


June 2022

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### Recommended Citation

Di Lalla, Max (2022) "Efficacy of the National Security Innovation Network's Hacking / Designing for Defense Programs," *Space and Defense*: Vol. 13: No. 0, Article 9.

DOI: 10.32873/uno.dc.sd.13.01.1061

Available at: <https://digitalcommons.unomaha.edu/spaceanddefense/vol13/iss0/9>

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## **Efficacy of the National Security Innovation Network’s Hacking / Designing for Defense Programs**

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*The National Security Innovation Network requires further reform to achieve its hoped for long-term effects on defense innovation.*

### **Introduction**

The National Security Innovation Network (NSIN) was created in 2016 after a rebranding of the MD5 National Security Technology Accelerator and is actively charged with the mission to “build networks of innovators that generate new solutions to national security problems.”[1] NSIN is just one of the plethora of government organizations tasked with some form of “innovation.” As the world begins to change and the United States no longer enjoys a period of unrivaled growth and security, government, military, and private leaders have begun to push for less red tape and more efficient processes when it comes to innovating for security. NSIN, in particular, is responsible for creating networks of industry and government leaders interested and willing to work with the DOD while, at the same time, connecting innovators and companies to those in the DOD who can use their products and expertise. It is less concerned with producing end products than it is creating relationships that can hasten the rate at which products are made and problems are solved. One of its programs, Hacking for Defense (H4D), is run at universities and aims to take high performing students and put them in small groups charged with solving DOD problems with advisement from sponsors, mentors, and instructors. H4D is an innovative program that produces value for the sponsors, students, and the universities where it is run, but NSIN lacks mechanisms to measure efficacy and needs to improve its long-term tracking of former students.

### **Background**

#### *1.1 Hacking for Defense and Designing for Defense Overview*

One of the ways that NSIN goes about doing this is running the Hacking for Defense program (called Designing for Defense, or D4D, at CU Boulder). The program started at Stanford University in 2011 and has grown into the curriculum at fifty top-tier universities across the country.[2] The course is designed to select a

diverse group of high caliber graduate and undergraduate students through an application process and pool them in small teams that are then assigned a sponsor and a set of mentors. The sponsor is a DOD/Intelligence Community representative that brings a difficult technical or policy challenge to the team and helps them work through it throughout the course of the semester. The mentors are typically experts in different fields that attend the course remotely and help guide the students as well as provide them with connections.

### *1.2 Designing for Defense Overview*

This research is focused mostly on the D4D course run at CU Boulder. Some nuances make each university's program different from one another. However, the lessons learned and suggestions are certainly applicable to the program as a whole.

With their support network over the course of one semester, each team is expected to conduct 60-80 interviews with industry leaders, legal experts, stakeholders, and other insightful persons that allow them to gain an understanding of the problem. They look to discover what gives the users of their product or those desiring a new policy directive problems and what would provide value to them. Additionally, they work to discover dual uses of their product and find how it might be used to solve similar problems. Around the halfway point in the term, students transfer their focus to developing a minimum viable product (MVP) to be pitched to their sponsor at the conclusion of the semester. The problems, as well as the sponsors, are different for each team and, as a result, MVPs vary across the small student teams. Students are also encouraged to continue their work beyond the end of the semester by applying for funding, forming startups, and pitching their products to the dual-use targets. NSIN states on their website that they have funded eighteen solutions following the semester and students have formed fifty-three start-ups from the solutions they found.[3] That number continues to grow with the increase in participating universities and students while the universities become more proficient in running the program.

However, as stated earlier, the goal of NSIN is not necessarily to create innovative products. The projects they have funded are merely a positive byproduct of the effort to engage these students in DOD problems with the hope that they will pursue a career or some level of work on defense problems. These students are purposely targeted because of the assumption that high caliber students from top-tier universities are most likely to be leaders of government and industry in the future. Giving them a positive experience working for and with the military and intelligence organizations is one way to help ensure they keep security interests in mind throughout their hopefully prosperous careers.

## **Positives of D4D**

D4D is a unique course that provides students with life skills like improved public speaking and pitching, developing business models, and critical thinking. It also exposes them to new people and problems. Finally, it gives students a chance to create a company with little threat to their finances. The programs run around the country are beneficial for students but also for NSIN and the sponsors.

### *2.1. Benefits for NSIN: Exposure to DOD Culture and Problems*

As a whole, D4D is a fantastic opportunity for students of all backgrounds to get out of their comfort zone, get exposed to DOD problems, and work with those they never would without the course. Many people enter the program with zero exposure to the DOD; they come in with nothing but movie stereotypes about what the DOD does, the people in it, and how it operates. By becoming immersed in one problem while also following the progress of multiple other teams throughout the semester, each student becomes aware of some of the intriguing things the DOD works on. Additionally, students get to travel to their sponsor's physical site and see all that goes on and the possibilities that come along with working in the defense sector. It is often their first time on a military base or other DOD installation.

