New Tech, Old Traps: The Persistent Pitfalls in Military Innovation

[00:00:00] Tech Hype Setup

Herb Lin: Since a new technology, by definition, is something you don't have already, you can paint a picture of it that glosses over difficulties and emphasizes all of the positive aspects of it.

[00:00:15] Show And Guest Intro

Ryan Vest: Welcome to *Horns of a Dilemma*, the podcast of the *Texas National Security Review*. I'm Ryan Vest, executive editor of *TNSR*, and I'm here with our editor-in-chief, Dr. Sheena Chestnut Greitens. We are pleased to have joining us today, national security scholar Herb Lin, author of "On Optimism About New Military Technologies," which is featured in the spring special edition of *TNSR*.

Herb is a senior research scholar, and research fellow, at Stanford University. He is also director of the Stanford Emerging Technology Review, as well as chief scientist emeritus for the Computer Science and Telecommunications Board of the National Academies. He previously served as a member of President Obama's Commission on Enhancing National Cybersecurity, the Aspen Commission on Information Disorder, and was a professional staff member and staff scientist for the House Armed Services Committee. Herb, welcome to *Horns of a Dilemma*. It's great to have you here.

Herb Lin: Great to be here.

Sheena Chestnut Greitens: Well, Herb, it's great to have you back on the podcast. I love this article, and I'm so pleased that we get to have a conversation about it today.

[00:01:13] Offset Strategies Explained

Sheena Chestnut Greitens: I wanted to, you know, start out with the way that you bring us into the article, which is about talking about the history of American military combat through the lens of the idea of technological overmatch, and then through the idea of offset strategies.

And so you walk through the first, second, and maybe most importantly, the third offset strategy. And so I wondered if you could tell us about each of those and their significance in this piece?

Herb Lin: As you know, World War II was a conflict in which the United States engaged basically with mass–more soldiers, you know, more tank production, more airplane production. You know, we produced 100,000 airplanes or something like that during the Second War.

100,000 airplanes. I mean, that's an unbelievable number for anybody who looks at the size of procurements today. We struggle to produce 1,000 of anything. It was a huge national mobilization to do World War II. And at the end of World War II, we were tired of it.

And so we demobilized fairly rapidly. But the Soviets didn't. And so we were left with huge asymmetries in the conventional force posture of the West, mostly the United States, and the Soviet Union.

And the first offset was an approach to say, "Well, we can't match them tank for tank, or man for man. Let's use nukes as a way of offsetting their conventional superiority." And then that worked for a while, until they achieved rough parity between their nuclear forces and our nuclear forces. And at which point we say–I mean, it's not quite this clean, but, you know, when it became clear that nukes weren't going to be the way to continue offsetting their superiority conventionally, we were going to do high-tech conventional weapons.

This is precision-guided munitions, stealth, and all that sort of stuff–that was the second offset. And we tried to make investments that would make it much easier for a smaller number of people to deal with a numerically superior adversary force so that it'll be easier, for example, to take out tanks.

You didn't need to use a, you know, a $2 million tank against another tank. You could use a $100,000 missile, you know, a precision-guided missile to take out a tank, and so that would help you out a lot. So that was the second offset, and we still see lots of that mindset appearing now.

On the other hand, adversaries have also started to invest in this, notably China, has adopted much of the approach, of the technological approach, of the second offset. And so we're starting to, we have been for some years now, at least a decade or so, thinking about a “third offset,” that will leverage other technologies, to favor Americans.

The specific technologies in the third offset are unclear. There hasn't been an official proclamation that there is a third offset underway. But it's broadly understood to mean things like artificial intelligence and the like, continuing on many of the successes of the second offset. And so this is supposed to give us many advantages in pursuing future combat, leveraging, again, a presumed American technological superiority.

Now, I say presumed because nobody knows. And the Chinese have certainly been watching us and what we do. So, you know, they're engaging in third offset behavior too. So it's not clear how all of that actually plays out in the end.

