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Faces of NPS: Byron Harder, PhD

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Faces of NPS

Spotlighting the students, faculty, staff and alumni of our Nation's premier defense education and research institution.

Byron Harder, PhD

MS IN COMPUTER SCIENCE '08,
PHD IN MOVES '17
MODEL ENGINEER, IMPROBABLE DEFENSE

Byron Harder, PhD:
Byron Harder served as a Marine artillery officer, acquisition project manager, and modeling and simulation officer from 1999-2021. He earned a B.S. in computer science from Vanderbilt University, a M.S. in computer science from NPS, and a Ph.D. in MOVES from NPS. While on active duty, he deployed to Iraq and Afghanistan in support of Operations IRAQI FREEDOM and ENDURING FREEDOM. His final assignment in the Marine Corps was Synthetic Training Integration and Management Branch Head, Training and Education Command. After completing a Skillbridge program internship with Improbable US Defense and National Security, he retired from active duty and started his current role with that company as a model engineer, where he contributes to the development of complex synthetic environments that feature integrated physical and cognitive models.

Tell us about your journey from the military into the tech industry. How did your time at NPS prepare you to make that transition? What role has your education played throughout your career both in and out of uniform?

I majored in computer science as an undergraduate, and the subject has fascinated me since I was in sixth grade. After a few years of excitement in the Marine Corps, I jumped at the opportunity to attend NPS and spend some time focusing on science and technology. There are very few chances for Marine officers to do that kind of technical work, and as military retirement approaches, I knew that I wanted to transition to a more technical job. My education helped me in that transition, of course, because it strengthened my credentials and abilities in those areas—but it also allowed me to contribute in some relatively unique ways while I was in uniform. Particularly after completing my Ph.D., I found myself answering hard questions from very senior leaders, including the Commandant of the Marine Corps. That was pretty exciting. Today, in my work with Improbable US Defense & National Security, I apply concepts that I learned through my education on a daily basis. I have many educators to thank for a post-military career that keeps me constantly challenged and motivated.

As a two-time alumnus ‘08 and ‘17 and having recently visited NPS this month, how have you seen NPS change over the years? How would you like to see it evolve, particularly within GEMS (Gaming, Experimentation, Modeling and Simulation) in the coming years to better support national security?

What has not changed, in my opinion, is NPS's position and reputation as a high-quality academic institution, chiefly due to the quality of the faculty and the graduates it outputs. There seems to be a pendulum swinging back and forth over time between a focus on research vs. education, but I don't think you can have one without the other at the postgraduate level. The rate of technological change keeps accelerating, so the only way to output masters in their fields is to keep pursuing the latest findings. Part of that process is being a contributor to cutting-edge research. From my perspective, the world's use and reliance on GEMS increases every day. I find it strange that very few academic institutions maintain modeling and simulation as a first-class discipline because every branch of modern science uses it in some way. It makes sense to study and share the cross-cutting findings and techniques that apply to M&S for any domain, and I appreciate my indoctrination into the field via the Modeling of Virtual Environments and Simulation Institute at NPS. Commercial M&S capabilities are becoming more modular, increasing the flexibility of sufficiently skilled users, so I hope to see NPS continue to expand partnerships and joint efforts with companies like Improbable Defense. But some work will need to remain "in house," to give students the opportunity to get as deep as they need into the technology, depending on their fields of study.

The NPS Foundation is supporting the creation of a forward-learning vision for NPS, supported by a new innovative facility on campus. How would the integration of state-of-the-art technologies and spaces, like immersive domes and simulation labs, impact education and research at NPS? What capabilities would this bring to the Department of the Navy? The DOD?

Graduates coming out of NPS need to have some hands-on experience with the latest technology. In many cases, they are the ones that will be asked to write the requirements or the contracts for the next systems. Various forms of immersive technology and simulations have existed in the force for years, and there is no shortage of people that understand the benefits and drawbacks of the currently fielded systems. NPS graduates can only be credible advocates for positive—and potentially disruptive—change if they have an understanding of how current systems work and what the realm of the achievable looks like. I think an innovation facility like that maximizes its effectiveness when multiple industry partners opt into participation.

Improbable Defense recently entered into a cooperative research and development partnership with the Naval Postgraduate School to explore defense-specific uses for Improbable's virtual environment software. With your experience on both the NPS and industry side, why are partnerships like this so important to tech transfer and development inside and outside the DOD?

I believe that industry partners like Improbable Defense are willing to take some risks in what they share under a CRADA—particularly with an academic institution like NPS. Risk is a defining characteristic of ground-breaking research. Great ideas can't just come from the government or industry side. They work best, from both a process and performance perspective, when they're grown from both sides and meet in the middle.

What value does each entity bring to the partnership?

The operational force usually doesn't have time to look at capabilities that aren't completely productized, but as a commercial company, you can't explore many new ideas if they all need to be developed to that level before you can try them out with a representative user. With a student body full of military experience, NPS offers a great place to try new things and get feedback. When we don't have to worry about showing up with a perfect pitch, we can iterate much faster. Speaking from my

government experience, it's nice to have an in-house technical organization like NPS that can spend some time working with technology to find out if it really works the way the contractor says it does, especially for more cutting-edge tools. Improbable Defense has a vision for a platform approach to modeling and simulation, supported by a variety of technology components that enable faster, more impactful development and delivery. We believe that we can better align the platform and tailor our software components when we can try them out with organizations like NPS and the MOVES Institute.

What does great look like to you for the NPS-Improbable partnership? What are Improbable's goals and ideal outcomes?

We've already gotten some of our software up and running in the MOVES Interoperability Lab. It would be great to see it incorporated into some upcoming experiments or coursework and to get feedback on things like ease of use, noticeable performance improvements, reliability, and additional needed features. Personally, I would be thrilled if Improbable Defense could get involved with some student research, either through use of our software or otherwise. Long term, I would like to establish a constant cycle of sharing, ideating, and improving a variety of capabilities, to include our scalable simulation runtime, population models other cognitive models, and tools that can streamline the M&S process from conceptual modeling through validation and exploitation of results. I think we have a lot to offer, and this partnership is a great way to lift up the hood and show how the engine runs.