These opportunities are not available for the general student. Without this kind of exposure and knowledge of the diverse array of problems, people, and places that the defense sector has, students are likely to continue with preconceived notions that can limit their interest in DOD down the line. As a result of this experience, students express a much higher general interest in working for and with DOD according to surveys conducted by the instructors. This interest and general open-mindedness about working for DOD is exactly what NSIN is hoping to create in the nation's future leaders.

### *2.2 Benefits for Students: Entrepreneurship, Life Skills, and Networking*

Not only are these students already identified as highly capable but they are also at high-level universities with promising careers ahead of them. NSIN is effectively betting on these students to become leaders. To improve their odds, D4D helps them further by forcing them to give over fifteen presentations, field tough questions, and receive feedback. Throughout the course, they become substantially better speakers and on-their-feet thinkers. This will help them immensely in job interviews and throughout their careers as they communicate with co-workers and bosses.

The multitude of interviews students conduct with experts provides exposure to multiple lines of thought. More importantly for these students, many of whom are looking for job opportunities, they are effectively getting interviewed as well as interviewing. They are networking throughout the semester. If they do well, they are likely to be able to find a job with their sponsor, mentor, or those they spent time interviewing. It gives them a hiring advantage that other students are unlikely to receive. This compounds the other valuable experiences they receive and makes them even more likely to have a successful career whether inside or outside of DOD.

Furthermore, the number of startups coming out of D4D/H4D teams is something both the universities and NSIN are proud to report. The students have a plethora of advisors critiquing their product, instructors with decades of entrepreneurship experience to guide them, and a multitude of funding sources. These resources typically cost more money than young innovators have to spend. Instead of failing and learning on their own, D4D students can learn from the collective experience and failures of the instructors, mentors, and sponsors. Then, when the semester ends, they can start a business at practically no cost to them and turn it into a moneymaking opportunity. All of these are unique benefits of D4D programs and can drastically improve the chances of students doing great things in the future.

### *2.3 Value for the Sponsor*

D4D does not exist without support and research topics from sponsors. Consequently, it is important to analyze the value D4D brings to the sponsor. While they do get very inexpensive MVPs provided for their difficult problems, the real value of supporting these projects often does not come from the product. Most MVPs, in fact, are not used by the sponsor. Nonetheless, D4D is a unique opportunity for the sponsor to get a diverse group of smart people to spend a considerable amount of time learning and thinking about a problem. Following them throughout their process gives the sponsor a new set of perspectives and ideas on how to approach a problem.

For example, the National Security Agency faces numerous difficult problems and can task groups of like-minded people to work on them. Unfortunately, it is difficult to get lawyers, international security strategists, and computer scientists to work together on a single policy challenge. As a result, agencies often get problem solvers looking through a keyhole rather than seeing the whole picture. Just as often, government task forces overlook potential solutions. D4D convenes people who are open-minded, diverse in background as well as thought, and willing to work with people who think differently. This meshing of individuals produces useful ideas on how to approach problems, which helps direct more in-depth efforts to solve them. In short, sponsors appreciate the holistic way these students think about the

problem and use their ideas to create unconventional yet efficient solutions.

### **Limitations**

While D4D is without question providing benefit to students in the form of skills and experience as well as to NSIN by having these future leaders immerse themselves in DOD problems, there are limitations as well. The short timeline, lack of technical resources and experience, and classification of key data limits the success of teams.

#### *3.1 Short Timeline*

Regardless of ability or resources, one semester is simply not a sufficient length of time to fully understand a complex problem and produce a product ready to be implemented. As instructors begin to adapt to this relatively new program, they are implementing supplements like opportunities for continuation and further funding to prevent potentially good solutions from fading before coming to market as a result of the limited timeline. For now, the semester limit is still hindering D4D output.

#### *3.2 Lack of Resources and Experience*

Although the students are bright, highly motivated, and capable, many of them do not have in-depth work experience. They are tasked with highly technical problems requiring software development and/or engineering expertise, which is a rarity in their demographic. As a result, MVPs are commonly not to the level of practicality that would be implemented by the sponsor. While this is often the case, again, a workable MVP is not the goal of the program. The intent is to get students interested in working on DOD problems in the future. While lower level MVPs are a limitation and may turn sponsors away from the program, they are not showstoppers that need to be resolved immediately.

#### *3.3 Classification*

Many of the problems the teams work on are very interesting, modern, and challenging.

Unfortunately, the same adjectives describe many of the classified projects being worked on in DOD. Given the short timeline, diverse backgrounds of students including foreign nationals, and funding restrictions, getting students the proper clearances to work on these problems is simply infeasible. As a result, D4D students



occasionally struggle to understand their defense problem as well as the resources available to help solve it. Not only this but MVPs they produce are unlikely to mesh well with preexisting infrastructure inaccessible to them.