[00:05:08] Why Optimism Persists

Ryan Vest: These offset strategies that you talk about are really important, and the United States has used these for quite a while in its drive for, what you call in the article, for overmatch. And there's a lot of optimism that the United States can succeed using this overmatch, perhaps maybe too much? But why do you think the policymakers and institutions remain so focused about new capabilities, even in the face of repeated acquisitions failures?

Herb Lin: Since a new technology by definition is something you don't have already, you can paint a picture of it that glosses over difficulties and emphasizes all of the positive aspects of it. So new capabilities, because of new technology, it offers a plausible way to reduce casualties, to preserve power with limited resources, and to say that you're actually taking action, in a situation that's otherwise increasingly unfavorable. And so it gives you a way of making an argument for what you're doing, that seems to be responsive.

I mean, you know, behind the scenes, of course, there are also a variety of bureaucratic incentives, inter-service competition, career, budget pressures, and all that sort of stuff, which reward optimistic narratives.

Nobody gets praised by his boss for revealing problems. And so, you know, failure is, in our political system, punished rather than viewed as a learning opportunity.

Sheena Chestnut Greitens: Well, when I think about modern warfare, technological overmatch definitely sounds better than a human meat grinder, which is, I think, you know, part of the framing, or the comparison, that policymakers have in their head.

[00:06:49] Transformational Rhetoric

Sheena Chestnut Greitens: That actually brings up a really interesting point about language, and one of the things I was struck by is, you walk through some historical examples in your article about technological optimism. You know, you look at rail guns, and hypersonics, and directed energy weapons, and then AI, which we'll come back to in a minute, I think, because I have lots more questions about that.

You document this really consistent pattern of revolutionary, or transformational language, that policymakers invoke when they talk about these promises of new technology. And I wondered if you had any thoughts, after going through all of these examples, and working in this space for so long, what that pattern tells us about how national security leaders, and the national security community in the United States at large thinks about, and talks about, emerging technologies as they evolve?

Herb Lin: We see the script over and over again, as you say. Everything is framed as transformational because what's the alternative? The alternative is saying we're going to do a little bit better, and that doesn't catch people's attention.

And when you're competing for budget, when you're competing for attention, the incentives are very high to exaggerate. Not even necessarily to exaggerate per se, but to be optimistic, to say that this is a big deal, because the alternative is saying this is a little deal and, you know, who's going to fund that?

So in some sense it reflects, for lack of a better term, political reality that, in the end, it's people making a case to other people, who will have to justify their decisions. It's basically a case of persuasion. One of the things that I learned while I was in, you know, working in Congress especially, but, you know, in observing the national security space for so long, has been that rational analysis actually doesn't affect things, except on the margin.

Okay? To approve a big program, it's made on the basis of many other factors that are not–I mean, I'm not saying that's necessarily bad, but rational analysis, or cost performance, you know, and all that sort of stuff, cost effectiveness, et cetera, just doesn't play very well in the budget game.

Ryan Vest: That's interesting.

[00:09:13] Why AI Feels Different

Ryan Vest: Sheena mentioned a bunch of transformational technologies that we've gone through and this rhetoric around it. Right now it seems like AI is occupying the most prominent space amongst all of these different technologies. Is that AI different than some of these past revolutions, or perhaps, what makes AI different, that makes the current AI optimism look familiar?

Herb Lin: AI is different in certain ways. And, I mean, there are similarities and differences, right? It's important to understand the difference between, what I'm going to call, an artifactual technology, what the paper calls it, artifactual technology, and an architectural one.

The artifactual technology is the one that creates the actual artifact. It's the railgun, it's the directed energy weapon, it's a new missile, and so on. It's the actual hardware that gives you the capability. I mean, AI by itself doesn't do anything, right? It just sits there and gives you output on a computer screen.

And if nobody takes action, and it's not connected to anything else, it doesn't do anything, okay? What AI is, is an architectural technology that helps you coordinate stuff better. For lack of a better term, the artifacts are the effectors, the things that actually cause effect.

