An Argument for Agile Autonomy in Airpower

David A. Heinitz

The US Air Force's existing processes for developing and fielding aircraft technologies and training pilots on new systems place warfighters at a disadvantage against rapidly advancing adversaries. In order to keep pace with technological advances and changes in global competition, the Air Force should employ Agile hardware development frameworks to its aircraft development. An analysis of the commercial use of Agile systems and of the Air Force's current fielding approach demonstrates how Agile hardware fielding, autonomy, and machine learning can be applied to Air Force aircraft development to meet current national defense needs.

Major Anichka Singh looks out the cockpit of her F-35 to where her augmented reality visor displays eight "wingmen"—an archaic term since these jets have a total crew of zero. Three new aircraft join her menagerie: five different airframe types, three manufacturers. But all run the same version of the Tactical Autonomy and Logistics Operating System (TALOS), updated just two days ago. The new aircraft are a type that she was briefed on only when she arrived in theater. She doesn't recall much about the missile they're armed with other than its name.

Just then two hostiles appear, out of her range but apparently not out of the hostiles' as launch indications quickly follow. TALOS presents defensive maneuver options for the wingmen most likely targeted, and with a few clicks Singh accepts the autonomy-generated options. One wingman automatically dispenses countermeasures, but the other doesn't have any. As the two missiles disappear so does one of her wingmen.

Two more launch icons appear from the hostiles. TALOS automatically repositions her now seven-ship of robots into an optional formation, but they are already within no escape range. Just then TALOS provides launch options from two of the new aircraft, one on the incoming missiles and one on what she thought were the out-of-range hostiles. Singh empties the aircraft's bays. Four of the missiles she had barely recognized take out the incoming missiles while the other four streak toward the distant hostiles who make last ditch maneuvers before disappearing from the sky.

While this story is science fiction today, the continuing acceleration of military technology amid a rapidly shifting global security environment will make it not only possible but potentially necessary for a pilot to go to war with weapons and capabilities they had never trained with before. A way to enable such rapidly fielded capabilities to be used effectively in combat is to move human hands further back from the stick and throttle work.

Recent advances in hardware, software, and product management frameworks have provided a way for complex systems to be updated daily—if not faster—but military systems

Lieutenant Colonel David Heinitz, USAF, Retired, is the chief, Mission Analysis Division, Force Capability Analysis Directorate, Department of the Air Force Studies and Analysis. He holds a master of military art and science from Air Command and Staff College.

still take months or even years to be upgraded, and military pilots spend months training to fly their specific aircraft. This temporal disparity means US pilots currently cannot have the latest technology at any moment. But could a pilot even maximize a jet's performance in a life-or-death situation when its systems are updated every day?

User productivity can be slowed when a simple update to Microsoft Office moves buttons on an application. Although pilots today are fully briefed on software updates before they fly with them and safety procedures are in place to ensure aircrew receive adequate training on new systems, the current security environment is demanding changes at an increasingly faster rate, and this may pose a challenge for pilots in combat. But if the pilot were instead focused on the nature of air combat and able to easily handle shifts in its character by working like the fictional Major Singh in the above vignette—moved back from basic fighter maneuvers and instead guiding the flow of the fight and letting autonomy provide options—could that pilot maximize every daily system update?

This article argues that Agile software development methodologies applied to military aircraft could enable the US Air Force to make faster, incremental improvements to more effectively meet national defense needs. An analysis of current Air Force structures reveals that they cannot absorb such rapid changes as they are built around lengthy fielding timelines. This article thus recommends that such human-integration challenges may be alleviated by the increased use of automation.

Using Agile Software Development for Hardware

Agile software development represents one approach to faster, incremental improvement. In 2001, when the original members of the Agile Alliance, a team of software developers, codified the *Manifesto for Agile Software Development* and the principles behind it, they provided clarity to a process that had been evolving for nearly 70 years.[1] The subsequent rise in familiarity and popularity of Agile frameworks for project management methodologies such as Scrum, Kanban, and Extreme Programming in companies, including Amazon, has driven a wide shift in how software is delivered to customers.[2] From design

1. "A Short History of Agile," Agile Alliance, accessed 9 March 2025, https://www.agilealliance.org/; Kent Beck et al., "Manifesto for Agile Software Development," agilemanifesto.org, accessed 8 March 2025, https://agilemanifesto.org/; and Craig Larman and Victor Basili, "Iterative and Incremental Development: A Brief History," *IEEE* [*Institute of Electrical and Electronic Engineers*] *Computer* 36, no. 6 (2003), https://doi.org/.

