Journal of Contemporary Rhetoric, Vol 15., No. 3, 2026, pp. 31-75.

Technical Ekphrasis and Blackboxing in Congressional Deliberation of Boeing's 737 MAX

Christopher Lee Adamczyk[1]

In a world accented by complex, privately developed technologies, rhetoricians should seek to understand rhetorical strategies involved in democratic, public regulation of technology. In this essay, I draw upon technical ekphrasis, a rhetorical practice recovered by Courtney Roby, as a lens to view rhetorical license in governmental inquiries centered on high technologies and examine how this rhetorical license affords blackboxing as a rhetorical strategy. To flesh out technical ekphrasis and blackboxing in regulatory settings, I look to the congressional hearing titled "The Boeing 737 MAX: Examining the Design, Development, and Marketing of the Aircraft." I argue that regulators and industry representatives used technical ekphrasis in a dialectic of visibility/invisibility that created preferred images of Boeing's 737 MAX airplane, its Maneuvering Characteristics Augmentation System (MCAS), and the Boeing Corporation. On the one hand, Congressional regulators employed technical ekphrasis as a rhetorical strategy that showed technical flaws of the MAX. On the other hand, Boeing's representatives used technical ekphrasis as a rhetorical strategy that subsumed those flaws within larger organizational depictions. I conclude by suggesting the value of recovering technical ekphrasis as a tool for deliberation about technology.

Keywords: Technical Ekphrasis, Blackboxing Regulatory Rhetoric, Congress, Boeing, 737 MAX

On October 29, 2018, Lion Air 610 plummeted into the Java Sea shortly after takeoff, killing all 189 people onboard. The incident was the "first major accident involving the Boeing 737 MAX—an updated version of the 737."[2] Five months later, on March 10, 2019, Ethiopian

1. Christopher Lee Adamczyk (PhD, Rensselaer Polytechnic Institute) is an Assistant Professor of Communication and Rhetoric at the State University of New York at Farmingdale. His work centers on public discourses about science, technology, and infrastructure—whether they manifest as Congressional hearings, heritage sites, science fiction, social media posts, theatre, or otherwise. His work has been published in *Review of Communication*, *Javnost*, *Environmental Communication*, *POROI*, *Philosophy and Literature*, *Advances in the History of Rhetoric*, and various edited volumes.

2. "Lion Air crash: Boeing 737 plane crashes in sea off Jakarta," *BBC Online*, October 29, 2018, https://www.bbc.com/news/world-asia-46014463.

Airlines 302—another MAX—crashed just minutes after takeoff, leaving no survivors.[3] While both incidents became bellwethers for the state of the 737 MAX aircraft line, at the time, both aircraft had been in service for less than six months and belonged to what Boeing billed as a more efficient, safer airplane.[4] Given similarities between the crashes and the recentness of the MAX's release, Boeing grounded the MAX worldwide and came under regulatory scrutiny.

At the center of the Lion Air and Ethiopian Airlines crashes was the Maneuvering Characteristics Augmentation System (MCAS), a novel fly-by-wire algorithm hidden in the MAX's electronics. MCAS was added to the MAX to address problems arising from Boeing's decisions to install efficient but oversized engines to an airframe little-changed since the 1960s. The addition of large engines caused the MAX's nose to pitch up at critical moments during aircraft testing, resulting in loss of control. MCAS was intended to mitigate this problem by embedding a program that used data from "Angle of Attack" sensors to automatically pitch down the aircraft's nose. However, in Boeing's haste to deliver the MAX to market, they designed an overpowered MCAS that drew upon a single sensor, forcing pilots into a "tug-of-war" with their aircraft.[5] While previously known only to a handful of technical experts at Boeing, MCAS and the corporate decision-making behind it became the focus of inquiry. Because Boeing designed the MAX using taxpayer funding, the U.S. Congress conducted the most significant inquiry.[6] On July 8, 2024, Boeing accepted charges of fraud and conspiracy in a plea deal with the U.S. Department of Justice, finally admitting their responsibility in the deaths of 346 passengers and

3. "Ethiopian Airlines flight crashes minutes after takeoff, killing all 157 onboard," *CBS*, March 10, 2019, https://www.cbsnews.com/news/ethiopian-plane-crash-flight-et-302-crashes-minutes-after-takeoff-boeing-737-8-max-live-updates-2019-03-10/.
4. "Boeing Puts 200-Seat 737 MAX on the Market," *Air Transport World* 51, no. 10 (2014): 11.
5. Peter Robison, *Flying Blind: The 737 MAX Tragedy and the Fall of Boeing* (New York: Doubleday, 2021), 1-11.
6. Robison, *Flying* Blind, 230.

crew of Lion Air 610 and Ethiopian Airlines 302—a testament to the long and grueling process of governmental regulation in the United States.[7]

During the years of inquiry into Boeing's 737 MAX program, non-expert lawmakers were repeatedly called to reckon with a complex, heretofore unknown technology. This scenario is not uncommon.[8] Congressional inquiries often lack uniform and robust technical expertise among publicly-elected inquirers. Although governmental resources exist to aid lawmakers' comprehension of complex technical concepts—such as the National Transport and Safety Board (NTSB), Congressional Research Services, and expert staff on Congressional committees—these resources have been gutted during the last several decades. Impactful examples include the defunding of the Office of Technology Assessment in 1995 and the 45% reduction of staffing in the House Science, Space, and Technology Committee between 1994-2016.[9] Compounding this issue in aviation is that many regulatory agencies, like the NTSB, have no legal authority to enforce their recommendations, meaning they must persuade lawmakers to engage in regulatory action—a scenario that causes friction with lawmakers' other priorities.[10] Moreover, regulatory agencies that *do* have legal authority to enforce regulations, like the Federal Aviation Administration (FAA), have transferred the obligation to the very organizations they regulate, like Boeing, further eroding their knowledge about regulation.[11] The resulting scenario is one in

7. Office of Public Affairs U.S. Department of Justice, "Boeing Charged with 737 Max Fraud Conspiracy and Agrees to Pay over $2.5 Billion," January 7, 2021, https://www.justice.gov/opa/pr/boeing-charged-737-max-fraud-conspiracy-and-agrees-pay-over-25-billion.
8. Bruce A. Bimber, *Politics of Expertise in Congress: The Rise and Fall of the Office of Technology Assessment* (Albany: State University of New York Press, 1996), 1-7.
9. Zack Graves and Daniel Schuman, "Science, Technology, and Democracy: Building a Modern Congressional Technology Assessment Office" (Cambridge, MA: ASH Center for Democratic Governance and Innovation, 2020), 8-11.
10. Deobrah Stone, *Policy Paradox: The Art of Political Decision Making* (New York: Norton, 2002), 298.
11. Fed Niedner, "Niedner: Boeing self-policing failure shows worth of regulations," *Chicago Tribune*, March 28, 2019. https://www.chicagotribune.com/2019/03/28/niedner-boeing-self-policing-failure-shows-worth-of-regulations/

which corporate representatives of the aviation industry, whose interests generally place the health of the corporation first, hold a rhetorical advantage over publicly elected lawmakers in both their comprehension of technical subjects, like MCAS, and their ability to leverage that knowledge to achieve their goals.

Because legislative deliberation about novel technical issues in the aviation industry is often the pivot upon which regulatory action rests, a knowledge gap between lawmakers-as-regulators and regulated organizations is a unique challenge in contemporary legal and regulatory rhetoric. Disparities between lawmakers' and aviation industry officials' technical knowledge, as well as the aviation industry's prerogative to depict novel technical developments as allowed by regulations, create a situation in which deliberation about technical issues involves "considerable rhetorical license."[12] The complexity of contemporary aviation technologies warrants further rhetorical craftsmanship. Modern jetliners like Boeing's 737 MAX are not singular systems that are easily understood. They are rather multi-layered technologies with abstract, embedded complexities. On a modern commercial aircraft, digital computer software like MCAS may be embedded within more extensive computer programs, which are then nested within various computer hardware, all of which comprise the flight deck, a single component of the overall system. Technical systems themselves are further embedded within highly complex organizational structures.[13] Such technical and organizational complexity in the modern aviation industry affords corporate communicators the ability to spotlight, obscure, or normalize those complexities in self-serving ways, using technically simple language.

12. Dorothy Nelkin, "The Political Impact of Technical Expertise," *Social Studies of Science* 5, no. 1 (1975): 44-45.

Despite Boeing addressing issues with MCAS after Lion Air 610 and Ethiopian Airlines 302 and the recertification of the MAX during 2023, further technical and organizational issues with variants of the MAX program emerged after 2019. Most recently, in 2024, the uncontrolled decompression of Alaska Airlines Flight 1282 because of a faulty door plug has drawn attention to numerous manufacturing and supply chain issues.[14] Thus, Boeing repeatedly has been called to publicly defend its practices and explain how the MAX's components function and why decisions regarding them have been made. Because they weigh greatly upon public trust in the aviation industry and provide insight into how technoscientific corporations navigate the tricky terrain between capitalism and public well-being, scholars of rhetoric would be remiss to overlook rhetorical strategies employed by Boeing and inquiring lawmakers in such moments of public regulation.