And what AI lets you do is coordinate all of those better, so that they can have a more potent effect on the adversary. A way of understanding that kind of technology is to think about process technologies.

One of the biggest revolutions in "technology" in the 20th century was the invention of the assembly line. Now, in fact, the assembly line is not any new technology. There's no new artifact in it. It's just a different way of organizing processes.

And it, you know, revolutionizes manufacturing, right? You know, whereas before, you know, you could only put out things in, you know, ones and twos and so on. It was an artisan craft. Now it becomes manufacturing. It's industrializing, you know, to a huge scale. No new technologies in the assembly line at all, except that it revolutionizes everything.

Another example that I sometimes use is the shipping container, right? The ship, what's new about the shipping container? It's just a steel box, right? But, you know, there's no innovation in it–Ah, but that's not true, okay. The "technology" of the shipping container is standardization. It's the standards that give you the

steel box that enable you to be interoperable–blah, blah, blah. You know, all that sort of stuff. And the shipping container changes the cost of shipping by a factor of 100. I mean, that's a big deal, and no new technology at all, in the sense of artifacts, but in the sense of standards, which are a kind of technology, a process technology–is a big deal. So that's the difference.

And AI is claiming to be, and I think it is, a general purpose enabling technology that can, you know, support a wide variety of military functions. But the things that actually cause effects on the ground, or in the air, or wherever, I mean, are the artifacts. And so, to make it understandable as to why you might want to invest in an architectural technology, you have to emphasize the effects of it.

So you see it, you know, characterized in the same ways. You know–it will bring a decisive advantage because it'll enable coordination–it'll have certain effects, and so you hear the same kind of rhetoric

[00:12:51] Complexity And Bias Traps

Sheena Chestnut Greitens: I think that's such an interesting distinction about artifactual versus architectural technologies, and I'm glad that you drew that out. I wanted to ask you about, when we think about these, and this is something–I'm circling back a bit here–to something you alluded to a minute ago, that I wanted to on a thread yeah little bit. And that's that we're talking about really large, complex defense programs for some of these technologies, and the way they get integrated into military operations.

And so you bring in the human element that comes with the large bureaucracy, the complex program, and you talk a little bit about how biases like confirmation bias, and the illusion of control, and motivated reasoning, all reinforce this tendency toward technological optimism. And you mentioned this in the context a little bit of budget debates a minute ago, but I wanted to–just to kind of circle back, and probe that a little bit more, and ask, you know– why it is that you think that these large, bureaucratic, complex defense programs seem especially vulnerable to those kinds of cognitive traps, that lead to this overly optimistic view of emerging tech?

Herb Lin: Because in fact, nobody understands the large complex problem–a large complex system. No one person actually understands it all, even the program manager, okay? If you've ever done any computer programming, okay? I assume that you've done some computer programming, in some language, at some point, and so on.

You know that if you have a 10-line program, you've written it all, you can understand it, and sometimes there's a bug in it, and you can debug it yourself, okay? And then, you know, when you graduate to a 20-line program, it gets a little bit harder. Well, every person, you can try this out–100% differentiator–a perfect differentiator between people who have taken a basic computer science course in programming, and one who hasn't.

You say, "Have you had the experience of writing a program in three hours and then spending 300 hours debugging it?" And if the person laughs, they have taken it. And if they don't laugh, they say, "Oh, okay," they've never taken a programming course, okay?

Because this experience is common to everyone. And the idea is that, at some point, even though you're, "in control of the whole thing,"–it's too complicated. Its ramifications are too much for you to understand every single bit of it, okay? And big complex programs are just like that. It’s the same work, right?

Acquisition of big complex programs are like that too. And so the only way to understand large programs, as every computer programmer will know, is to abstract away some of the complexity. Because, you know, you can keep in your head only, you know, half a dozen–research says, you know, 7 + or - 2 unrelated items in your head, at a time. And, you know, maybe for some extraordinary people it's 10 and so on, but it's not 100.