2. "What Is Scrum?," Scrum.org, accessed 8 March 2025, https://www.scrum.org/; Dan Radigan, "Kanban: How the Kanban Method Applies to Software Development," Atlassian, accessed 8 March 2025, https://www.atlassian.com/; "Agile Glossary: Extreme Programming," Agile Alliance, accessed 8 March 2025, https://www.agilealliance.org/; and Beth Galetti et al., "Inside Day 1: How Amazon Uses Agile Team Structures, Adaptive Practices to Innovate on Behalf of Customers," SHRM [Society for Human Resource Management] Executive Network, accessed 8 March 2025, https://www.shrm.org/.

programs to video gaming, users no longer purchase finalized software projects and wait years for updates.[3] Instead, they receive enhancements and new features sometimes weekly.

With these examples of success, companies have been looking to apply Agile software development methodologies and frameworks to physical products as well. For example, Trek Bicycle, Dainese, and SpaceX use Agile methodologies to rapidly prototype and iterate physical items, providing improved versions of products at a much faster rate than before.[4] Yet, there are challenges in applying such methodologies to physical product development. A company cannot as easily or quickly push an update that changes physical components of already fielded systems as they could with software. The more complex and integrated a physical system is, the harder it is to update fielded systems. This is the case with military aircraft, which represent some of the most complicated physical systems available today.

Aircraft Versus Space Hardware

A review of conventional US military aircraft development shows how it differs from recent spacecraft development using Agile methodologies, even when such methodologies have already been applied to some military support areas. For example, Air Mobility Command's Negative Pressurized Conex, an air-transportable isolation and medical room, took only 85 days to develop from issuance of the Joint Urgent Operational Need to the first system being flown on a mission using Agile development processes.[5] While impressive, the progress SpaceX has made with its Falcon series of rockets using Agile methodologies is even more directly applicable to aircraft development. SpaceX, founded in 2002, tested its first rocket, the Falcon 1, in 2006.[6] By 2009, the Falcon 1 was flying operational missions, and by 2010, it had been replaced by the larger, improved Falcon 9, itself only five years in development.[7]

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3. Peter Green, "Measuring the Impact of Scrum on Product Development at Adobe Systems," *Proceedings, 44th Hawaii International Conference on System Sciences* (2011), https://doi.org/; and Edward Lowe, "Riot Games: Using Agile to Build the World's Largest E-Sport," *Medium*, 23 February 2022, https://edwardlowe13.medium.com/.

4. PTC, "Why Agile is the Next Big Thing in Product Development," *Wired*, accessed 8 March 2025, https://www.wired.com/; Vasco Duarte, host, *Scrum Master Toolbox*, podcast, "Agile in Hardware: Agile for Physical Products—Insights from Dainese's Helmet Project with Massimo Terzo," Oikosofy, 7 November 2024, https://scrum-master-toolbox.org/; and Ryan de Freitas Bart, "Is Hardware Agile Worth It? - Analyzing the SpaceX Development Process," *Proceedings of AIAA* [*American Institute of Aeronautics & Astronautics*] *SCITECH 2024 Forum* (2 January 2024), https://doi.org/.

5. Joseph Novick, "Agile Acquisition for... Hardware?," *Army AL & T Magazine*, Spring 2024, https://www.lineofdeparture.army.mil/; and "Negatively Pressurized Conex (NPC) and NPC Lite (NPCL)," Air Mobility Command, accessed 24 May 2025, https://www.amc.af.mil/.

6. Tariq Malik, "SpaceX's Inaugural Falcon 1 Rocket Lost After Launch," Space.com, last updated 23 March 2021, https://www.space.com/.

7. Paul Spudis, "The Tale of Falcon 1," *Smithsonian Air & Space Magazine*, 22 July 2012, https://www.smithsonianmag.com/; and Office of Safety and Mission Assurance, "SpaceX Falcon 9 Data Sheet," National Aeronautics and Space Administration (NASA), updated 1 May 2017, https://sma.nasa.gov/.