In this article, I look to the 2019 U.S. House of Representatives hearing titled "The Boeing 737 MAX: Examining the Design, Development, and Marketing of the Aircraft" to investigate how Boeing officials (led by then-CEO Dennis Muilenburg and then-Chief Engineer John Hamilton) and U.S. Representatives (led by Rep. Peter DeFazio) used rhetorical license while deliberating the opacities of MCAS, the 737 MAX, and the Boeing Corporation. As the first full-committee inquiry about the MAX in the wake of the Lion Air and Ethiopian Airlines incidents, this marked a watershed moment in congressional investigation when substantive debate opened and senior Boeing officials directly responded to lawmakers' inquiries. The hearing also marked the first regulatory incident for the MAX in what has now become many

13. Braden R. Allenby and Daniel Sarewitz, *The Techno-Human Condition* (Cambridge, MA: The MIT Press, 2011), 93-94
14. Alisha Ebrahimji, "This Alaska Airlines Boeing lost its door plug in flight. The impact ripped headrests off seats and a shirt off a passenger," *CNN*, last modified January 8, 2024, https://www.cnn.com/2024/01/08/us/what-happened-alaska-airlines-flight-1282/index.html.

incidents between 2019-2024. Importantly, the tone, timbre, and rhetorical strategies used within this hearing are representative of a broader issue within contemporary rhetoric about regulation and legal oversight.

Key concepts to my analysis are *blackboxing*, the process through which the inner workings of a technology becomes opaque, and *technical ekphrasis*, a rhetorical technique that makes complex technical objects visually understandable. I argue that, during the inquiry, lawmakers and industry representatives clashed over blackboxing of the 737 MAX using technical ekphrasis in a dialectic of visibility/invisibility that crafts preferred images of MCAS, the MAX, and Boeing. On the one hand, Rep. DeFazio and other representatives employed technical ekphrasis as a rhetorical strategy that made visible problematic aspects of the MAX. On the other hand, Boeing's representatives used technical ekphrasis as a rhetorical strategy that subsumed those aspects within larger organizational depictions. Ultimately, while lawmakers' ekphrases drew attention to flaws of the MAX's design, Boeing's ekphrases refocused attention on broad, corporate virtues—a rhetorical strategy that encouraged blackboxing of choice aspects of the MAX.

Blackboxing and Technical Ekphrasis in Rhetorical Practice

The modern era gives rise to pressing concerns about the complexity of technology, public understanding of it, and our ability to communicate effectively about it. The stakes of these concerns should not be underestimated, as the more complex a technology is, the more difficult it is for non-experts to comprehend and communicate about it, thereby making public oversight of technocratic corporations difficult. The aviation industry is not exempt from such concerns. Not only do passengers depend upon trustworthy aircraft design, but also the stability of economic systems based upon reliable air travel. Therefore, it is vital to investigate rhetoric at

the heart of discourse about aviation in public settings—especially in moments of regulatory importance. To that end, I contend two rhetorical phenomena are central to how complex technologies in the aviation industry become more or less opaque to experts and non-experts alike: blackboxing and technical ekphrasis.

Blackbox(ing)

Although a wide-ranging term, the notion of a black box is generally applied in situations in which the internal complexity of some given object or phenomena has become hidden to those who interact with it. The concept emerged from cybernetics during the mid-twentieth century and was codified by Ross Ashby, who saw a black box as related to human ability to control electronics without fundamentally understanding them.[15] Although Ashby's work on black boxes in cybernetics is highly technical, its relevance as a method for understanding how humans interact with and communicate about technology quickly became apparent in academic circles. During the mid-1980s, Social Construction of Technology (SCOT) theorists expanded upon the cybernetic understanding of a black box, employing it to consider how various stakeholders contributed to the design and use of any given technology and as a method of discussing obscurities that emerged when complex technologies were adopted by non-expert users.[16] For SCOT theorists, and cyberneticists to a certain degree, black boxes were challenges to open and understand. By peering inside them, we could better understand how a given technology worked and the politics designed into it.

15. W. Ross Ashby, *An Introduction to Cybernetics* (London: Chapman & Hall, 1957), 86.
16. Trevor J. Pinch and Wiebe E. Bijker, "The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch (Cambridge, MA: The MIT Press, 1987), 18-50.

Building upon expanded notions of a black box, Bruno Latour envisions *blackboxing* as the *process* through which the workings of discreet technologies become unknown to users. Here, blackboxing explains how users understand technologies in terms of utilization instead of operation, such as how most passengers comprehend an airplane as a mode of transportation and not the technical components that make it fly. Latour argues that highly effective technologies are "made invisible" by their success insofar that users care only about "inputs and outputs" and that the technology runs efficiently.[17] Thus, critical inquiry into technologies is rare so long as they do the job they were designed for, which leads them to be taken for granted. The process of blackboxing can lead to public ignorance about the technical and organizational details that make highly complex technologies possible. If a technology works, we are comfortable leaving knowledge of *how* it works within the proverbial black box, instead focusing on what a technology enables us to accomplish.

Blackboxing is a profoundly rhetorical process with synecdochic characteristics, whereby accepting a particular viewpoint on any given technology requires certain aspects of that technology stand in for and characterize the whole. Importantly, the development of technical objects and systems necessarily involves diverse social groups concerned with use and meaning, whereby a given technology is filtered through layers of competing discourse in order to be understood.[18] This means that, although there certainly can be personal dimensions of attachment to a given technology, most individuals' understandings stem from interaction with outside stakeholders' discourses that have a vested interest in what the public understands. More

17. Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge: Harvard University Press, 1999), 304.
18. Trevor J. Pinch and Wiebe E Bijker, "The Social Construction of Facts and Artifacts or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other," in *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*, eds. Wiebe E. Bijke, Thomas P. Hughes, and Trevor Pinch (Cambridge: The MIT Press, 1987), 30.

theoretically, complex technologies, like jet airplanes, tend to occupy what Lynch and Kinsella call "liminal zones," or the spaces between different types of knowledge and their discourses, like the spaces between organizational, cultural, and technical ways of knowing.[19] When interpreting a complex technology, granting more authority to one domain of knowledge or stakeholder over others can lead to distinct blind spots, which, over time, drives the process of blackboxing. For example, involvement with technical aviation engineering discourses gives rise to a more technical understanding of a jetliner, whereas a more commonplace involvement with airline advertising about that jetliner might cause a more utilitarian understanding that blackboxes technical nuances. In each case, our conception of a jetliner is necessarily a combination of what we understand about it contrasted with what we do not understand, and the broad discourses we interact with can either hinder or fuel the blackboxing process.

Influential stakeholders have numerous opportunities to draw attention to and from aspects of development, design, use, and consequences, adding a more explicit layer of rhetorical activity. In this vein, Pasquale describes how technocratic stakeholders often resist spreading knowledge about proprietary technologies that are effectively blackboxed by hindering knowledge access, limiting ability to share knowledge, and deliberately obfuscating information.[20] While all approaches are innately rhetorical, obfuscation is of special interest because it works as a red herring, burying relevant knowledge by forcing public attention elsewhere. The goal of obfuscation is lack of clarity, what Pasquale argues is best understood as "remediable incomprehensibility."[21] Shifts of attention, thus, are not harmless and influence how

19. John Lynch and William J. Kinsella, "The Rhetoric of Technology as a Rhetorical Technology," *Poroi* 9, no. 1 (2013): 2.
20. Frank Pasquale, *The Black Box Society: The Secret Algorithms that Control Money and Information* (Cambridge: Harvard University Press, 2015), 6-7.
21. Pasquale, *The Black Box Society*, 7.

others understand and interpret a technology and the ideological frameworks implied by those interpretations.[22] Because blackboxing removes attention from highly technical aspects of a given technology, rhetorical interventions like obfuscation can influence how that technology supports the interests of influential stakeholders. At their best, such rhetorical interventions can allow public interest groups to spotlight problematic designs. At their worst, corporate interests might use them to obscure problematic designs in a way that ultimately leads to intentional blackboxing. In either case, technology development "from the stage of 'potential' technology" to "settled, blackboxed technology" involves layers of rhetorical practice.[23]

Technical Ekphrasis

While forms of rhetoric that accumulate over technical objects to render them blackboxed are multifaceted, I offer *technical ekphrasis* as a rhetorical practice of central importance. Identified by Courtney Roby, technical ekphrasis is an ancient rhetorical technique referring to written or spoken depictions of non-present or difficult to conceptualize technical objects or concepts.[24] Technical ekphrasis itself is a variant of ekphrasis, which broadly refers to deliberate rhetorical acts that use words to visually reveal unseen objects or locations. As a form of description, ekphrasis "has no formal rules and no stable technical definition" and refers to any deliberate effort that calls an audience to visualize something in the world through a rhetor's lens.[25] The ability of ekphrasis to conjure mental images stems from properties of rhetoric variously defined in ancient sources like Aristotle's *Rhetoric*, Cicero's *De Oratore*, the *Rhetorica*