And so the only way you can deal with this, with a complicated system, is to abstract away components of it, so you can chunk the stuff in it into bigger and bigger chunks, so that you can manage them in your head.

But of course, as you know, any abstraction process, by definition, gets rid of some detail. And it's the details that screw you. It turns out that you tried to abstract this detail and you made an assumption about it, and you assumed that this detail wasn't important. That's why you left it out. But it turns out it was important.

Nobody understands the whole thing, you know, in exact precise detail, and the details will get you every time.

Ryan Vest: I love that, and I have found that is true. And I have written that code before, and you are absolutely right.

[00:16:53] Fallacy Of Last Move

Ryan Vest: As you talk about these biases, one of the key points that I really grabbed out of here, you talk about the fallacy of the last move. And I found this really interesting, because it's not something I'd thought deeply about before. But why is the belief that a single technological breakthrough can provide permanent advantage so appealing? And at the same time, why is it so dangerous to military planning?

Herb Lin: It provides cognitive closure. I mean, you know, if I can believe that this is going to be decisive, I can say, "Well, okay. Now I'm done with it, I can move on to other issues." And so there's a strong temptation to do it. Choose any aspect of your life–raising kids–I mean, wouldn't it be nice to say that, you know, you could solve your teenager's discipline problem once and for all? I mean, it would be great to think that, okay? And lots of people make lots of money selling programs that will do exactly that. But, you know, the track record on that isn't great.

And, you know, there's a strong need for closure, and decisive solutions, where you don't have to worry about it anymore.

Sheena Chestnut Greitens: I'm not sure anything has reduced my ability to achieve cognitive closure more than becoming a parent. But, I will say that geopolitical problems are probably a close second in my life, depending on the day. Because these are problems that don't lend themselves to neat, permanent solutions, right?

That's the geopolitics and conflict, and the complex world that we live in. So it's really interesting to me that, you know, that continues to be so appealing, even though the impossibility of it is sort of hardwired into the human experience, at both the very granular individual level and at the, you know, much broader geopolitical and strategic level.

[00:18:46] Can Do Culture Limits

Sheena Chestnut Greitens: One of the other things I found really interesting, the first time that I read this article that I wanted to ask you a little bit about is, you know, a piece of your argument that is, that the US military has developed a culture, including historical lessons that are extracted from World War II–this really strong can-do ethos, right? The no fail mission, and idea that that can actually have some danger in it, in the way that it feeds into, and reinforces, an overly optimistic view of technology.

So I wanted to ask you, to talk a little bit about your thinking on this, and how you see these cultural norms, particularly in American military culture in this case, shaping how military planners and strategists evaluate the role of new technologies?

Herb Lin: Well, a can-do ethos basically says, "Here's the task. Yes, sir, I'll do it." And, you know, you move out with confidence, and move. And in that environment saying, "No, no, sir, asking me to do that violates the laws of physics," doesn't play very well. For one, it presumes the other guy knows something about the laws of physics. I've seen generals wonder about why you can't have permanent satellite presence with one satellite, for a satellite in low Earth orbit, right? I mean, they go around, you know–no.

And they'll complain about that, and you know, they're used to getting their way. And, you know, you don't get very far by saying, "No, sir, the laws of physics don't let us do that." It's all of this, "Don't bring me problems, bring me solutions."

And, you know, that, I mean, that's not an unreasonable tasking, but the problems that you pose have to be reasonable, have to be solvable. I mean, and there are problems that are in fact not solvable, they are not tractable. And I mean that in the most literal sense of the world. We will take, you know, longer than the age of the universe to solve it.

Let me give you an example, which I didn't write about in this paper. But, you know this business about the desire to have ubiquitous, and essentially perfect information, about the battlefield. And you know, knowing where everything is, knowing where the good guys are, and the bad guys are, and having perfect battlefield awareness.