Conversely, F-35 development had its origins in the 1993 Common Affordable Lightweight Fighter program and produced a flying prototype seven years later.[8] Yet it would be another 15 years before the first F-35 version was declared operational.[9] Similarly, the Air Force's Common Configuration Implementation Program took a decade, from 2000 to 2010, to upgrade 650 F-16s to a common standard.[10] The next set of 22 modifications to the F-16—begun in 2022 and called the Post Block Integration Team (PoBIT) project—is being completed in phases, with the first phase taking seven weeks per jet and the total time expected to be up to nine months per jet.[11] This disparity of fighter jets taking three times longer to be developed and twice as long to be upgraded as space launch vehicles potentially highlights the benefits of Agile development methodologies.

At first glance, in terms of safety and operations, a comparison between the development of an unmanned space launch vehicle and a manned fighter jet might appear tenuous. Dramatic SpaceX failures, such as the 16 January 2025 explosion of a Starship rocket, may raise questions regarding the safety of applying rapid fielding Agile principles to systems with humans onboard. But a look at the data shows that such risks have at times been accepted and may become even more so with increases in automation.[12]

SpaceX has suffered 12 failures in rocket takeoff or landing from 2006 to May 2025: three with its Falcon 1 rockets, three with Falcon 9, and six with Starship.[13] Those 12 failures over 19 years yield just over a 0.6 failure rate per year. From the start of its Mercury program through the end of the Apollo program (1958 to 1972), the National Aeronautics and Space Administration lost nine people in aircraft or spacecraft flight and test operations: four in T-38s, one in an F-105, one in an X-15, and three in the Apollo 1 fire.[14] Those nine

8. "DARPA/Navy Common Affordable Lightweight Fighter (CALF), 1993–1994," GlobalSecurity.org, last modified 7 July 2011, https://www.globalsecurity.org/; and "Lockheed-Martin X-35A First Flight," photograph, US Air Force [USAF, website], accessed 8 March 2025, https://www.af.mil/.

9. "U.S. Marine Corps Declares the F-35B Operational," US Marines [website], 31 July 2015, https://www.marines.mil/.

10. Chris McGee, "Largest-Ever Modernization Program Enhances F-16s," Air Force Materiel Command, 16 March 2006, https://www.afmc.af.mil/.

11. Kaylin P. Hankerson, "8FW Flies First 7AF POBIT-Upgraded F-16," Kunsan Air Base, 7 April 2023, https://www.kunsan.af.mil/; and Christian Baghai, "How the U.S. Air Force Will Keep Its F-16s Flying into the 2040s," *Medium*, 31 January 2024, https://christianbaghai.medium.com/.

12. "FAA Orders SpaceX to Investigate Starship Explosion," *World News Tonight* with David Muir, posted 17 January 2025, by ABC News, YouTube, 1:11, https://www.youtube.com/.

13. Tom Junod, "Elon Musk: Triumph of His Will," *Esquire*, 14 November 2012, https://www.esquire.com/; "Starlink Mission," SpaceX [website], 11 July 2024, https://www.spacex.com/; Will Robinson-Smith, "SpaceX Falcon 9 Booster Collapses in a Fireball on the Droneship, Ending a Streak of 267 Successful Landings," *Spaceflight Now*, 28 August 2024, https://spaceflightnow.com/; and Jeff Foust, "Fuel Leak Blamed for Falcon 9 Booster Loss After Landing," *SpaceNews*, 8 March 2025, https://spacenews.com/.

14. "Astronaut Killed in Plane Crash," *The Spokesman-Review*, 1 November 1964, https://news.google.com/; "2 Astronauts Die in Plane Crash," *The Tuscaloosa News*, 28 February 1966, https://news.google.com/; "Board Pinpoints Astronaut's Death," *Sarasota Herald-Tribune*, 7 June 1968, https://news.google.com/; and "Air Crash Kills Astro," *Nashua Telegraph*, 9 December 1967, https://news.google.com/.

fatalities over 14 years yielded just over a 0.6 fatality rate per year.[15] While no program desires a failure rate this high—or any fatality rate for that matter—circumstances have previously driven the industry to accept them for the rapid development of critical systems.

Moreover, with an increased use of automation, it may be possible, even in manned aircraft development, to remove humans from the most dangerous, rapid tests. The Air Force Test Pilot School's X-62A VISTA (Variable In-Flight Stability Test Aircraft) is one such example of this path. The VISTA, a manned aircraft designed to test autonomy software and fly without pilot input, could lead the way to autonomy software that enables aircraft tests without pilots onboard.[16]

While there are mitigation strategies for Agile safety concerns, it could be argued that a fighter jet piloted by one person and reused nearly every day for hours of dynamic missions is significantly different than a semi-reusable launch vehicle whose single, 30-minute function is carefully managed by dozens of people. Perhaps that is exactly the point. In other words, to keep up with advancing technology, perhaps fighter jets should be both developed and used differently.