22. William R. Brown, "Attention and the Rhetoric of Social Intervention," *Quarterly Journal of Speech* 68, no. 1 (1982): 2, https://doi.org/10.1080/00335638209383588.
23. John Lynch and William J. Kinsella, "The Rhetoric of Technology as a Rhetorical Technology," *Poroi* 9, no. 1 (2013): 2–6, https://doi:10.13008/2151-2957.1152.
24. Courtney Roby, *Technical Ekphrasis in Greek and Roman Science and Literature: The Written Machine Between Alexandria and Rome* (Cambridge: Cambridge University Press, 2016), 1-5.
25. Claire Preston, "Ekphrasis: Painting in Words," in *Renaissance Figures of Speech*, edited by Sylvia Adamson, Gavin Alexander, and Katrin Ettenhuber (Cambridge: Cambridge University Press, 2007), 115–30.

ad Herennium, and in the exercises of the *Progymnasmata*—for example, *enargeia* (vividness), *sapheneia* (clarity), and *phantasia* (mental image), which appeal "to the immediacy of an imagined presence."[26] Thus, ekphrasis has been described variously as a rhetor's ability "to try to make an audience imagine a scene," an ability to invite audiences "to view the thing being set forth," the presence of "elaborate, digressive descriptions embedded within rhetorical discourse," and as detailed accounts that bring "before one's eyes what is to be shown." [27]

Roby argues that early conceptions of ekphrasis had a special relationship with technical and scientific topics, offering *technical ekphrasis* as a subgenre of the rhetorical technique. According to Roby, technical ekphrasis allowed rhetors to communicate complex technical knowledge richly in the absence of the more rigorous methods of communication available today. Because of technological objects' "embodiment of knowledge that can be decoded," ekphrasis offered an intuitive method to "perform that decoding" that relied on extant and robust modes of communication. [28] Technical ekphrases are unique within ekphrastic practice, as complex technical artifacts present a "set of descriptive strategies and challenges" that rhetors must navigate.[29] Because technical, mechanical, and scientific phenomena are abstract, composers of technical ekphrases must reckon with various elements when describing their chosen topic. Accordingly, technical ekphrasis is a diverse genre with individual ekphrases possessing distinct timbres. Depending on the goal of an ekphrasis, some details are left out while others are centered. For example, ekphrases about a technical object might highlight its

26. Froma I. Zeitlin, "FIGURE: EKPHRASIS," in *Greece & Rome* 60, no. 1 (2013): 17; D'Angelo, Frank J., "The Rhetoric of Ekphrasis," *JAC* 18, no. 3 (1998): 440.
27. Webb, *Ekphrasis, Imagination, and Persuasion*, 3; Ray Nadeau, "The Progymnasmata of Aphthonius in Translation," *Speech Monographs* 19, no. 4 (1952): 279; Mack Smith, *Literary Realism and the Ekphrastic Tradition* (University Park: Pennsylvania State University Press, 1995): 11; Charles Sears Baldwin, *Medieval Rhetoric and Poetic* (Gloucester: Peter Smith, 1959): 66.
28. Roby, *Technical Ekphrasis*, 3.
29. Roby, *Technical Ekphrasis*, 45.

intended or popular use, providing an image of how it is woven into a given society. Alternatively, ekphrases might instead describe how an object is constructed, like how modern blueprints focus on composition while only suggesting use. Furthermore, ekphrases might highlight the appearance of a technical object, excluding technical information in favor of developing a sense of sublimity. In all cases, rhetors decode technical objects in a manner befitting the telos of their composition.

Technical ekphrasis' breadth during antiquity is apparent in the extant corpus of ekphrastic texts. Roby provides several examples, of which I recount a handful. Using mathematical details and descriptions of construction materials, Hero's *Cheiroballistra* straightforwardly describes a machine in a manner that helps readers reconstruct it without physically seeing it.[30] Alternatively, *De Rebus Bellicis*, composed by an anonymous Roman author, vividly describes war machines but does not provide concrete information about how to build those machines. By juxtaposing war machines with cultural characterizations of the late Roman empire, the author instead uses technical ekphrasis to suggest "innovative military and economic technologies" as a solution to societal ills. Unlike *Cheiroballistra*, a construction aid, *De Rebus Bellicis* illustrates technical ekphrasis' utility as commentary on societal relationships with technology.[31] Still further, Apollodorus' *Poliorcetica* goes so far as to include crude cutaway views of mechanical inner workings that mean little without accompanying text, demonstrating that diagrammatic supplementation was used in technical ekphrasis from the beginning.[32] In *Poliorcetica*, the diagram not only aids the reproduction of a mechanical object but also provides evidence of its feasibility. Its presence suggests ekphrasis' ability to address

30. Roby, *Technical Ekphrasis*, 76-78.
31. Roby, *Technical Ekphrasis*, 92-93.
32. Roby, *Technical Ekphrasis*, 157.

audiences' reservations, whether they disbelieve in the existence of a technical object or are concerned about the practicability of reproducing it.[33] As these three examples demonstrate, technical ekphrasis was a diverse practice whose form was tied to its context and the goals of rhetors. It offers a practical application of ekphrastic rhetoric that is more pragmatic and utilitarian than its modern association with poetics and art.

In modern settings, technical ekphrasis is similarly practical, inhabiting any rhetorical situation potentially as a singular account, though more commonly as discrete descriptors that suggest a distinct image when considered holistically. A contemporary example of the later related to aviation can be found in Mark Vanhoenacke's popular short commentary "The Parlance of Pilots."[34] In this commentary, an identifiable technical ekphrasis of a Boeing 747 cockpit emerges though scattered descriptions embedded within a larger discussion of communication in aviation. Thus, in "the pointy end" of the jetliner, pilots in the cockpit communicate via "expensive-looking noise-cancelling headsets" and attend to the various ways that the jetliner itself communicates problems to them. Pilots' interaction with the plane takes place in English, as "everything that's written in the cockpit is in English, or English-derived acronyms," and the computerized voice of the plane "comes in a female, English-accented voice" that sounds when an "altitude or height at which we must either have sight of the runway environment or break off the approach" is imminent. Moreover, pilots intuit potential issues through checklists, or "sheet[s] of laminated paper or, increasingly, a display on a computer screen." Vanhoenacke describes communication between pilots in the cockpit as taking place in

33. Roby, *Technical Ekphrasis*, 152.
34. Mark Vanhoenacke, "The Parlance of Pilots: High above London, Tokyo and Cairo, the Language of the Cockpit is Technical, Obscure, Geeky – and Irresistibly Romantic," *Aeon*, published June 9, 2016, https://aeon.co/essays/the-language-of-the-cockpit-is-technical-obscure-and-irresistibly-romantic.

"Aeroese," a language itself bound to the technical realities of aviation via "its small vocabulary" and reliance on utilitarian "callsigns and numbers." Yet, somehow, Aeroese manages "in its technical, obscuring precision, to capture the high romance of flight." Emerging from language woven into the larger body of Vanhoenacke's writing, these discrete descriptions come together to present technical ekphrasis to an audience that likely has never set foot in an active cockpit, helping them imagine the scene through the author's eyes and ears. The importance of this descriptive language is amplified by the fact that Vanhoenacke includes no supporting images of the cockpit, meaning the reader's mental image of the cockpit is primarily evoked by the language itself. The description that emerges, of course, is rudimentary and unpoetic. Even so, it still manages to evoke a mental image that is reflective of Vanhoenacke's romantic attitude toward cockpits and their communication technologies.

Drawing upon ekphrastic practice broadly, technical ekphrasis inhabits rhetorical situations in which communication about complex technical phenomena takes place—especially if that communication refers to objects not easily made physically present or discourse between experts and non-experts. The latter point is important to technical ekphrasis' relevance to modern communication, as considerable advancement has occurred in technologies of vision. No longer must rhetors describe technological artifacts only orally, textually, or with crude illustrations. Now, photographs, videos, 3D modeling, precise blueprints, and rapid transportation enable the mass movement of people and goods, so they do not need to be described from afar. However, as technologies of vision have developed, so have modern technical systems become increasingly complex. Though today a simple mechanical device can be easily conceptualized in photos or diagrams, the larger devices they assemble—like jetliners—are still difficult to conceptualize in a functional sense. To look at a jetliner is not to comprehend the individual systems that

comprise it, and even schematics can become a tangle of hyper-specific descriptions without clear relationships—the average Boeing aircraft is composed of approximately 6 million individual components, after all. Moreover, digital aircraft components contain millions of lines of code and algorithmic processes that are more difficult to accurately depict than the components themselves (which takes center stage in the drama about MCAS and the Boeing 737 MAX). This does not even consider the vast sociotechnical networks in which aircraft production and operation occur. Thus, technical ekphrasis is a potent technique for making abstract technological phenomena understandable, even as technologies of vision make less-complex phenomena understandable in nearly one-to-one terms.

