Trust.

Major challenges and hurdles beset making this event grow, and giving it legitimacy in the investment community. The first was the lack of major sponsorships, either by private corporations or public sector institutions, the kind enjoyed by Rice, et al. The second was the often-heard lament by the investor community, that space “was too rich for my blood”.

Indeed, when the argument was made for private commercial efforts to develop space capability, the focus centered on launch systems, tourism, freight hauling, and supportive “spaceport” infrastructure. While these are important, to date, inspired individual millionaires and billionaires, all of whom made their fortunes in other arenas, have driven all the most consistently successful private efforts in these areas. The most notable examples of these are Jeff Bezos (Amazon), Elon Musk (PayPal), Sir

Richard Branson (Virgin Group), John Carmack (game developer), and Walter Anderson (telecom industry), spending US\$10’s to US\$100’s of millions of their own dollars to pursue a specific space vision.

The general investment community, consisting of angels, venture capitalists, and institutional investment banks, saw little potential in space at that high investment level, with too much invested and not enough potential return (if any) in the sorts of time frames to which they were accustomed. Something else had to happen to convince them to come to the table. In addition, the “overbuilding” of commercial “spaceports,” in naïve expectation of a vast market demand for commercial suborbital services, which began around 2006, has yet to show any potential for return, as not a single paying “spaceflight participant” has been flown as of this date of publication.² In response to these challenges, this author, in 2008, developed a new concept that could directly assist in achieving this goal, and bring new and much needed attention/potential investment to the space commercial enterprise. Dubbing this “Space-scalable³,” he began to slowly win over some key players in the investment community to see differently what a “space investment” might really look like, and at a much lower and more reasonable cost of entry.

In parallel with this, a coalition comprised of the SFF, National Space Society, and the Space Business

² See “Extreme Ports” 3-part series, the SpaceCynics blog, 2006 <http://spacecynic.wordpress.com/2006/06/18/x-treme-ports/>

³ “Space-scalable” has a US registered Trademark pending, by Exodus Consulting Group, Inc., New York, USA

Roundtable, along with sponsors such as Boeing and EADS/Astrium, created in 2007 the bi-annual “Space Investment Summit” event series. While the premiere event was purely for educational purposes, many in the investment community were persuaded to attend and participate in the talks and panel discussions. Subsequent events offered presentations from entrepreneurs seeking funding. While the reaction to the events was mixed – many in the investor groups found them educational – little in the way of deal flow was achieved. Boeing and EADS dropped their support in late 2010, and the events had lost steam by 2011. Today the SIS is in a “rebuilding” phase.

Meantime, by 2009, some of the work done in promoting SIS was beginning to pay off in the form of the NewSpace BPC. In this year, entries were not just about “rockets” any longer, but also included software startups and a media company among the contestants. While the prize was still only \$5000 from the Heinlein Trust, the stage was being set for a much greater and very visible expansion.

Due to logistical issues in 2008 and 2010, there was no BPC associated with the SFF NewSpace conference. But in early 2011, a new opportunity presented itself.

At NASA’s Ames Research Center, an “Emerging Commercial Space Office” had been established, offering grant funding for unique proposals. SFF submitted a grant application for a new and expanded BPC. In early June, 2011, that grant was approved, and a 2011 BPC was ramped up.

But this time, there was major media exposure, as the 1st prize, thanks to the grant, was raised to US\$25,000. Ames

also sponsored a US\$2,500 3rd Prize. 2nd Prize (US\$5,000) was sponsored by the Heinlein Trust. Also for the first time, there was an actual budget for expenses and to pay for professional event management. In addition, SFF was able to offer a sponsored Conference pass for one member of each Finalist team, including hotel and domestic airfare.

The only challenge to all this was the fact that the Grant was finalized only 7 weeks prior to NewSpace 2011, hence organizing was a massive effort. Getting the word out was crucial, as well as recruiting qualified Judges from the investment community. Despite the short notice, there were 26 entries for the competition, in the form of a 3-5 page Executive Summary. Using tools developed in Excel for the SIS, screeners for the BPC were able to narrow down the entries to five Finalists just after the July 4 US holiday weekend. This only left a little over three weeks to get Finalist teams to the venue, coordinate activities, and set the parameters for which the Judges would make their decisions. A dedicated team of SFF volunteers, in conjunction with professional staff, got the job done. Finalists submitted their full business plans with only a week to spare for Judges review prior to the main event at the NewSpace 2011 Conference

Finalists attended a full-day “bootcamp”, where they attended lectures by investors and entrepreneurs, and practiced their pitches in front of “coaches” recruited by the BPC team.