Multiple factors have driven the Air Force to keep its aging aircraft for longer and longer. The most extreme example is the B-52 bombers built in 1960 and scheduled to fly until 2060.[17] Additionally, military aircraft are mostly crewed systems. Even the MQ-9 remotely piloted aircraft has a crew complement larger than many planes with humans in them.[18] This structure of decades-old aircraft designed to have humans monitoring individual gauges and adjusting specific switches leads to the need for slow upgrades to entire fleets of physical objects as major long-term projects—something that is the antithesis of Agile development.

But what would happen if Agile methodologies were applied to this process? Evidence from other fields suggests that such methodologies could incrementally yet significantly speed up development; however, the operational implications of such rapid fielding warrant further exploration.

Agile Systems and the Air Force's Current Combat Employment

Analysis of the Air Force's current aircraft employment structures reveals potential compatibility issues with Agile development methodologies. Yet it also begs the question

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15. See also "Pilot Killed as X-15 Falls from Altitude of 50 Miles," *Toledo Blade*, 16 November 1967, https://news.google.com/; and "One Astronaut Cried 'Fire' Before All Died," *Daytona Beach Sundy News-Journal*, 29 January 1967, https://news.google.com/.

16. Giancarlo Casem, "Modified X-62 Helps Accelerate Tactical Autonomy Development," Edwards Air Force Base, 22 August 2022, https://www.edwards.af.mil/.

17. Justin Hayward, "The Oldest Active B-52: A Guide," *Simple Flying*, 7 March 2024, https://simpleflying.com/; and Stephen Losey, "The New B-52: How the Air Force Is Prepping to Fly Century-Old Bombers," *Defense News*, 12 February 2024, https://www.defensenews.com/.

18. "Reaper (MQ-9A)," Royal Air Force [website], accessed 4 May 2025, https://www.raf.mod.uk/.

of whether such issues could be overcome with changes to the ways in which these structures are managed.

A typical Air Force fighter squadron has 18 to 24 jets. If an engine manufacturer created rapid, small, and iterative changes to the jets' engines that improved thrust and fuel efficiency, these changes could be immediately implemented one jet at a time. But following Agile methodologies, that vendor would keep developing new improvements before the squadron's entire fleet had been updated with the first changes. If the second set of improvements was ready before all the jets had been upgraded with the first set, the next jets to be upgraded should receive both the first and second set of improvements simultaneously, resulting in three different engines operating in one squadron at the same time.

If this logic were applied to aircraft sensors, computer hardware, communication systems, electronic warfare systems, weapon carriage modifications, and cockpit instrumentation, trying to keep the squadron up to date with the latest capabilities using an Agile methodology could result in every jet in the squadron being different, indefinitely. This may be a problem for systems requiring complex direct human interaction.

A typical fighter squadron has 30 to 100 crew members and is supported by a maintenance squadron with 100 to 300 personnel. Ensuring the maintenance personnel are familiar with ever-changing technical specifications on multiple versions of each system of that squadron's jets would be a daunting challenge, as would ensuring the right jets were available for specific mission needs, especially with daily maintenance fallouts and tail swaps. Similarly, different power, fuel consumption, and weight values across the fleet would require different takeoff and landing data and in-flight fuel planning assumptions for the crew members. Operationally, different jets would bring different capabilities, adding complexity to training plans and transferability from one tail to another.

Operational units regularly deal with daily fallouts and tail swaps because the current rate of system fielding does not overly strain the structures in place. A pilot who has spent hundreds or thousands of hours training to expect a jet and its systems to behave in a certain way in combat depends upon that muscle and process memory to be able to maximize that jet's potential. What if this jet is different from the jet they flew yesterday?