Given increasing complexity in what are ostensibly singular technical objects, it is unsurprising that vivid and visually-oriented descriptions—and thus technical ekphrasis—remain highly desirable in technology-bound contexts. Latour argues there is a unique advantage in engineers' and scientists' ability to demonstrate their ideas vividly insofar that clear discussions, drawings, and other evidence of abstract concepts instill more confidence than mere assertion.[35] Pacey notes that wholly verbal discussions about modern mechanical and scientific topics are rife with visual imagery, suggesting such language is the foundation upon which many novel technologies are developed and provides a sense of realism when making informed decisions.[36] Coeckelbergh contends that metaphors of modern technology provide a "holistic, active, and process-oriented view of human-technology relations" that transcends information provided by rigidly realistic depictions.[37] The ability to call an audience to imagine a technology through the

35. Bruno Latour, "Visualisation and Cognition: Drawing Things Together," in *Knowledge and Society: Studies in the Sociology of Culture Past and Present*, eds. Elizabeth Long, Henrika Kuklick (Amsterdam: Elsevier, 1986), 14.
36. Arnold Pacey, *Meaning in Technology* (Cambridge: The MIT Press, 1999), 39-57.
37. Mark Coeckelbergh, *Moved By Machines: Performance Metaphors and the Philosophy of Technology* (London: Routledge, 2020), 153.

senses of a rhetor is still vitally important, even as technologies of vision become more advanced.

I argue the phenomena of blackboxing and technical ekphrasis are intimately linked insofar as technical ekphrasis is a rhetorical activity through which blackboxing can occur. Like a terministic screen, technical ekphrasis creates distinct depictions of technical objects and necessarily engages in a dialectic of visibility and invisibility that renders aspects of those technical objects knowable while making others opaque. This process is not limited to the physical qualities of technical objects but also extends to bodies of knowledge associated with those objects. Thus, like blackboxing, technical ekphrasis, too, resides in liminal spaces between relevant forms of knowledge, as it draws upon and privileges certain ways of knowing technology while making others effectively invisible.

While technical ekphrasis enables blackboxing as a natural outgrowth of how it highlights aspects of a technology relevant to a rhetor's purpose, we must also recognize that it affords intentional acts of what Pasquale terms obfuscation and thus has significant persuasive potential. In fact, ekphrases broadly have long been understood as inherently convincing because of their ability to praise and blame their subject.[38] As Clark argues, honing ekphrastic ability through the Progymnasmata prepared rhetors to "make their mature public addresses more vivid" and "hence more persuasive."[39] Relatedly, Webb and Weller argue using the visual imagination of a listener to involve them in speech "can persuade more effectively than through logical argument alone."[40] By extension, technical ekphrasis is also a persuasive tool enabling rhetors to

38. Frank J. D'Angelo, "The Rhetoric of Ekphrasis," *JAC* 18, no. 3 (1998): 440.
39. Donald Lemon Clark, *Rhetoric in Greco-Roman Education* (New York: Columbia University Press, 1957), 203.
40. Ruth Hellen Webb and Philip Wellerm, "Enargeia," in *The New Princeton Encyclopedia of Poetry and Poetics*, eds. Alex Preminger, T. V. F. Brogan, Frank J. Warnke, O. B. Hardison Jr., and Earl Miner (Princeton: Princeton University Press, 1992), 332.

illustrate enticing images of technical objects, whether through honest depiction or by obscuring less savory characteristics. In this vein, technical ekphrases offer a variety of persuasive capabilities in technical contexts. For example, they may convince audiences to accept the feasibility of a technical enterprise, to suggest how a person would interact with a technical object, to invite audiences to imagine themselves interacting with a technological phenomenon, or even to link innovation to already established technological practices.[41] Such affordances are especially relevant when we consider situations in which a rhetor may have a vested interest in an audience perceiving a technology in a given way—be it financial, political, or otherwise. Intentional blackboxing may even seek to make invisible aspects of a technology that would cause the public or regulatory bodies to reject it—a tactic that will become relevant to Boeing's defense of the 737 MAX—thus highlighting the persuasive capabilities of technical ekphrasis.

Technical Ekphrasis, Blackboxing, and Congressional Investigation of the 737 MAX

In the remainder of this article, I analyze the Congressional hearing titled "The Boeing 737 MAX: Examining the Design, Development, and Marketing of the Aircraft" (hereafter referred to as TBM), using it to demonstrate the relationship between blackboxing and technical ekphrasis in legal deliberation about the aviation industry. TBM is an apt venue to explore how technical ekphrasis enables stakeholders in the aviation industry to engage in dialogues of visibility/invisibility and, thus, resist or encourage blackboxing. The Lion Air 610 and Ethiopian Airlines 302 incidents made visible multiple dimensions of the aviation industry that stakeholders sought to obfuscate. This is demonstrated by showing how language used by Boeing officials throughout the hearing is ekphrastically charged, drawing attention away from

41. Roby, *Technical Ekphrasis*, 165, 201, 214.

the MAX's design specifics and associating it with a vivid, genial image of Boeing as a benevolent corporation. Furthermore, lawmakers' efforts to render the nuances of Boeing, its decision-making, and the design of its aircraft knowable demonstrate how technical ekphrasis can also be used to fix depictions of the aviation industry and its technologies into forms more friendly to public regulation. Together, these discourses respond to the need to characterize the global and complex aviation industry, showing how experts and non-experts use technical ekphrasis as a vital tool for visualizing the industry, how it serves the public, how it is legally regulated, and how the technologies used therein are understood.

TBM is a worthy setting for investigation because of its regulatory nature. Government regulation is a complex process in which governmental bodies impose guidance upon organizations under their jurisdiction via public agencies and legal precedence.[42] Regulatory hearings usually center on allegations of misconduct by private organizations like Boeing, meaning their actions conflict with the public good—in this case, safe air travel.[43] Some of regulators' most important work relates to emergent technologies like MCAS, which arrive rapidly and challenge existing legal frameworks. Tragedies like those that occurred because of MCAS cause regulatory structures to be in a constant state of flux, thus inviting vigorous debate and very slow regulatory change.[44] In moments of regulatory failure and resultant tragedy, stakeholders' ability to craft vivid, ekphrastic depictions of what is under scrutiny directly influences future legal frameworks via their ability to render visible objects of regulation while

42. Rob Baldwin, Martin Cave, and Martin Lodge, *Understanding Regulation: Theory Strategy, and Practice* (Oxford: Oxford University Press, 2013), 1-2.
43. Cinzia Giglioni, *Linguistic and Rhetorical Perspectives on Congressional Hearings* (Berlin: Frank & Timme, 2020), 25.
44. Andrew Murray, "Conceptualizing the Post-Regulatory (Cyber)state," in *Regulating Technologies: Legal Futures, Regulatory Frames and Technological Fixes*, eds. Robert Brownsword and Karen Yeung (Oxford: Bloomsbury, 2008), 289.

hiding others.[45] This reality is doubly true for recommendations produced by agencies without authority to compel compliance, like the NTSB, who rely on the persuasive power of their recommendations and legal representatives who draw upon them.[46] Because new and emerging technologies like the MAX are complex machines embedded within abstract, far-reaching contexts, technical ekphrasis is vital for constructing and implementing their regulation.

