Illustration by Jim Elmore

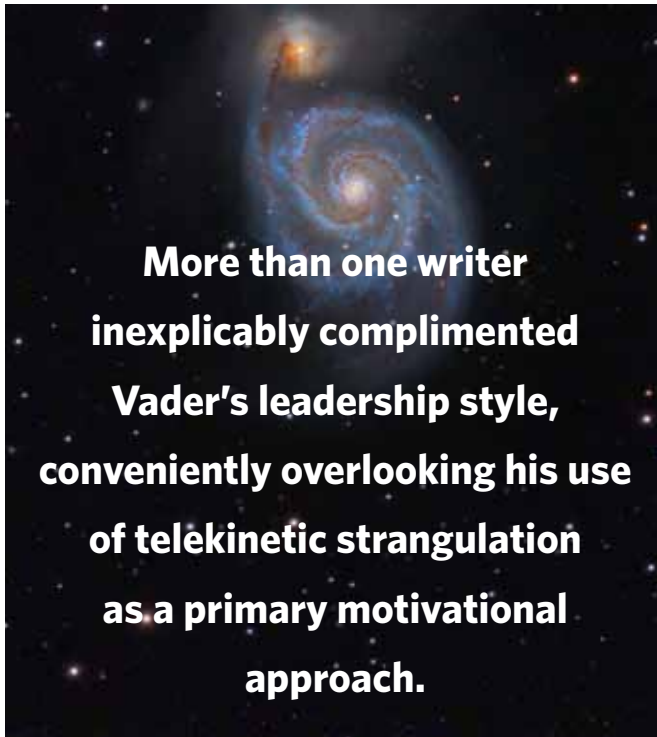# Don't Come to the Dark Side

Acquisition Lessons from a Galaxy Far, Far Away

Lt. Col. Dan Ward, USAF

After watching the climactic battle scene in *Return of the Jedi* for the first time, my 8-year-old daughter said, "They shouldn't build those Death Stars anymore. They keep getting blown up." She may be a little short for a stormtrooper, but the kid's got a point.

Yes, the Empire should stop building Death Stars. It turns out the DoD shouldn't build them either, metaphorically speaking. What sort of system fits into this category? I'll resist the urge to give specific examples and instead will simply point out that any enormous project that is brain-meltingly complex, ravenously consumes resources, and aims to deliver an Undefeatable Ultimate Weapon is well on its way to becoming a Death Star, and that's not a good thing.

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Why are Death Stars a bad idea? The main objections fit into two categories: operational and programmatic. The operational shortcomings of the Empire's doomed battlestations are well known and widely mocked. Their programmatic shortcomings are less well known but worth considering. We'll take a look at both categories.

Death Star Operational Assessment

Introduced in Episode IV, *A New Hope*, the Death Star makes an impressive debut when it vaporizes the planet Alderaan—the one and only time it fires its main weapon. Shortly thereafter, the entire station, with 1.2 million people on board, is destroyed by a single shot fired by a half-trained Jedi. That's what we call a critical vulnerability, and it's the subject of relentless fan disdain. The second Death Star's performance in combat was even less impressive. Despite being much larger than the original one, it was dispatched by the rebels before firing its planet-busting laser even once. So much for being "fully operational."

To be sure, the Death Star is primarily a weapon of intimidation rather than something to be used all willy-nilly. Even the Evil Empire didn't want to demolish more than a handful of planets. So the fact that the Death Star only ever fired one shot may not be that big of a deal. However, the fact that the stations kept getting blown up is a big deal indeed. It's hard to be intimidating if you're a smoking cloud of debris.

One might wonder how such an ostensibly powerful weapon could have such a consistently poor track record and such a gaping weakness. Despite the opinion of certain critics, these shortcomings are not a cheap plot device by a lazy writer. In

fact, the Death Star's combination of inadequacy and vulnerability may be the second-most realistic aspect of the entire saga.

Build Them, Do Not

From a design perspective, a system as enormously complex as a Death Star is more than any program manager or senior architect can handle, no matter how high their midi-chlorian count is. There is bound to be an overlooked exhaust vent or two that leads directly to the reactor core. That is just the sort of vulnerability an asymmetric opponent can exploit. In my professional engineering judgment, a flaw of this type was inevitable. As C-3PO would say, the possibility of building such a large and complex system without overlooking something critical is approximately 3,720 to 1! The resulting error may not be as dramatic as George Lucas envisioned, but even a malfunction in the life support system or navigation software can be pretty exciting in its own way.