This line of thinking indicates that current combat aircraft employment structures may not be compatible with Agile development of physical systems. Yet the structure can be changed to execute within Agile methodologies. Starting with basic mission planning, when a pilot steps to a spare with different power and weight than the jet they were planning to fly, algorithms could be written for that jet to automatically calculate its own takeoff and landing data and determine if that jet is compatible to perform a formation takeoff with another jet. It could even go so far as to let the jet perform the takeoff without any human interaction. For fuel planning, additional algorithms could consider the performance of all aircraft in a four-ship formation, determine which jet is the limiting factor from a fuel standpoint, and recommend a mission profile that still allows objectives to be met. It might even be better to have the jets fly themselves during administrative portions of the flight to optimize each jet's profile. This approach was highlighted in the introduction when the fictional TALOS software automatically repositioned the uncrewed wingmen when one was shot down.

Regarding tactical operations, a hypothetical scenario illustrates how this might play out. Assume Blue 1 has been modified with a new, longer-range missile carriage and employment capability that the other jets in the formation do not have, but Blue 2 has engine modifications that permit a higher operating altitude. It is possible in certain situations that Blue 2 might have a longer range shot than Blue 1 due to the improved kinematics of the older missile when fired from higher altitude. If these system capabilities and mixes were put into computer simulations during development and machine learning approaches applied to the variations of these simulations, a set of algorithms could be developed and loaded into the jets that provide optimal and alternate solutions to tactical problems as they arise, like the launch options TALOS provided in the introductory story.

If each of the 24 jets in a squadron had different capabilities and a pilot could not know for sure which jets their flight would be flying tomorrow, it is unlikely they could optimize their formation's capabilities in real time. Instead, if a pre-trained algorithm were presented with the problem and provided the pilot with choices to select from, they could pick the option that made the most sense as easily as Singh did with a click of the button in the introductory vignette. But would having different jets in the same squadron really be a problem, or is this just speculation?

Although the Air Force has not yet realized the type of rapid system fielding being described above, small movements in this direction provide an indication of what challenges such fielding may entail. Current Air Force combat aircraft spent decades in development, and partially for that reason, many—such as the F-15, B-1, and B-2—have already spent over 30 years in service, with the aforementioned B-52 scheduled for a century in service.[19] If this is combined with a structure that has crew members monitoring and setting individual switches, it leads to the desire for entire fleets to be up to the same standard, the goal the Common Configuration Information Program achieved with the F-16 fleet in 2010.

But going forward the Air Force is approaching upgrades in a more piecemeal manner. The Post Block Integration Team program has broken the next nine months of F-16 upgrades into steps as small as seven weeks. While this is not true Agile development, since the 22 upgrades scheduled in the PoBIT program have already been fully developed, the F-35's development path is closer. Each year the new lot of F-35 aircraft delivered from Lockheed-Martin includes the newest modifications. This has resulted in something similar to the hypothetical squadron problems described above.

There are nominally three versions of the F-35: the F-35A employed by the Air Force, the F-35B with vertical takeoff capability employed by the Marine Corps, and the F-35C with aircraft carrier landing capability employed by the Navy. Yet, according to a 2023

19. John Tirpak, "Average Age of USAF Aircraft Drops Slightly, but Eight Fleets Now Exceed 50 Years Old," *Air & Space Forces Magazine*, 23 November 2021, https://www.airandspaceforces.com/.

Government Accountability Office (GAO) report, there are "at least 14 different versions."[20] This is due to the continual improvements with each lot delivered. The GAO report highlights the complication this is creating for maintenance and sustainability, which contributes to poor fleet-wide readiness. While there are currently no reports that state the continual improvement of F-35s from lot to lot creates the same tactical mission issues for pilots outlined in the hypothetical squadron above, this might be because those mission updates are long delayed.

A separate GAO report from 2023 states that "the [F-35] program hasn't fully installed the hardware and software needed for future aircraft upgrades because of delays developing the needed technologies."[21] Given these realities it does not appear that there is any future where there are only three versions of the F-35, but this can be an opportunity as opposed to a problem. The military has already seen the issues such incremental fielding can create for maintenance and sustainment, and if operational capability upgrades reach the same speed of delivery, it is possible similar challenges could arise for pilots. A way to potentially overcome these challenges and marry this rapid capability fielding with effective operations is to automate the wrench-turning and G-pulling.