Congressional investigation of the MAX began on May 15, 2019, in the House Committee on Transportation and Infrastructure (T&I Committee), which oversees the Department of Transportation, FEMA, the Army Corps of Engineers, the FAA, and portions of the NTSB. The T&I Committee draws upon resources produced by its attendant organizations to legislate on issues related to transportation and infrastructure. Because the timbre of debate in congressional committees impacts subsequent deliberation and influences how laws are written, rhetoric in settings like the T&I Committee is significant to how industries are organized, how they function, and how they are depicted.[47] Carrying out this charge, the T&I Committee's investigation of the MAX lasted months and comprised five hearings—eventually resulting in the *Aircraft Certification, Safety, and Accountability Act*.[48] TBM was the first full committee hearing in the T&I Committee's investigation and a watershed moment because it called corporate leaders from Boeing to testify. These witnesses included Boeing's then-President and

45. Charles R. Bantz, "Public Arguing in the Regulation of Health and Safety," *Western Journal of Speech Communication* 45, no. 1 (1981): 73, https://doi.org/10.1080/10570318109374030.
46. David Coogan, "Public Rhetoric and Public Safety at the Chicago Transit Authority: Three Approaches to Accident Analysis," *Journal of Business and Technical Communication* 16, no. 3 (2016): 277-278, https://doi.org/10.1177/10506519020160030.
47. Lisa M. Gring-Pemble, "'Are we going to now govern by anecdote?': Rhetorical constructions of welfare recipients in congressional hearings, 1992–1996," *Quarterly Journal of Speech* 87, no. 1 (2001): 342.
48. U.S. Congress, House, Committee on Commerce, Science, and Transportation, *Aircraft Certification Reform and Accountability Act*, 116th Congress, H.R. 8408. https://www.congress.gov/bill/116th-congress/house-bill/8408

CEO Dennis Muilenburg and then-Chief Engineer John Hamilton. Muilenburg and Hamilton were asked to "bring clarity" to "murky" issues uncovered by regulators regarding the MAX.[49]

In the proceeding sections, I demonstrate how TBM's competing participants utilize technically ekphrastic language to craft depictions that make visible or invisible aspects of the MAX and Boeing, thus demonstrating how technical ekphrasis can be used as a rhetorical strategy that both resists and encourages blackboxing. I examine ekphrastic language used by members of Congress and Boeing representatives that crafts rhetorically potent images of MCAS's relationship with the MAX's pilot-machine interface and Boeing's organizational ethos. Specifically, I focus on language used by Rep. DeFazio, Muilenburg, and Hamilton. As T&I Committee Chair, Boeing CEO, and Boeing Chief Engineer respectively, this trio exercised great influence over how the technical complexities of the 737 MAX and Boeing are rhetorically depicted. I also support my analysis with ekphrastic language used by other members of Congress as relevant, identifying them as they arise. Importantly, the ekphrasis I identify is not present as a single rhetorical moment or poetically crafted as ekphrases are often assumed to be. It rather emerges piecemeal from TBM's pragmatic language of deliberation and other rhetorical phenomena therein. It emerges in depictions that lawmakers use to interrogate and that Boeing uses to obfuscate, demonstrating how technical ekphrasis is a subtle, yet ever-present, feature of contemporary discourse about technology in the aviation industry and elsewhere.

49. The House Committee on Transportation and Infrastructure, "Chairs DeFazio, Larsen Statements from Hearing titled, 'The Boeing 737 MAX: Examining the Design, Development, and Marketing of the Aircraft,'" October 30, 2019, https://transportation.house.gov/news/press-releases/chairs-defazio-larsen-statements-from-hearing-titled-the-boeing-737-max-examining-the-design-development-and-marketing-of-the-aircraft_--.

Depicting Boeing

Many technical ekphrases set the scene by focusing on the physical or social contexts that technologies are embedded within. [50] This tendency also is present in TBM's investigation of MCAS through lawmakers' and Boeing representatives' characterization of the Boeing Corporation. Emerging from the inquiry's language are two ekphrastic descriptions of Boeing and its organizational ethos. The first, favored by Boeing's representatives, depicts the company as dedicated to engineering excellence. The second, favored by most lawmakers, depicts the company as motivated by profit. Together, these depictions set a stage that becomes crucial to how MCAS is reasonably depicted elsewhere in the hearing and contribute to which aspects of MCAS and the MAX are deemed as required to be visible and which are not. Moreover, characterizations of Boeing that emerge from the hearing serve as terministic screens guiding how Boeing's design decisions regarding MCAS are understood and determine whether the company's efforts to rhetorically blackbox MCAS are perceived as reasonable or unreasonable. I begin by discussing the T&I Committee's depiction of Boeing. Then, I discuss Boeing's self-depiction.

Throughout TBM, members of the T&I Committee portray Boeing as a profit-driven corporation far removed from its roots as an engineering collective. However, congressional participants do not present this depiction of Boeing in univocal terms. Instead, it emerges piecemeal from TBM's lines of inquiry, within which similar descriptions resonate, even if the overall thrust of representatives' inquiries clash, demonstrating how ekphrastic depictions can emerge from collective, baseline experiences and bodies of knowledge. Because TBM was

50. Roby, *Technical Ekphrasis*, 14-17.

initiated by Congress, congressional depiction of Boeing justifies at least one impetus for inquiry that Boeing must ultimately accept or respond to.

Instances of Congress members' emergent descriptions of Boeing abound but are best represented in the remarks of Reps. DeFazio, Garcia, and Larsen, of which I provide examples. Rep. DeFazio—then chair of the T&I Committee—opens the hearing by suggesting Boeing was more concerned with "rapid expansion" against competitors, translating limited pilot training into "marketing incentives to sell," and actively "keeping everybody in the dark" about design changes to the 737 than it was with the ethics of the aviation industry.[51] He further suggests serious questions be asked about "why Boeing designed the MAX to rely on a single point of failure [MCAS]" instead of designing multiple redundancies.[52] DeFazio's opening description centers concerns about unchecked capitalism that have re-emerged en masse early in the 21st century, creating an image of Boeing in which profits, not engineering excellence, are the goal.[53] As Roby argues, most successful technical ekphrasis is intertwined with culturally bound knowledge and assumptions.[54] Other representatives' characterizations of Boeing resonate with DeFazio's characterization, demonstrating its contextual salience. For example, Rep. Garcia, through a series of questions directed at Muilenburg, suggests "financial forces" guided Boeing to make decisions that "contributed to the catastrophe."[55] Referencing a "$20 billion stock buyback program . . . 2 months after the Lion Air incident" and Muilenburg's earnings of "$95 million from 2015-2018," Garcia effectively uses numbers to further craft an emergent depiction

51. U.S. Congress, House of Representatives, Committee on Transportation and Infrastructure, *Boeing 737 Max: Examining the Design, Development, and Marketing of the Aircraft: Hearing before the Committee on Transportation and Infrastructure*, House of Representatives, 116th Congress, October 30, 2019, 4-5.
52. U.S. Congress, *Boeing 737 MAX*, 6.
53. Sven Beckert and Christine Desan, *American Capitalism: New Histories. Columbia Studies in the History of U.S. Capitalism* (New York: Columbia University Press, 2018).
54. Roby, *Technical Ekphrasis*, 8.
55. Roby, *Technical Ekphrasis*, 90.

of Boeing in which profits, rather than aircraft, are the main production.[56] Driving the point home, Garcia further references an internal Boeing survey that shows 40% of Boeing employees felt pressured to achieve productivity goals at the expense of safety.[57] Rep. Larsen adds detail to this unflattering, capitalistic image of Boeing by comparing the Lion Air and Ethiopian Airlines crashes with the Deepwater Horizon disaster, juxtaposing Boeing with British Petroleum's "inappropriate culture of focusing on the wrong objectives . . . [and] looking at stock prices" instead of the people a corporation impacts.[58] Although well-represented by the above examples, the depiction of Boeing as a profit-centered machine echoes throughout the hearing in most representatives' inquiries. Given public expectations of corporate social responsibility in addition to profit, it is unsurprising that public representatives' image of Boeing highlights the company's suspected profit-over-all ethos.[59]

As the foremost representative of Boeing, Muilenburg's depiction of the corporation attempts to undercut the T&I Committee's portrayal of corporate context. Muilenburg's depiction crafts a first persona for the corporation, or "the created personality put forth in the act of communicating."[60] This persona not only spotlights Boeing in a more favorable light but also underscores corporate personhood as a legal reality. Corporate self-description is vital to Boeing's strategy.[61] As witnesses' opening testimony plays a crucial role in predicting the contours of a defense strategy, Muilenburg's characterization of Boeing in his opening testimony is illustrative of their overall defense.[62] Here, Muilenburg's depiction of Boeing opens with

56. Roby, *Technical Ekphrasis*, 91.
57. Roby, *Technical Ekphrasis*, 91.
58. Roby, *Technical Ekphrasis*, 13.
59. Hyejoon Rim and Chuqing Dong, "Trust and Distrust in Society and Public Perception of CSR: A Cross-Cultural Study," *Social Responsibility Journal* 14, no. 1 (2018): 1-2.
60. Walker Gibson, *Persona: A Style Study for Readers and Writers* (New York: Random House, 1969).
61. Giglioni, *Congressional Hearings*, 30-33.
62. Giglioni, *Congressional Hearings*, 27-28.

heavy appeals to the company's reputation as an engineering firm that put engineering ethics ahead of profit during the mid-to-late 20th Century. [63] Muilenburg describes modern Boeing in terms that resonate with its past, thus attempting to invoke a similar present image. Hearkening the past, Muilenburg's opening testimony portrays Boeing's as dedicated to the rigors of safety, highlighting "100,000 engineering and test hours," "800 test flights," "simulator sessions with 545 participants from 99 customers and 41 global regulators," and a "reduced accident rate of "95% over the last 20 years."[64] Muilenburg's quantitative representation of Boeing's commitment to safety is supplemented by qualitative depictions of the company as "working closely with the FAA and other regulators," transparently providing "documentation" to regulators, and generally being committed to "safety," "quality," "integrity," and "utmost excellence."[65]

During the inquiry portion of the hearing, Muilenburg further depicts Boeing as possessing a "culture of engineering" within which employees are encouraged to "speak up" about engineering problems, thus creating a "culture of visibility on issues."[66] Later in the hearing, Muilenburg even appeals to his own persona as an Iowa farm boy who does not "run away from challenges" and "sticks to it . . . to help out teamwork through it . . . to get Boeing ready for the future."[67] By cultivating his persona, Muilenburg identifies himself with the values of perseverance and safety he ascribes to Boeing, thus suggesting he led the company in a similar manner. Kendall suggests that the construction of such personae "opens up the possibility that

63. Robinson, *Flying Blind*, 19-20.
64. U.S. Congress, *Boeing 737 MAX*, 16.
65. U.S. Congress, *Boeing 737 MAX*, 16-17.
66. U.S. Congress, *Boeing 737 MAX*, 39.
67. U.S. Congress, *Boeing 737 MAX*, 59.

particular forms of personae emerge to address and help to constitute particular communities."[68] Paired with his characterization of Boeing, Muilenburg's rhetoric about himself and his capacity as Boeing's CEO is geared toward creating an image of Boeing as a community dedicated to ethical safety over profit.

