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Issue Brief

Helping Start-ups Cross the 'Valley of Death': The Main Challenge for iDEX

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S*ummary*

While the iDEX has made a commendable effort at putting a defence start-up ecosystem in place, the US experience shows that there can be many challenges ahead, in terms of maintaining momentum and successfully turning over the project to the respective services. Partnering with foreign organisations and variations like 'Pitch Days' could be considered to expand the scope of iDEX.

The Ministry of Defence (MoD) has sought to bring in fresh innovations to power the country's defence forces through the Defence India Start-up Challenge (DISC), an initiative of the newly set-up Defence Innovation Organisation (DIO). Launched by the then Raksha Mantri (RM), Nirmala Sitharaman, in 2018, the inaugural edition of the DISC set forth 11 problem challenges spanning various domains, from underwater remotely piloted vehicles to secure hardware encryption devices to see-through armour.¹ The fourth iteration is currently under way, with the last date for applications being December 15, 2020.

Start-up challenges have become popular around the world as a vehicle to harness the creativity of young techpreneurs to come up with solutions. They aim to match entrepreneurs with mentors, venture capital (VC) and other associated elements of the start-up ecosystem in the best way possible. Many start-ups are formed by first time entrepreneurs who would need handholding and capital, as well as access to markets to take their ideas from the conception to the product-output stage.

This is all the more required in the defence sector which is largely impenetrable even to established business houses, given that it is largely a monopsony. At the same time, the defence sector is captive to public sector units for its needs, and has extensive regulatory requirements for reasons of national security. This sector is also most in need of cutting-edge innovations and out-of-the-box thinking to keep pace with peer and competitor militaries. Emerging technologies have not only brought about new challenges to the world's militaries but also given them opportunities to expand their existing capabilities.

For that reason, a lot of groundwork had to be done before the DISC could take flight. The MoD, under the guidance of the Niti Aayog, set up the Defence Innovation Organisation (DIO) to manage a Defence Innovation Fund (DIF). It also created an operational arm to manage a roadmap for creating an ecosystem, called the Innovations for Defence Excellence (iDEX). This two-tier system is structured in such a way that the DIO gives overall guidance to the iDEX.

The DIF was begun with a corpus of Rs 100 crores, contributed equally by two the public sector units, Bharat Electronics Limited (BEL) and Hindustan Aeronautics Limited (HAL), respectively. The corpus is to be expanded, as required, through the utilisation of a portion of the CSR funds of the PSUs, as well as a percentage of their profits. At the launch of the 3rd DISC, RM Rajnath Singh announced that the Ministry is seeking approval for Rs.500 crores to fund more than 250 start-ups over the next five years to achieve approximately 50 'tangible innovations' for the Indian defence sector.²

¹ ["Innovations for Defence Excellence."](#) Innovations for Defence Excellence.

² ["Govt seeks INR 500 cr to fund start-ups working in defence technology."](#) *Daily Hunt*, November 12, 2019.

Three iterations of the DISC saw 18 “problem statements” or challenges from the various arms of the armed forces that start-ups could work on. More than 700 start-ups participated in these challenges and 44 contracts for building prototypes have been signed, with a cumulative total of 58 winners who could get up to Rs 1.5 crores in project funding, to make up 50 percent of the project cost.

The latest iteration of the DISC has seen a qualitative and quantitative change in the “problem statements”, with more than half of the challenges based on artificial intelligence (AI) and machine learning and the remaining five focussed on hardware. An open challenge has also been issued where start-ups can apply to have their technologies and products assessed by the military.³

Though these are early days, the process of establishing an ecosystem in the short span of two years has been quite commendable, with the iDEX partnering with over nine incubators in different parts of the country and carrying out roadshows, and now, virtual roadshows, to answer the queries raised by interested start-ups. Questions and queries have ranged from the overly broad nature of the problem statements which make it difficult for start-ups to gauge the exact requirement of the prospective clients, to difficulties in getting relevant large data sets, which is a pre-requisite to run algorithms for AI and machine learning problems. This is a classic chicken and egg dilemma for the start-ups since they would not get access to such data sets until the contracts are signed.

Then, there are the more mundane doubts about the large number of regulations which naturally bind any defence contract, irrespective of whether it is with a start-up or an established defence company. The limit of 50 percent funding is also a constraint since start-ups will have to obtain the other 50 percent from other sources, such as VC funds, which have not looked upon the defence sector very favourably. The limit of Rs 1.5 crores also seems to be on the lower side, since prototype development, especially on the hardware side, would require much more capital. It is estimated that drone prototypes, as a case in point, require between Rs 5 crore to 10 crore to get off the ground.⁴

That said, there are a number of innovations within the framework that have been put in to sweeten the deal for start-ups; in the first instance, the intellectual property rests for perpetuity with the start-up though the government may restrict its transfer on considerations of national security. Secondly, those start-ups that are shortlisted for a challenge only compete amongst themselves to develop the product/service at the optimum cost within the shortest period of time, without then having to compete with other companies. A role for the start-ups has been incorporated into the Defence

³ [“Defence India Start Up Challenges,”](#) Innovations for Defence Excellence.

⁴ [“DRDO ensured funding for IIT Chennai drone programme never comes to us: Lt Gen Shankar \(Retd\),”](#) *The Print*, December 4, 2020.