Well, the problem with that is the more sensors you add, the harder the computational problem gets to actually coordinating all of this information. And somebody says, "Well, okay, let's add another sensor." You say, "No, it'll slow it down." They say, "No, no, you know, next year we'll have faster computers." Okay?

“And don't worry, we'll get it.” But it turns out that adding sensors complexifies the problem so much more rapidly than any advance in computers will give you, that you'll never be able to catch up. And so the desire to add, just add more sensors, turns your computational problem into one that might be tractable with 5–I'm making the numbers up–with 5 sensors, but not with 7 sensors because, if I go from 5 to 7 sensors, what I'm going to do is change length of time it takes

do the computational problem about displaying information, and analyzing it all that, by a factor of 4.

Just by adding 2 more sensors–and it gets even worse if it's going from 100 sensors to 102 sensors. You know, I'm going from something that'll take four times as long, you know, a problem that took me one month to solve, takes me four months to solve now. Now that, you know, that's ridiculous. And no amount of better computing is going to solve that kind of problem. And that's just in the nature of the mathematics used to solve it.

So, you know, you can't just salute and move out when posed with certain problems. They have to be posed as solvable–they have to be solvable problems.

Sheena Chestnut Greitens: We're in a conversation about American civil-military relations right now, and I'm really fascinated by the way that this technology conversation fits into the broader conversation about the American civil-military relationship. Because I think that if you asked a lot of ordinary Americans and a lot of people working in national security, that can-do attitude in the United States military would be seen as one of its greatest strengths.

So how do you get maybe civilian policymakers or military, senior military leaders, a more realistic sense of what they can ask their teams and their people to accomplish, without taking away that fundamental can-do attitude that has sometimes been critical to military culture and unit success on specific operations, and is part of the sort of, you know, the historical culture of the US military?

Can you do both?

Herb Lin: That is a very deep question, and I don't know how to answer that. But let me give you a way of looking at that problem. I mean, I think it comes back to this question of, you have to give the person a solvable problem.

By the way, I mean, I agree with you about the can-do ethos. It's an important and valuable central aspect of the American military. And my interactions with the American military have shown me that this attitude is a very powerful asset, that they often do things, the right things on the ground, despite what's coming down from Washington.

We agree, I think, that it's hard to go to the Moon, and it's even harder to go to Mars. Everybody would sort of agree with that but, there's a difference between

saying going to Mars is hard and doing the impossible, versus going to Pluto and doing the impossible. Same laws of physics. We don't have any magic warp drives or anything that'll get us out to Pluto very quickly. So it's the same kind–and we could do it with known engineering.

I mean, it's not, doesn't violate the laws of physics to go to Pluto with known engineering techniques, and materials, and so on now. But those are different kinds of impossibility. You say it's impossible to go to Pluto, it's impossible to go to Mars. And by the way, there are people who will say that it's impossible to go to Mars, despite all of the plans to do it.

And it's incumbent on the policymaker, on the general, the decision-maker, to understand the difference between going to Mars and going to Pluto.

How do you get people to be more realistic and still not lose the can-do spirit? And I don't know how to do that. That's a lesson in leadership that I don't know how to do, beyond what I just said.

Ryan Vest: I think that might be a little bit beyond all of us. But it's something that people need to think about. I think it's a really good point, and something to pull out of this article.

[00:25:58] Amara's Law And Internet

Ryan Vest: Just continue on this train of thought, as we talk about this can-do attitude, and the way that people approach that, in the article, you argued that we often tend to overestimate the effects of technology in the short run, but then we underestimate them in the long run–and you talk about Amara's Law. I was wondering if you could talk a little bit about Amara's Law and how it helps reconcile the tension between technological hype and the undeniable, these long-term benefits of military innovation?