Although tangentially related to ekphrasis and blackboxing at first glance, interpreting these competing characterizations of Boeing as ekphrastic in nature is relevant in two ways. First, doing so underscores the stakes of organizational visualization to capitalist organizations like Boeing. The stakes here become more apparent when we allow that global corporations themselves are an organizational technology that exercise influence over and are influenced by legal precedent.[69] Depictions of Boeing that are intended to invoke an image of the company, its actions, and its goals writ large, resonate with blackboxing insofar as aspects of the company—like profit motive—are rendered visible or invisible, depending on which image is accepted. Essentially, interpreting organizational depictions as ekphrastic underscores how corporations that produce complex technologies can work to blackbox not only their products but also the corporation itself. Second, and most relevant to MCAS, interpreting depictions of Boeing in this manner highlight how ekphrastic language about context justifies and enables inquiry to take place. Although the focus of the hearing is MCAS, it is ultimately the characterization of Boeing as cutting corners for profit that provides the impetus for inquirers to focus on Boeing's more technologically nuanced products. By crafting a persona of a "responsible corporation," Boeing not only attempts to blackbox what takes place within its doors but also strives to foreclose upon

68. Brenden E. Kendall, "Personae and Natural Capitalism: Negotiating Politics and Constituencies in a Rhetoric of Sustainability," *Environmental Communication* 2, no. 1 (2008): 62, https://doi:10.1080/17524030801945583.
69. Christopher M. Bruner, *The Corporation as Technology: Re-Calibrating Corporate Governance for a Sustainable Future* (Oxford: Oxford University Press, 2022); Jacques Ellul, *The Technological Society* (Toronto: Vintage Books, 1964).

the need to dig deeply into MCAS and rather assigns blame to other, unrelated factors. As the forthcoming sections about depictions of MCAS and pilots' relationship with the MAX demonstrate, Boeing's strategy centers strongly upon depicting itself as a morally upstanding organization and claiming that outside factors influenced the Lion Air and Ethiopian Airlines crashes.

Depicting MCAS

Like emergent depictions of the Boeing Corporation, two competing images of MCAS emerge from TBM. Importantly, the image of Boeing, through which MCAS is investigated—either as guided by industry best practices or profit—provides a base upon which ekphrastic description of MCAS rests. The first description of MCAS, favored by regulation-minded lawmakers with a generally profit-centered view of Boeing, portrays the system as a hidden, radical technical change. The second, favored by Boeing officials who characterize the corporation as a praiseworthy engineering conglomerate, depicts MCAS as an essential but run-of-the-mill improvement to the 737. Both descriptions of MCAS in TBM are technical and geared toward describing MCAS's functionality within the MAX's avionics, providing a glimpse into a technology in the process of being blackboxed. Relevantly, such highly technical descriptions raise and answer questions related to context, like "the craftsman's tacit knowledge, rules of thumb for defining appropriate building materials and dimensions, assessment of individual machines" and "the material, hands-on aspects of the craft process."[70] Here, both descriptive approaches not only call audience members to assess MCAS as a system but also to weigh judgement upon the engineering practices that made it possible—justifying or

70. Roby, *Technical Ekphrasis,* 17.

undercutting extant depictions of Boeing. Thus, lawmakers and Boeing representatives alike are keenly concerned with the implications of ekphrastic description that emerge from descriptions of MCAS, vying to produce a dominate image. Fleshing out this dichotomy, I first examine emergent, ekphrastic language that depicts MCAS as a radical, unproven technology. Here, my primary focus is on language used by Rep. DeFazio with supporting instances from Reps. Steve Cohen and Greg Stanton. Second, I turn to descriptions that depict MCAS as run-of-the-mill, with a focus on language used by Muilenburg and Hamilton.

Characterizations of MCAS as flawed technology first appear in Rep. DeFazio's opening statement, setting the overall tone for the inquiry and further ensconcing Boeing as a defendant resisting public examination of a technology they created. Achieving criticism of MCAS using ekphrastic language, DeFazio paints an image of a MAX in flight with a faulty angle-of-attack (AoA) sensor feeding incorrect data to unproven MCAS technology. He characterizes MCAS as a "new and novel system" that is "repeatedly triggered" due to a "faulty or missing sensor" that forces pilots themselves to unknowingly become the "backup system" because of a lack of redundancy.[71] Because of its low safety factor, he further describes MCAS as "a radical system that could trigger catastrophic failure" in this relatively common situation. [72] Importantly, this depiction builds upon facts that emerged in the wake of the Lion Air and Ethiopian Airlines crashes that conclusively showed Boeing purposely removed references to MCAS from pilot training materials and regulatory documents, making it difficult to respond to crises involving the system.[73] Thus, when an issue arose with the system, pilots could not troubleshoot the problem, a

71. U.S. Congress, *Boeing 737 MAX*, 3.
72. U.S. Congress, *Boeing 737 MAX*, 3.
73. Jack Nicas, Natalie Kitroeff, David Gelles, and James Glanz, "Boeing Built Deadly Assumptions Into 737 Max, Blind to a Late Design Change," *The New York Times*, June 1, 2019. https://www.nytimes.com/2019/06/01/business/boeing-737-max-crash.html

reality made worse by MCAS only drawing data from a single AoA sensor. DeFazio's description crafts the image of a scenario in which these problems are growing.

DeFazio continues building this image of the MAX with MCAS in his questioning of Muilenburg and Hamilton, inviting Muilenburg to agree that MCAS was designed as an "autonomous system operating in the background" of the MAX's avionics.[74] When Muilenburg agrees, DeFazio displays an image (Figure 1) of an early design iteration of the MAX's flight deck. An indicator light in the image clearly denotes MCAS's existence.

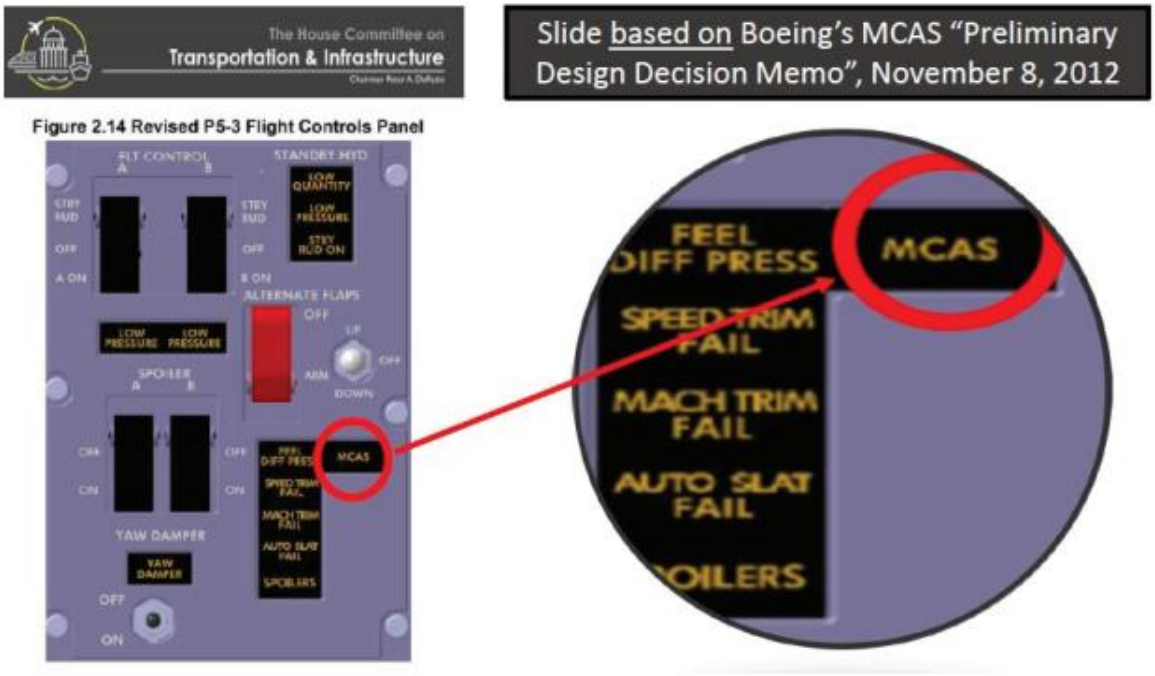


Figure 1. U.S. House Committee on Transportation and Infrastructure. *Untitled Slide*.[75]