Death Star Programmatics

The Death Star's lackluster contribution to the fight is reason enough not to build one, but serious problems emerged long before it was declared operational. In *Return of the Jedi,* viewers gain a fascinating insight into the programmatics of Empire acquisitions. In the single most realistic scene in the whole double-trilogy, Darth Vader complains that the second Death Star construction project is … behind schedule. In fact, much of the drama in Episode VI revolves around this delay.

Consider the implications of pop culture's most notorious schedule overrun. In the Star Wars universe, robots are self-aware, every ship has its own gravity, Jedi Knights use the Force, tiny green Muppets are formidable warriors and a piece of junk like the Millennium Falcon can make the Kessel Run in less than 12 parsecs. But even the florid imagination of George Lucas could not envision a project like the Death Star coming in on time, on budget. He knew it would take a Jedi mind trick beyond the skill of Master Yoda to make an audience suspend that much disbelief.

Even worse, it turns out getting a moon-sized project back on track requires the personal presence of a Sith Lord. Let me assure you, if your project's success depends on hiring someone whose first name is Darth, you've got a problem. Not just because Sith Lords are make-believe, but also because they're evil.

I've Got A Bad Feeling About This

If you count the 14 hours I spent rewatching all six movies, I did way more research for this article than any other project in recent memory. During the phase of research that did not involve popcorn, I was surprised to discover several blogs and published articles praising Darth Vader for his programmatic prowess.

You'd think it would go without saying that Vader is not a great example of anything other than redemption. From the time he

puts on that black helmet until his (spoiler alert!) heart-warming death scene, he's a complete baddie. And yet, it turns out many fans have drawn unfortunate lessons from this character.

An article in *Project Magazine* titled "If His Day Rate Is Reasonable, Get Darth Vader" commended Vader's ability to turn around an ailing project. Another program management professional wistfully wrote, "If only most project managers could have the presence and command the respect that Darth Vader did..." Um, have you seen these films? I don't think we really want PMs to walk around in capes and black armor. Sure, I've known people who thought they were on par with Vader, but I assure you, his path is not one we should follow. I'm pretty sure it leads to suffering.

A few writers praised Vader's strong communication skills, pointing out that he conscientiously "ensured the Emperor was kept up-to-date with regular progress reports." In a similar vein, I'm told Mussolini kept the trains running on time. Even if that were true (and it's not), it doesn't make him a good role model.
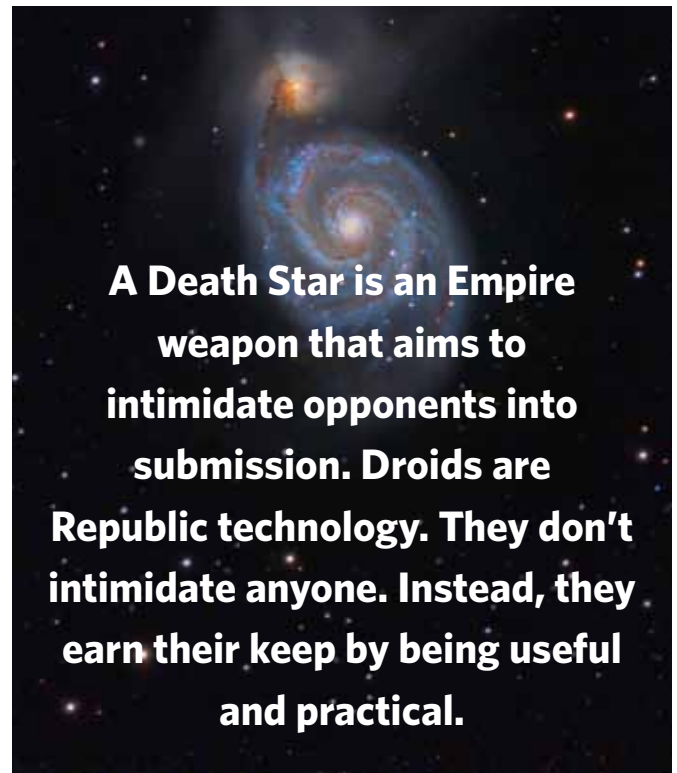
More than one writer inexplicably complimented Vader's leadership style, conveniently overlooking his use of telekinetic strangulation as a primary motivational approach. One misguided soul described Vader as "an authoritative figure who commanded respect." A more accurate description might be "a murderous tyrant who commanded obedience." There's a difference.

Happily, a blog commenter with the unlikely nom de net of Luke had the wisdom to point out, "All projects developed by Dark Lords will end up like the Death Stars." By that I presume he meant "glowing fields of space junk," but it's possible he also meant "over budget, behind schedule and blown-up before Act II." Online Luke is probably right: Dark Lords build Death Stars. I suspect the inverse is also true—building Death Stars makes program managers end up like Dark Lords. If so, that's one more reason not to do it.