Herb Lin: Well, Amara's Law is kind of like Moore's Law, only it's fuzzier. Moore's Law–they are both observations about the way technology progresses, and the impacts of technology on society and the like. Moore's Law was never a law of nature. It was just a statement about how fast semiconductor manufacturers could extract money from the, you know, from the world. And, you know, leading to new generations, and so on.

Amara's Law just reflects the observation that, you know, as stated–that we overestimate the effects of a technology in the short run, and underestimate it in the long run. And so an interesting question is–why is that?

And I think the underestimation, in the long run, is because of the fact that you get second and third order effects, that you can't easily foresee, because they're contingent. And you just don't know what the future will bring.

The best example that I know, that I think that's familiar to most people, is the remarkable, ubiquitous nature of the internet, in our lives. I mean, you know, you guys have cell phones. They're almost certainly smartphones. The ubiquitousness of the internet today, in all of our daily lives, it depends on two other innovations, which were not necessarily a given.

One is the invention of the personal computer. You guys are probably too young to remember this, but the first computer that I used, ever, was the size of my dining room table–two dining room tables–big dining room tables. It took up a whole room with dedicated air conditioning and so on. And that was my computer–that was the computer I cut my teeth on, okay?

And then the personal computer came along in 1980 or so. Now individuals could pay, you know, reasonable money, about what they would pay for a car, less than what they would pay for a car, to have a computer on their desk that would actually do something useful, okay? So this brings it out of, you know, from the offices, where I had to go to the computer, where the computer came to me.

Now the computer's in my home, it's in my bedroom. And then the invention of the cellphone, you guys remember before–you probably do remember before cellphones, right? You know, you were six, or something like that.

You had to be home to get a phone call, right? And, you know, it was a big deal to have a super long extension cord, so you could move from the kitchen to the dining room, or something like that. I mean, I remember those days. And, you know, to have a mobile phone was just amazing. Now you could go out and, you know, you were no longer tethered to one location.

Then after that, of course, you know, data networks, and so on. Now you have more power in your pocket on the street, than you had in these giant computers running the Apollo mission in 1969–and, you know, from a big fixed headquarters in massive buildings, right? That's a total revolution, right?

How could anybody–how could the inventor of the transistor in 1947 have predicted any of this stuff? They might have, they probably did predict computers and, you know, physical computers–because there were computers

there, only they were made with vacuum tubes. They could imagine smaller computers. But coming out, you know, imagining what we have now? No way.

As to the overestimation in the short run, it's just because we have the–you know, it's what we see, okay? And it's easy to go crazy on that. It's obvious what it can do in this situation, and then maybe in that situation, if you leave out the difficulty, and in that situation, if you leave out the difficulties, and so on.

The example that I use in the paper, I wish I had coined this myself, it's so good. But, you know, I first heard it from Kathleen Hicks, is that, you know, think about electricity. The value of electricity as a weapon, you know, if you thought about it, would be to electrocute people, okay?

You use it to electrocute enemy soldiers. That's not how we use electricity on the battlefield at all, right? I mean, yes, on occasion electricity has been used to kill. Yes, I don't want to deny that. But very rarely. But it's an enabler for all sorts of military things, and those things are contingent.

At the beginning, if you said, "How would I use electricity as a wonder weapon? I'd use it to zap people." Well, okay, but that's not how we wound up using it.

Sheena Chestnut Greitens: It's really interesting, that gap between what we can see in the short term, and the way then that the future plays out in the slightly longer term, right? I'm reminded of, I think it was Winston Churchill, "Man can only see one link in the chain of destiny," or something like that. I'm probably butchering the quote, but you get the idea.

[00:31:37] Two Policy Imperatives

Sheena Chestnut Greitens: So Herb, you conclude the article with two policy imperatives aimed at tempering excessive optimism, while still encouraging innovation and progress. And so I wondered if you could tell us about those imperatives? And then if you could get policymakers to take one or two lessons from your article as they evaluate emerging technologies in their role, particularly in the national security and military space, what should it be?

