DOE SBIR-STTR SUCCESS STORY

Luna Innovations Shines Light on SBIR Opportunities

Luna Innovations Incorporated	
Founded	1990, Roanoke, VA
Lineage	Virgnia Tech Spin Out
Technology	Optics-based sensing, testing and measurement, monitoring, and control solutions
SBIR Use Case	Sensing in extreme environments
DOE SBIR Funding	86 Awards, $30mm; 2023 Revenues approx. $120mm
Success Metric	Public stock listing, LUNA, Nasdaq, June, 2006
Employees	450
Website	https://lunainc.com/

The term 'small business' in the SBIR/STTR program at the U.S. Department of Energy (DOE) and all participating agencies is defined by a headcount of 500 employees; not financial size or annual revenue. The median company size in the DOE program is about 10. Companies, larger and smaller, leverage the Program's non-dilutive financing for de-risking product development with the dual goals of addressing the Department's mission and generating meaningful revenue. Publicly traded companies can qualify for SBIR/STTR funding too; enter Luna Innovations, Inc.

The story of Luna Innovations started in 1990 when the company was spun out of Virginia Tech by founder Kent A. Murphy; an electrical engineering professor at the time[1]. The company won its first Small Business Innovation Research (SBIR) Phase I grant in 1991 from the Department of Defense. They received this grant for using their fiber optic sensing technology in condition monitoring and control system reconfiguration for large space trusses[2]. From DOE, Luna Innovations has received 86 grants for over $30 million beginning in 1997. Most of the DOE grants have been made to de-risk advanced fiber optic sensing capabilities in harsh environments. Environments that are critical to the U.S.'s energy technology advancement, including nuclear reactors, high-temperature gas turbines, and coal-fired plants. Senior Research Scientist at Luna Innovations, Derek Rountree, who joined the company in 2016, explained the importance of their contributions this way: "With the specific fiber optic interrogator technology that we use, we can take measurements along that single fiber optic sensor continuously up to hundreds of meters of length and down to sub-millimeter gauges. We can take measurements in environments that other technologies just can't do."

[1] https://www.wsj.com/market-data/quotes/LUNA/company-people
[2] https://www.sbir.gov/sbc/luna-innovations-incorporated

Luna Innovations' sensing capabilities have been applied to support the DOE's mission in numerous ways. For example, the DOE's Office of Nuclear Energy (NE) has funded several projects for Luna Innovations' that help further develop fiber optic technology. "Advancing the operational tolerance of fiber optic sensors will enhance the current reactor fleet measurement capabilities and support the development and deployment of next generation reactors" said Daniel Nichols, NE's Advanced Sensors and Instrumentation (ASI) Program Manager. Nichols added, "innovating technologies such as these will support clean nuclear energy production, which is critical to meeting carbon emission goals and ensuring national security."

To meet the need for advanced sensors, in 2017, Rountree proposed a project titled '*Fiber Optic Sensor for Simultaneous Measurement of Temperature and Pressure*'. The project received Phase I and Phase II funding from NE. Leveraging this funding, Rountree, as Principal Investigator, looked at the feasibility of Luna's technical approach through design and modeling of the new sensor system, fabrication of a small-scale prototype, experimental validation to demonstrate the sensor's ability to measure temperature and pressure simultaneously, and finally operation in a research reactor.

Luna's flagship fiber optic sensing instruments; the Hyperion si255 (black) and the ODiSI 7100 series

Performance on this project and related grants has helped to develop a technology that has been leveraged inside DOE R&D and has garnered attention from the broader nuclear energy community. "Fiber optic sensors are poised to be a disruptive technology, improving the measurement fidelity of existing systems, while also opening the door to novel approaches of improving the safety, and capabilities for advanced reactor designs," explained PM Nichols.

The de-risked technical capabilities resulting from this 2017 grant were also integrated into Luna Innovations' Optical Distributed Sensor Interrogator (ODiSI™) and Hyperion™ product lines for additional product differentiation. The ODiSI product line, which initially launched in 2011, and the Hyperion™ product line, acquired with acquisition of Micron Optics (2018), are now considered core to Luna Innovations' business. Although the company do not break out revenue by product line, the company's most recent quarterly report[3] shows over $30 million in quarterly revenues from services, software, and hardware; much of which can be related back to SBIR origins.

Rountree explained that being part of a larger company has some advantages. Per Rountree, "We have my group, that performs contract research where we are de-risking engineering developments and exploring new and beneficial technologies enabled by external funding. Then, we have what I would refer to as a product engineering group that is doing the development to transition these technologies into our products. It's like spinning the technology out internally generating new products and product capabilities." Rountree also noted a very important feedback loop: from the product engineers, who are closer to the customers, back to the research team to help prioritize customer-driven opportunities in the search for research dollars. SBIR and STTR grants directly contributed to establishing at least 22 of Luna's patents and inspired follow-on R&D that led to dozens more. Licensing revenue and product

[3] https://lunainc.com/news/luna-innovations-reports-third-quarter-2023-results

sales related to these patents has helped Luna expand substantially in recent years, and currently Luna owns or licenses over 1,000 patents and patent applications.

The Luna Innovations story, however, is much broader and more complex than a linear in-house pipeline of SBIR funding for de-risking technical innovations which then lead to successful commercial products. The company launched an initial public offering (IPO) in 2006 and went public, trading on the NASDAQ exchange under ticker symbol LUNA. Subsequently, the company went through a bankruptcy reorganization in 2009. Through its history, Luna Innovations has spun out or divested several companies when third parties could be more successful commercializing: Luna Energy and Luna Labs. The company has also merged with or acquired companies to add to their core technical capabilities: Advanced Photonics (2015), Micron Optics (2018), New Ridge Technologies (2020), Optasense (2020), and LIOS Sensing (2022). The company is currently valued at approximately $225 million based on a projected $120 million in 2023 revenues with almost 400 employees in 14 locations around the world (as of December 31, 2023).

The Luna Innovations story isn't over yet. In December of 2023, Luna Innovations announced a $50 million strategic investment (private investment in a public entity, or a PIPE) from White Hat Capital Partners. Proceeds from this strategic investment were partially used to fund the acquisition of Silixa, also announced in December of 2023[4]. Luna expects to apply the proceeds of this investment across a range of initiatives already in process. Funds will be used to accelerate growth and increase profitability, (including capitalizing on inflection point for adoption of fiber optic sensing solutions), increasing manufacturing capacity to meet demand arising from strategic partnerships, and enhancing investments in innovation. With investment from White Hat Capital Partners and the acquisition of Silixa, Luna will no longer pursue SBIR/STTR program grants as a prime contractor; however, that does not mean the company is completely out of the SBIR/STTR world. The company plans to actively look for small innovative companies with which to partner; now, from the big company side of the deal table.

Given the history and success of Luna Innovations, from its start as a small burgeoning business to now a more sizable and publicly traded company, Rountree shared this advice for earlier-stage companies. "For companies just starting out, not every Phase I will transition to a Phase II. The DOE cannot fund every good idea." Rountree continued, "When you do win Phase IIs, keep as much of your IP [intellectual property] as possible and the SBIR program is a great way to find partnerships. Don't get discouraged – stay focused."

[4] https://ir.lunainc.com/news-releases/news-release-details/luna-announces-50-million-strategic-investment-white-hat-capital