A Jedi Craves Not These Things
Now, the commentaries I quoted were surely at least partially tongue-in-cheek. However, there seemed to be a sincere underlying belief in many cases that a) the Death Stars were awesome engineering projects and b) Darth Vader was a good leader who got stuff done. I can excuse enthusiastic fanboys and fangirls for holding these beliefs, but as professional military technologists, we know better.

Consider the fact that even the Empire, with all its vast resources and the full power of the Dark Side, could only build one Death Star at a time. Building two at once was clearly more than it could handle. This reminds me of Norm Augustine's famous prediction that at some point, the entire DoD budget would purchase just one aircraft for all the Services to share. The Empire apparently arrived at this singularity long, long ago. I'm not convinced this achievement represented real progress.

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The truth is, Death Stars are about as practical as a metal bikini. Sure, they look cool, but they aren't very sensible. Specifically, Death Stars can't possibly be built on time or on budget, require pathological leadership styles and, as we've noted, keep getting blown up. Also, nobody can build enough of them to make a real difference in the field.

The bottom line: Death Stars are unaffordable. Whether we're talking about a fictional galaxy far, far away or the all too real conditions here on Planet Earth, a Death Star program will cost more than it is worth. The investment on this scale is unsustainable and is completely lost when a wamp-rat-hunting farmboy takes a lucky shot. When one station represents the entire fleet (or even 5 percent of the fleet), we've put too many eggs in that basket and are well on our way to failing someone for the last time.

The answer isn't to build more, partly because we can't and partly because the underlying concept is so critically flawed. Instead of building Death Stars, we should imitate the most successful technology in the saga: R2-D2.

The Droids We're Looking For
My extensive research uncovered an interview where George Lucas identified R2-D2 as "the hero of the whole thing." I found this comment startling at first, because in all my boyhood hours of playing Star Wars, nobody ever wanted to be an astromech droid. We all wanted to be Luke. And yet, a closer look at the films shows Artoo has an impressive tendency to save the day, in scene after scene. Whether it's repairing the Millennium Falcon's hyperdrive, destroying a pair of Super Battle Droids, conveying a secret message to old Ben Kenobi or de-

livering Luke's light saber at the critical moment on Jabba's Sail Barge, he's always got a trick up his proverbial sleeve.

When a young Anakin snuck Padme off Coruscant and reassured her by saying "Don't worry, we have Artoo with us," he was not being ironic. No other character, biological or mechanical, is quite so dependable. If I was assaulting a Death Star in an X-wing fighter, you bet I'd want a good R2 unit on board.

Our Only Hope
Yes, there are plenty of flaws in the Star Wars films—I'm looking at you, Jar Jar Binks—but casting R2-D2 as the hero isn't one of them. Just as the Death Stars' vulnerability and inadequacy are perfectly realistic, the superior operational performance of a simple droid corresponds to real-life experience. Time and again, war-winning weapons tend to be simple, inexpensive and small.

An astromech droid's simplicity makes it reliable, and its long history of use in battle makes it robust and widely useful. Consider Artoo's restrained design. He doesn't have fancy language processors; beeps and squeaks suffice. He doesn't have arms or even a face. Artoo is pure function. He has no unnecessary features, no superfluous parts. He's not even very tall, proving once again Yoda's dictum that size matters not.

Consider this: A Death Star is an Empire weapon that aims to intimidate opponents into submission. Droids are Republic technology. They don't intimidate anyone. Instead, they earn their keep by being useful and practical. Droids are about finesse, while Death Stars are about brute force. And given the current world situation, finesse is clearly what we need.

Droids aren't expensive; their requirements aren't overstated. One might argue that a droid can't do what a Death Star does, but then again, the Death Stars didn't do very much when all was said and done. In the final accounting, a droid like Artoo does more than it was designed to do, while a Death Star ends up doing less. Much less.

If you want to keep your limbs intact, let the Wookie win. And if you want to develop and deliver effective weapon systems, build droids instead of Death Stars. The key is exercising design restraint, focusing our requirements on the essential requirements rather than the endless list of desirements, living within our budget and resisting the temptation to extend the schedule. Sure, it's hard to tell the Emperor no when he insists on building yet another Death Star, but since the Force is imaginary, chances are good you won't get zapped with lightning for suggesting an alternative approach.

There are all sorts of ways to simplify a design, to reduce a set of requirements to the bare minimum, to make sure we build what we can afford. Don't believe such a thing can be done? That is why you fail. But those who do believe will find the system they built just might be "the hero of the whole thing."