### **Suggestions for Improvement**

Overall, D4D is a great program for students that provides value to the sponsor and NSIN. As aforementioned, it has limitations and can certainly be improved. Some methods of improvement are as follows.

#### *4.1 Improvements for the D4D Course*

D4D can improve in ways that it has already started by allowing more opportunities for continuation to teams, including more time, funding, and guidance. It can also make each week less redundant. Many times, teams found presenting each week to be more of a chore than an opportunity. While they were provided valuable feedback and their progress in public speaking was noticeable, it may be beneficial to draw back the presentation requirement, shorten the length of the Wednesday class, and spend more time directly critiquing products and providing contacts for interviews.

On top of that, the screening process at the university could be tailored toward the goal of NSIN by focusing on students who do not already have jobs or a career outside of the defense industry. If the intent is to create leaders of industry interested in working on DOD problems, targeting those who are yet to find a career or are in the late stages of their study (and are beginning to look for work) would provide the greatest odds of them choosing the defense industry.

Another way instructors can better achieve the goal of immersing students in DOD problems is to have sponsors rotate through teams during the semester and give them an in-depth overview of their organization, different careers within it, and the kinds of problems they work on. This would allow students to get a broader sense of opportunities in the defense sector. If they only work on one problem and are not overly fond of their singular sponsor organization, they may be discouraged from working in defense in the future. On the other hand, if they are exposed to several organizations and problems, they may find an opportunity they never knew existed and pursue it. This would also serve as a wonderful recruiting opportunity by having sponsors ready to bring in recruiting directors for people in D4D who may be interested in something they discuss in an overview.

## *4.2 Improvements for NSIN*

While the program is great for the people involved, NSIN has a lot of room to improve H4D/D4D. For example, the opportunity to work with DOD inherently attracts students with prior military experience. One goal is to expose those with little or no DOD experience to defense problems; this is countered by enrolling many students with an existing DOD connection. The screening process should limit enrollment of those with such a background. That is not to say the program should not admit those with prior experience. On the contrary, having those who are currently serving or have served on the H4D team is a great way to expose other teammates more intimately to DOD members. It allows first-timers on the team to build relationships with DOD members and remove stigmas they may have about the military. Such experiences will generally make H4D veterans more open to working with DOD in the future. Ideally, one former DOD member per team would balance the goals of taking non-military applicants and giving students enough exposure to DOD. This could also be supplemented by assigning cadets from military academies to work on the teams remotely and go through the process with them.

The area where NSIN needs not just to improve but start is in tracking and data collection on their students' careers. As of now, there are no internal studies on the efficacy of the H4D/D4D programs; there is no mechanism for NSIN to determine how effectively they are promoting defense work and encouraging careers in DOD. To determine if the programs are working, they need to examine exactly how much more likely the products of H4D and D4D are to succeed in the defense sector compared to the general population. Now, their programs seem like they would promote this and that they are at least marginally effective. However, without long-term tracking of students, there is no way to confirm this hypothesis. If NSIN wishes to continue to receive funding and grow its efforts, it would behoove them to provide metrics illustrating past success. Not only would studying this allow them to confirm their programs' work, it would also give H4D/D4D more connections to potential future sponsors and funding sources as well as feedback on how to improve the course. It should not be up to the hosting university to conduct their own short-term and small-scale research on students' sentiments about DOD work.

If the D4D course at CU Boulder is reflective of the other H4D programs around the country, NSIN should encourage sponsors and mentors to seek employment opportunities for the students. It should be made clear to sponsors that part of the intent of the course is to get students into a career in the defense sector. This would compound the improvement of taking in more students without other jobs as well as the reform to make all sponsors meet and brief all other team members. Overall, NSIN needs to stress to students, mentors, instructors, and sponsors the fact that this course is meant to create enduring networks of people in the defense



sector—not just immediate product solutions—in order to have more H4D graduates go directly into DOD work.

## Conclusion

In sum, the H4D/D4D program is a fantastic introduction to the world of defense projects for future leaders of the nation. It grants students unique opportunities to experience the kind of work they could participate in should they choose the defense route versus other industries. It is not only good for the students. The sponsors, too, get value out of having a bunch of intelligent and dedicated students from different backgrounds spend considerable time researching and thinking about a problem and providing thoughtful solutions. The program is very likely to achieve, to some extent, the goal of NSIN.

However, there is currently no official mechanism for verifying this assertion or improving the program based on feedback. This must change. Program instructors, mentors, and sponsors can all work to improve how they encourage their students to enter a career in the defense industry. Through a number of relatively minor changes, they could succeed in this. Whether NSIN remains the lead government agency, H4D/D4D is worthwhile for students and private sponsors alike. The educational program on defense design should continue.

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