The day of the presentations, Finalists were allowed to make an eight minute pitch, followed by eight minutes of Q&A by the Judges. All this was done before a live conference audience, and,

in addition, video streamed to the world over the internet. The first place winner in 2011 was Altius Space Machines, for its “sticky boom” technology; second place went to Celestial Circuits for its tech that better enabled data collection from nanosats, and third went to Final Frontier Design for its innovative commercial spacesuit work.

TAKING THINGS TO THE “NEXT LEVEL”

The 2012 BPC would be the most challenging yet. Thanks to an extension of the previous year’s grant, there would be a \$100,000 grand prize for 2012, followed by a \$10,000 second prize. There was no sponsored third place prize in 2012.

As the budget was also doubled for operations, it was decided to be bold and ambitious. In January 2012, the 2012 NewSpace BPC was announced in parallel press releases by NASA and the Space Frontier Foundation. This year there would be ten Finalists, and outreach would be particularly aggressive to the bio- and nanotech communities, in keeping with the Space-scalable paradigm. The “bootcamp” was expanded to a day-and-a-half.

Working partnerships were established with nano- and biotech online media/news portals, and an agreement was reached with DecisionDesk.com as a working partner in the event. The event management team was able to use DD’s collaborative tools to manage applicant screening and track status of Finalist paperwork, saving valuable time for all participants.

This year, as a result of a much longer and coordinated effort, 55 entries were submitted, and ten Finalists survived the

intensive screening process. 40 percent of the Finalists represented nano- or biotech companies with a demonstrated Space-scalable hook, including a firm called Terapio, which had developed an internal allopathic medication for ionizing radiation tissue damage.

In the eyes of the Judges, in 2012, literally every Finalist they analyzed were worthy of funding of some kind from angels or VCs, and the decision process was far more challenging than in previous years. In the end, two companies survived the cut: Space Ground Amalgam for its groundbreaking work with inflatable structures, won the \$100K first prize, followed by second place Digital Solid State Propulsion, for their solid-fueled thrusters, that could be switched on and off electrically. Terapio received an honorable mention.

This competition went to the next level due to several factors. The first was *quality*. The Judges and screeners both were amazed at the increased level of excellence and sophistication on the part of the contestants, the visionary teams assembled and the compelling technologies put forth. The second was *exposure* – Silicon Valley was beginning to take notice. One prominent Sand Hill Road VC leader attended the entire session and was thrilled with what he were seeing. It is hoped he and others like him will be sponsors of future contests. The third was an amalgam of the other two: *potential for deal flow*. Even though eight of ten contestants failed to win a cash prize, the exposure led them to both potential investors and potential customers. In more than one case, during the presentations, there would be someone in the audience watching, and saying to themselves, “We *need* that!” Introductions were later

made. Further research will determine how successful these deal flow efforts were.

Previous BPC winners have prospered. The second place winner in 2007, Masten Space Systems, went on to win the 2009 NASA's US\$1 million Lunar Lander Challenge. The 2009 winner, FlightsuitLLC, continues to win NASA grants and prizes, and is engaged in making custom pressurized outerwear for both space and terrestrial uses. 2011 winner Altius Space Machines is in talks for expanded development of its tech at ISS in conjunction with Nanoracks.

WHY THE BPC IS MEANINGFUL

What sets a "Prize-model 2.0" BPC apart from the century-old "Prize-model 1.0" is that everything in the process can be bootstrapped upwards without a great deal of initial investment. Most competitors had already been through their early seed/startup funding rounds, had developed prototypes or models ready for manufacture, had their initial market analyses completed, and were prepared for their A-rounds. This was a test run for a major investor pitch, and in 2012, every Finalist was a "winner" in one way or another. As stated above, Silicon Valley is taking notice. Word is getting around that there are deals to be struck at NewSpace, and the future looks very promising for the BPC to be a new type of catalyst for space, space-related, and Space-scalable startup or expanding companies.

In addition, the Prize 2.0 model is more flexible in terms of the goal. As the goal is deal flow, as opposed to a specific Prize 1.0 "milestone", there is greater potential for a wide variety of innovative and disruptive technologies to make it to

the commercial marketplace, whether they win the prize or not.

The more pieces we can add to the entrepreneurial-problem-solving puzzle, the faster humanity will become a spacefaring civilization, and the frontier will open up to new opportunity for all of us.

Thomas Andrew Olson is the founding partner of Exodus Consulting Group, prime contractor to the Space Frontier Foundation, for project management of the 2011 and 2012 BPCs under the NASA/Ames grant.