As Roby argues, technical ekphrasis emerges from visual rhetoric *and* verbal rhetoric. Taken from Boeing's 2012 "Preliminary Design Decision Memo," the image demonstrates the

74. U.S. Congress, *Boeing 737 MAX*, 19.
75. U.S. Congress, House of Representatives, Committee on Transportation and Infrastructure, *Untitled Slide*, House of Representatives, 116th Congress, October 30, 2019, 20.

deliberate removal of references to MCAS on the flight deck, and that, at some point during the design process, knowledge of MCAS was considered critical for pilots. This technical detail in the MAX's development strengthens DeFazio's portrayal of MCAS as a catastrophic and radical change. It makes Boeing's organizational choice visible to blackbox MCAS and thus remove it from pilot control—a decision that doomed two commercial flights. Image and word combine to portray how the MAX functions and to suggest whether it functions safely. Notably, the ethical implications of Boeing's erasure hinge upon which company characterization is accepted. Was the decision to remove MCAS references motivated by safety or profit? Begging the question, DeFazio's ekphrasis generates lines of inquiry into Boeing's motivations and the effectiveness of regulatory institutions. Interpreting Boeing's motives as profit-driven, DeFazio suggests that "pressures from Wall Street" and other "market forces" influenced Boeing's decisions, encouraging the company to hide MCAS and jeopardizing the public and Boeing's "hardworking employees."[76]

DeFazio also quantitatively describes MCAS to make apparent two images of the MAX—one before MCAS was hidden, and one after. He reminds Muilenburg that in the MAX's MCAS-hiding final design, the system was able to independently move the aircraft's horizontal tail "up to 2.5 degrees" every 10 seconds.[77] Boeing deemed this iteration of MCAS to be non-essential knowledge for pilots despite significant control over flight dynamics. Contrasting with this depiction, DeFazio points out that when the earlier iteration of the MAX's flight deck explicitly referenced MCAS, the system was enabled to move the horizontal tail to a maximum of only 0.6 degrees.[78] By juxtaposing these two technical depictions of MCAS's abilities,

76. U.S. Congress, *Boeing 737 MAX*, 5.
77. U.S. Congress, *Boeing 737 MAX*, 21.
78. U.S. Congress, *Boeing 737 MAX*, 21.

DeFazio begs questions about why the decision to scrub references to MCAS was made. Why make the system invisible when it has more control over the aircraft and make it visible when it has less? This approach ultimately supports DeFazio's description of MCAS as a radical and hidden technology, while inviting a mental image of an overpowered system.

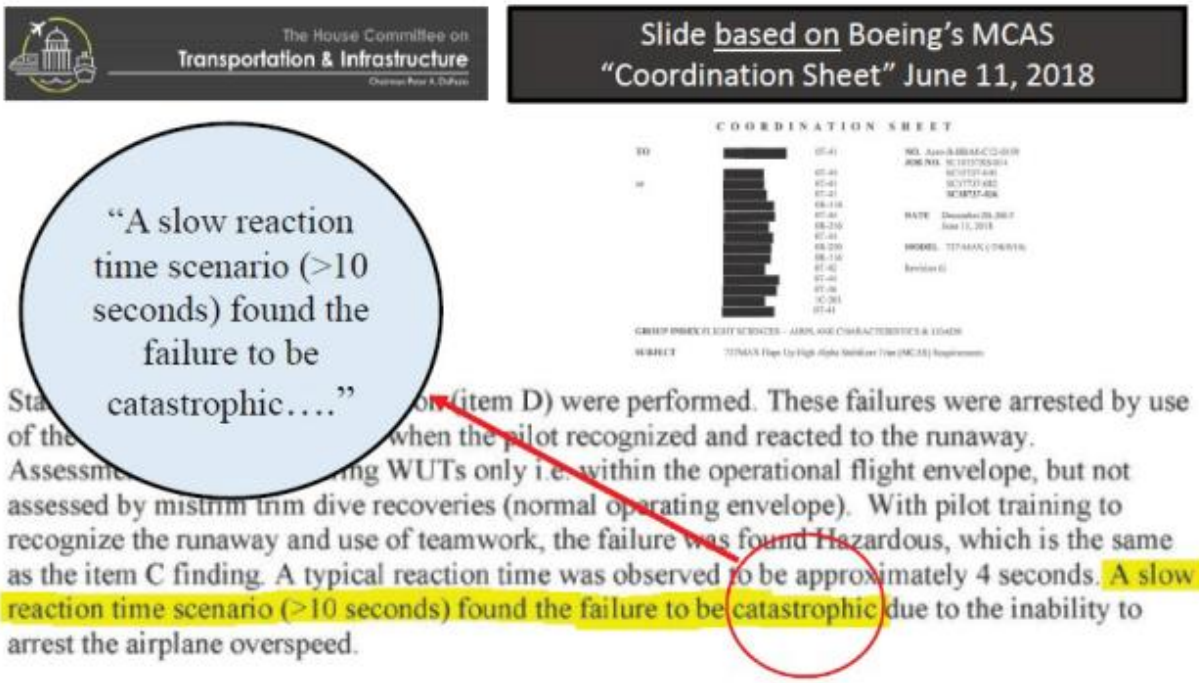


Figure 2. U.S. House Committee on Transportation and Infrastructure. *Untitled Slide*.[79]

DeFazio further uses quantitative data about pilot reaction time to continue reinforcing the danger made apparent in his image of a MAX in operation with hidden MCAS. To do so, he spotlights Boeing's assumptions about pilots' reaction time to MCAS failure (Figure 2). He points out that Boeing assumed pilots would react to a problem within 4 seconds—a bold assumption considering that MCAS was not mentioned on the flight deck—but acknowledged

79. U.S. Congress, House of Representatives, Committee on Transportation and Infrastructure, *Untitled Slide*, House of Representatives, 116th Congress, October 30, 2019, 22.

that reaction time greater than 10 seconds could prove catastrophic (in the Lion Air and Ethiopian Airlines crashes, it was). DeFazio's juxtaposition further illustrates the radicalness of blackboxing MCAS instead of informing pilots about its existence by crafting a mental image of pilots unable to respond to crisis. It layers the problem of pilot-aircraft interface over issues of the amount of control MCAS was granted over the MAX and its erasure from the flight deck. The total is an unsettling hypothetical scenario that neatly mirrors reality.

Ultimately, DeFazio's qualitative and quantitative portrayal reinforces the need for serious inquiry into Boeing and the MAX by inviting imagination of a scenario in which an in-flight MAX is flown by pilots who cannot effectively interact with the aircraft's avionics. Given MCAS's strength and risk of catastrophic failure, DeFazio opines on the ethics of Boeing's erasure of references to MCAS, arguing this action ensured the existence of pilots who "didn't even know the system existed."[80] Moreover, DeFazio reinforces the connection between executive-level decision-making and the two crashes by reminding Muilenburg that the crew of Lion Air 610 was unaware of MCAS's existence, asking him if the FAA was made aware of Boeing's internal conclusions about MCAS (they were not) and pressing Muilenburg if "it was a mistake to not inform pilots of the existence of the MCAS system."[81]

Other T&I Committee representatives add to DeFazio's portrayal of a flawed MAX, demonstrating how technical ekphrases of complex artifacts emerge from participants' collective rhetoric during deliberation—especially when initial characterizations are potent. Although their ekphrastic language is not as technically or quantitatively specific as DeFazio's, Reps. Cohen and Stanton's references to MCAS are exemplary. Their descriptions portray Boeing as primarily

80. U.S. Congress, *Boeing 737 MAX*, 22.
81. U.S. Congress, *Boeing 737 MAX*, 22

concerned with profit and removed from its roots as an engineering collective. Cohen engages in a line of questioning with Hamilton that describes MCAS as a technology to which "all references . . . [were] removed from the flight crew operations manual and training material" because Boeing determined the system would only activate "outside of the normal flight envelope."[82] Describing MCAS's activation in the Lion Air and Ethiopian Airlines incidents, Cohen reminds the Boeing representatives, "MCAS activated within the normal operating envelope," thus contributing to the loss of pilot control and undermining Boeing's declaration that the design was in line with standard industry practices. Cohen's questioning alludes to an image of MCAS symmetrical with DeFazio's. Similarly, Rep. Stanton describes MCAS as a "deeply troubling" system that Boeing went to "great lengths to hide" from customers and pilots.[83] Drawing from Boeing's internal documentation, he references guidelines drafted by the company's engineers that state, for MCAS to operate safely, it "shall not have an objectionable interaction with the piloting of the airplane" and "shall not interfere with dive recovery."[84]