Herb Lin: I have two imperatives in there. One is to–I hate to say it in these terms, because it sounds trite and silly, but, you know–be more rigorous in your assessment of new technologies. To be more willing to pay attention to skeptics. The problem is that confidence is good, overconfidence is bad, right?

And I don't want to suppress all confidence, I want to suppress overconfidence. And so the only way I know how to do it, is to pay attention to skeptics who say that you're being overconfident. Well, what I think is overconfident, may in fact be justified confidence. So you have to get into that debate. You have to get into the argument, and you have to examine it closely.

And that's hard. You know, having technically trained people matters, and so on, and so forth. But, you know, first is the attitude. You have to want to hear from those people. And the second thing is, and we do some of the, what I'm about to say already, we just don't do enough of it. I want to encourage innovation in the field, in addition to innovation, sort of, from the top down.

There's a long history of American military innovation in the field, making do with what they have, and using things in innovative ways, and so on. You know, putting together stuff from spare parts, and you know, this is what was, pejoratively called, hillbilly armor in Afghanistan, and so on. You know, they just put stuff together that would help them.

And, you know, part of the problem is that these things are often suppressed. Because it goes against doctrine, and it fouls up the acquisition systems, and logistics trains, and so on. But in my view, there ought to be more attention and resources provided to guys in the field, the men and women in the field, to innovate on the fly.

And that should be encouraged rather than discouraged. Because it's often that innovations that come down, from up above, are not the things that they need, but something else comes along. I mean, you may not know this story, but the internet started in 1969, 1968 with ARPANET.

The original function, the way it was sold, was to enable a researcher at location one, to log into the computer at location two. It was to support–the entire purpose of the internet was to support remote login. Email and chat were afterthoughts on it. And of course, nobody does remote login anymore.

Well, not, that's not true, but that's not the way we experience it. And email was the first killer app of the internet. Took over the internet for a while. And chat functions, I mean, you know, of which, this video call is an example of a chat function, okay? That was actively suppressed. It was an add-on capability, but now people learn to use it and so–and users like me had to fight to get chat to survive. That's a little bit of an exaggeration of the story, but not much.

You want stuff lying around, so that people can adapt it to their local circumstance, and you should encourage that, and fund it, rather than suppress it.

There's a saying that I've always taken to heart, which is that there are three roads to ruin. “Sex is the most fun, alcohol is the fastest, and technology is the most certain.” It's attributed to some minister somewhere in France, or something like that. I first saw it in a computer center many years ago, and it just always had the right ring of cynicism to it–that technology is something that, you know, I live and breathe technology, and I work with it all of the time, and it's always disappointing. How many times have you been to a presentation and, you know, the slides were in backwards or, you know, they can't get the projector to work, or whatever.

You know, you see, we've all seen this, and if they could just solve those problems, we'd be so much farther ahead. But no, we want to go for the fancy new technology and, you know, let the rest of us peons suffer.

I wish I could have found a way of putting that into the article, but I couldn't, I couldn't think of a good way to do it.

Sheena Chestnut Greitens: Well, I think you're continuing your track record as remaining one of *Horns of a Dilemma's* most quotable podcast guests. So, you know, thank you for working that into this episode. We'll see what we can do in the editing.

Herb Lin: Okay.

[00:37:05] Closing And Credits

Ryan Vest: Well, thanks for joining us on *Horns of a Dilemma* from the *Texas National Security Review*. Our guest today has been Herb Lin, author of the article "On Optimism About New Military Technologies," which, as always, can be accessed for free on our website. Herb, thank you very much for joining us today.

Herb Lin: This was great. Thank you so much for letting me be part of your show.

Ryan Vest: If you enjoyed this episode, be sure to subscribe and leave a review wherever you listen. We love hearing from you. You can find more of our work

at *TNSR*.org. Today's episode was produced by *TNSR* Digital and Technical Manager Jordan Morning, and made possible by the University of Texas System. This is Ryan Vest and Sheena Chestnut Greitens.

Thank you for listening.