If humans can simply direct the intent of what is desired instead of flipping each switch or installing each piece of hardware, the speed of Agile development can be joined with consistently effective operations. An example of this in practice can be seen at Amazon. The sale and distribution juggernaut is currently also one of the world leaders in hardware automation. Since 2012, it has expanded its fleet of semi-autonomous and autonomous robots to over 750,000 across its distribution centers. Some of these robots can locate individual products in acres of warehouse space or select them from bins of mixed products. Additionally, "machine-learning techniques allow robots to teach themselves what to pick and how to pick."[22] Amazon continually collects data from these operations and uses it to improve its robot fleet across all centers. This increase in the use of automation fueled Amazon's ten-fold growth in sales from 2010 to 2020.[23]

For Amazon, merging autonomy with data has thus proved successful for evolving its operations. The potential for the Air Force to do the same warrants serious consideration if it is to meet the demands of an increasingly competitive security environment.

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20. Audrey Decker, "How Many F-35 Versions Are There? Hint: More Than 3," *Defense One*, 3 October 2023, https://www.defenseone.com/.

21. Jon Ludwigson, *F-35 Joint Strike Fighter: More Actions Needed to Explain Cost Growth and Support Engine Modernization Decision*, GAO-24-107177 (US Government Accountability Office, 12 December 2023), https://www.gao.gov/.

22. Will Knight, "Amazon's New Robots and the Automation Revolution," *Wired*, 26 June 2023, https://www.wired.com/.

23. Knight.

Agile Application and Concerns

If similar automation were applied to Air Force maintenance and sustainment, could the service keep up with the year-by-year F-35 lot improvements, or better yet, continual system improvements? What would automated parts distribution and computer optimized maintenance scheduling look like? Perhaps an aircraft technician could check their computer-generated schedule to find which plane they were working on that day, arrive at the jet with all necessary equipment already brought there by automated robots, and then supervise a robotic installation of the part to be replaced using augmented reality goggles that show them what steps should be followed for any part they have never seen before.

Similar logic applied to flight operations may manifest as automated takeoff or automated administrative flying. Automated tactics options based on the real-time situation and pre-trained algorithms might be updated daily with new data across the fleet. Perhaps the pilot becomes more of a passenger, focused on military command of the operation, instead of a stick actuator flying the jet. In this case, there may not need to be a pilot in every jet.

Key players in the international community including technology leaders, Human Rights Watch, and the UN secretary general have raised concerns that automated weapons or "killer robots" are an unwise direction for military development. While there may be legitimate issues with certain levels of autonomy, what is proposed here is a small step down a path that has been progressing for centuries.[24] Employment of the first projectile weapons required several key points of human involvement. The intent of the commander had to be passed to the shooter; the shooter had to then determine the right target and right time to fire, use their skill to aim the shot, have the physical strength to fire the weapon, and then shoot.

When gunpowder changed how projectile weapons were employed, the commander's intent, right target, right time, and aiming skill were still required, but the physical strength of firing was eliminated. When guided missiles augmented simple firearms, the commander's intent, right target, and right time were still required, but aiming skill was eliminated with the push of a button. Now the military is looking at autonomy handling the right time and right target components, with only the commander's intent required for execution. This could manifest as a pilot giving their uncrewed wingman a target and launch criteria and letting the wingman decide how to get there and when to fire, or autonomy providing options for a commander to choose from, like Singh's TALOS software did. While more of the tasks would be handled by autonomy, this is only a small step away from how military operations are already executed.

24. See, for example, "Killer Robots," Human Rights Watch, accessed 8 March 2025, https://www.hrw.org/; Samuel Gibbs, "Elon Musk Leads 116 Experts Calling for Outright Ban of Killer Robots," *The Guardian*, 20 August 2017, https://www.theguardian.com/; and " 'Politically Unacceptable, Morally Repugnant': UN Chief Calls for Global Ban on 'Killer Robots,' " *UN News*, 14 May 2025, https://news.un.org/.

Conclusion

The idea that autonomy is the key to Agile fielding of state-of-the-art airpower technology does not require belief in science fiction or acquiescence to killer robots. Instead, a structural change that removes many of the manual tasks from human hands, unlocking the higher order thinking of the supercomputer that is the human brain, may allow daily changes to warfighting systems to be utilized by fast-thinking warfighters. Companies like SpaceX have shown how Agile development methodologies can be applied to physical products, and Amazon has shown how merging autonomy and data can make continually changing operations effective.

While fighter aircraft development has historically taken a much slower approach, there are ways to shift development to more incremental releases and optimize operations with mixed fleets. In a war tomorrow many fighter pilots would be flying with technology that is more than 20 years old. Changing that paradigm is an immediate necessity so the Major Singhs of the future can keep the United States safe.