Acquisition Procedure 2020, which allows “entities recognised as ‘Start-up’ by Department for Promotion of Industry and Internal Trade (DPIIT) to participate in Make II cases and also reserves projects up to Rs.100 crores for the Micro, Small and Medium Enterprises (MSMEs).⁵

The US experience

The iDEX is modelled on similar efforts in the United States and Israel. There are many takeaways from the learning curves of the organisations in those countries. Some of those have already been incorporated into the framework here. As early as 2000, Ashton Carter, then Director of the Belfer Centre at Harvard University had written a paper titled “Keeping the Technological Edge,” wherein he pointed out that even though state-funded labs had been at the forefront of defence innovation, the speed of technological change was such that the commercial labs and start-ups would soon overtake defence labs at innovation. He flagged the need for the US Department of Defense (DoD) to undertake suitable reforms to respond to this fundamental shift.⁶

The historical model had been that of civilian applications spinning off from military technology, with many technological advancements from GPS to multi-touch, and Voice assistants, which grew out of a Defense Advanced Research Projects Agency (DARPA)-funded project to "develop a virtual assistant for military personnel". In the reverse scenario, privately-funded products developed for civilian use were increasingly being modified for military use.

In 2015, the ‘Defense Innovation Unit Experimental (DIUx)’, a body similar to the Indian DIO, was created by Carter, who by then had become Secretary of Defence, with the head of the unit reporting directly to him. The remit of the DIUX was to field and scale commercial technology across the US military at commercial speeds. In 2017, it was re-designated as the Defense Innovation Unit. Despite having an office in Silicon Valley, DIUX did not get much traction initially. It got its second wind only when its Managing Director, Raj Shah, took a leaf out of the DARPA’s Cyber Fast Track project and instituted measures that accelerated the procurement process from proposal to contract within a 2-year time frame⁷

⁵ Amit Cowshish, “[Decoding Defence Acquisition Procedure 2020](#),” *Manohar Parrikar Institute for Defence Studies and Analyses*, November 20, 2020.

⁶ Ashton B., Carter, Marcel Lettre, and Shane Smith. "Keeping the technological edge," in Ashton B. Carter and John P. White, (ed.) *Keeping the Edge: Managing Defense for the Future* (MIT Press, 2001), pp. 129-164.

⁷ The Cyber Fast Track project was started by Peiter “Mudge” Zatkó, a well-known White Hat hacker, who saw start-up challenges as a way to cut through the bureaucratic red tape and go from proposal to contract in a few days. Fred Kaplan, “[The Pentagon's Innovation Experiment](#).” *MIT Technology Review*, April 2, 2020.

The DIU has a number of different teams, with the Defence Engagement team working with the services to understand their requirements, and another called Commercial Engagement, which is constantly scanning the technology landscape, looking for commercial technologies that would be useful for the military. While the initial phases of this process, involving of shortlisting proposals to prototype development, is relatively smooth and seamless, most of the obstacles arise in the contracting phase, referred to in Silicon Valley parlance as the “Valley of Death”.

In responding to these challenges, the DoD has taken another leaf out of the start-up eco-system and moved on from challenges to ‘Pitch Days’, where contracts are signed on the spot, thus avoiding the pitfalls of the ‘Valley of Death’. The first Air Force Pitch Day held in March 2019 resulted in contracts worth \$8.75 million given out to 51 companies in one day, and over \$75 million over the next week. The average time between pitch and award was just 15 minutes.⁸ These figures are still a drop in the ocean for an entity that has a Research, Development, Test, and Evaluation (R&DTE) budget in excess of \$100 billion.

These pitch days are now even being co-hosted with partner governments, with the recently concluded UK-US international Space Pitch Day seeing an Indian company walking away with a contract for its ‘Spacewise’ program for real-time data analysis.⁹ In this context, foreign start-ups and partners have also expressed interest in participating in IDEX.¹⁰ Part of the reason for partnering with other countries is to make good the supply-chain deficiency since all components may not be available within one country.

Given the different stages of development of various economies, strict comparisons can only be made, *mutatis mutandis*. However, a study of broader approaches can provide some useful inputs. The US strategy is on product acquisition and getting start-ups and companies outside the established defence-industrial complex interested in creating products for the DoD. The Chinese approach has been to “invest in early-stage start-ups to shape the development of those products before they even make it to market,” with the budget for investing in AI alone being \$150 billion.¹¹ These investments have not been limited to China but are global, leading to the US restricting Chinese investments in US companies working on sensitive technologies.

⁸ Amanda Macias. [“Air Force officials handed out more than 200 contracts worth \\$75 Million in one week. Here's how they did it.”](#) CNBC, April 9, 2019.

⁹ [“Winners of International Space Pitch Day revealed.”](#) GOV.UK, November 17, 2020.

¹⁰ Response to a question put to the Defence Secretary Shri Ajay Kumar, at the 11th Y.B. Chavan Memorial Lecture on [“India’s Defence Policy,”](#) MP-IDSA, December 7, 2020.

¹¹ Jeff Decker, [“Renewing defense innovation: Five incentives for forming Pentagon-Startup partnerships.”](#) *War on the Rocks*, May 7, 2018.

On the other hand, the DIU itself is yet to have a VC arm as yet, even though a National Security Innovation Capital fund with an initial allocation of \$15 million has been approved by the US Congress. The vibrant VC landscape in the US notwithstanding, the need for a dedicated VC fund has been felt because 92 percent of US commercial VC funding goes into software. This not only results in an underinvestment in dual-use hardware but also companies turning to Chinese VC funds that are actively looking to invest in such technologies.

Conclusion

While the iDEX has made a commendable effort at putting a defence start-up ecosystem in place, the US experience shows that there can be many challenges ahead, in terms of maintaining momentum and successfully turning over the project to the respective services, overcoming bureaucratic obstacles and dealing with myriad legacy issues. The start-ups also face challenges in obtaining funding, access to toolsets and data sets, and navigating the thicket of regulations that will come their way in subsequent stages. In that sense, the DIO also faces a challenge in itself being a Startup and having to show results for the efforts it has made so far. Partnering with foreign organisations and variations like Pitch Days could also be considered to expand the scope of iDEX.

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