The Boeing representatives provide an alternative portrayal of MCAS. Here, it is essential to remember that Muilenburg and Hamilton do not describe freely, as they must respond to questions committee members have significant time to prepare.[85] Muilenburg and Hamilton's language necessarily responds to the T&I Committee's initial rhetoric. This reality is in line with the nature of regulatory discourse in congressional settings.[86] Unlike members of the T&I Committee, who prepare visuals using subpoenaed material from Boeing, Muilenburg and Hamilton must use ekphrastic descriptions of MCAS reliant upon their rhetorical skill. Rather

82. U.S. Congress, *Boeing 737 MAX*, 47.
83. U.S. Congress, *Boeing 737 MAX*, 79.
84. U.S. Congress, *Boeing 737 MAX*, 79.
85. Giglioni, *Congressional Hearings*, 26.
86. Giglioni, *Congressional Hearings*, 25.

than presenting the committee with an overabundance of technical documentation from Boeing—a strategy previously used by Boeing to overwhelm regulators[87]—the Boeing representatives are repeatedly called to provide lucid and singular descriptions of MCAS and decision-making regarding its design. Accordingly, Muilenburg and Hamilton's image of MCAS contrasts DeFazio's and manifests in response to questions. Using ekphrastic language, Muilenburg and Hamilton defend Boeing's corporate image, provide a vivid portrayal of MCAS updated in response to regulators' concerns, and justify MCAS's original erasure as reasonable.

To this end, Muilenburg uses his opening statement to describe MCAS's updated design, which had been changed in response to the investigation of the Lion Air crash. By immediately portraying MCAS as *updated*, Muilenburg offers a contrasting image of MCAS and Boeing, sidestepping questions about the system's original design and Boeing's decision making. This strategy focuses on positive aspects of Boeing's response to MCAS's failure and spotlights improvements to MCAS. Muilenburg refers to the updated system as an "enhanced" MCAS that compares "information from both [AoA] sensors," activates sparingly, and never augments the jetliner's flight dynamics more "than the pilot can counteract using the control column alone."[88] Although Muilenburg's description of enhanced MCAS necessarily suggests information about the system's original design (by process of deduction, MCAS's original design must have relied on too few sensors, activated too often, and took too much control away from pilots), the description is clearly intended to draw attention away from these issues and back to Boeing's preferred ethos. Throughout TBM, the Boeing representatives reinforce Muilenburg's preliminary description of MCAS's enhanced design by situating its creation within idealized

87. Peter Robison, *Flying Blind: The 737 Max Tragedy and the Fall of Boeing* (New York: Doubleday, 2021), 95-115.
88. U.S. Congress, *Boeing 737 MAX*, 16.

design processes, a move which doubles down on a positive image of the corporation. Moreover, situating MCAS in this manner calls for the T&I Committee to visualize the development of the MAX as a chronological process that improves the aircraft over time and not a process that generates immediate perfection.

Although Boeing's contextualization does not engage with the technical specifics of MCAS's original design, the visualization they offer shows the design's improvement. Indeed, depicting a chronological process implies that MCAS's original design was a deliberate, purposeful choice guided by engineering principles. Of course, this choice could only be made by a company whose chief goal is engineering perfection, not profits. The best example of this emerges from the T&I Committee's questioning of Muilenburg. In an early exchange with DeFazio, Muilenburg describes MCAS's design process in a manner that connects it to the evolution of previous, proven-safe iterations of the 737. He states that "the original concept, from a safety standpoint, was to build the MCAS, [then] extend the current speed trim system on the previous generation of 737 . . . one of our principles is to take systems, then incrementally extend them. That was the safety concept behind the original decision."[89] In other words, Boeing planned to build upon older generations of 737s, updating them incrementally as problems arose—such as the MCAS issue.

Moreover, associating MCAS with previous iterations of the 737 invites inquirers to adopt an image of Boeing as a company built upon technologically sturdy foundations and dedicated to the process of engineering excellence. Crucially, this strategy portrays MCAS in a manner that needs no technical specifics and stresses Boeing's ethical nature. Even when

89. U.S. Congress, *Boeing 737 MAX*, 24.

responding to direct questions about MCAS's original, failed design, Muilenburg consistently describes it as designed upon accepted practices in aviation engineering. For example, in an exchange with Rep. Johnson about the consequences of design, Muilenburg states that Boeing "designed the system to longstanding industry standards," thus invoking accepted design processes.[90]

Hamilton also normalizes MCAS by comparing it with other, standard-in-the-industry automated systems. For example, in an exchange with Rep. Brown about MCAS's novelty as an automatic flight augmentation system, Hamilton argues that autopilot—a long standard feature on commercial jetliners—was the first "software system that manipulated primary flight control in the 737," not MCAS.[91] This statement not only places MCAS within an accepted genre of flight automation but also invokes Muilenburg's abstract image of MCAS in an advancing process of aircraft engineering. In a later exchange with Brown, Hamilton also identifies the MAX's yaw damper, which "moves the rudder surface in response to wind gusts . . . up to 3 degrees" as another flight system that operates outside of pilot input, further building the case that MCAS was not radical. By invoking systems with which pilots have long successfully interacted, Hamilton strengthens Boeing's overall image of MCAS as a system built, and continuing to be built, upon safe and proven engineering principles. He implies a vision of Boeing as an organization dedicated to improving engineering excellence rather than using untested technologies to increase profit margins. More importantly, the association of MCAS with other technically complex avionics systems fortifies Boeing's image of the MAX as

90. U.S. Congress, *Boeing 737 MAX*, 60.
91. U.S. Congress, *Boeing 737 MAX*, 70.

innovative and safe. If MCAS is like other safety systems and those other systems' functionality is more-or-less blackboxed, then Boeing's rollout of MCAS was ethically sound.

Taken together, TBM's participants' ekphrastic language illustrates MCAS as either an acceptable or unacceptable technology and demonstrates clear strategies intended to justify making the technology visible or invisible. These strategies stem from the more general depictions of Boeing-as-context described in the previous section. By verbally painting a picture of a 737 MAX with unproven technology, DeFazio provides inquirers with a depiction that affords arguments against Boeing's attempted blackboxing of MCAS. Similarly, by offering a counter-depiction of MCAS as a run-of-the-mill technology, Muilenburg and Hamilton illustrate a situation that justifies its initial invisibility and suggests resultant accidents as unavoidable parts of the process of innovation. In the next section, I turn to how depictions of pilots in command of MAX jetliners layer over descriptions of Boeing and MCAS, providing mental images of either a well-designed aircraft under the control of poorly trained pilots or well-trained pilots in control of a poorly designed aircraft.

Depicting Pilots and the Pilot-Machine Interface

Ekphrastic language depicting pilots and their relationship with the 737 MAX also layers over descriptions of the MAX and Boeing, suggesting definitive scenarios afforded by the jetliner's design and Boeing's decisions. Because this language introduces human agents that were not involved in the development of the MAX but are involved in its use, the scenarios it visualizes offer logical endpoints. These endpoints arise when given characterizations of the jetliner are accepted as well as emphasize how those characterizations justify praise or blame of Boeing and the decision to blackbox MCAS. Two main characterizations emerge from TBM. The first, and most pervasive, is primarily offered by Muilenburg and Hamilton in response to

T&I Committee questioning. This depiction paints the picture of undertrained pilots in control of a MAX aircraft juxtaposed with well-trained pilots deftly navigating the pilot-machine interface. The second characterization, which is crafted by Rep. DeFazio and other T&I Committee members, portrays pilots at the mercy of corporate design and training practices. I discuss each of these characterizations in turn.

Muilenburg and Hamilton use ekphrastic language to craft a mental image in which shortcomings of the pilots involved in MAX crashes are highlighted and generalizations about pilot expertise are invoked. This descriptive strategy resists questions about MCAS and the MAX by plausibly suggesting the pilots involved in both incidents were unable to capably use either, regardless of their design. Layering over Muilenburg and Hamilton's contextual depiction of Boeing as an upstanding corporation and their depiction of MCAS as not out-of-the-ordinary, this rhetorical strategy paints an image of an idealized pilot in control of a more-or-less well-designed MAX.

While much of this depiction is suggested by, or layered over, general descriptions of Boeing and MCAS, it emerges several times in the hearing when pilot reactions and responsibilities are specifically alluded to. For example, in an exchange with Representative Palmer, Hamilton states that Boeing believed the original training materials for the MAX, which erased MCAS, were "sufficient" because the materials taught pilots "how to react to aircraft behavior, regardless of what is causing it."[92] He further describes the standard response to stabilizer issues, like those caused by an MCAS failure, as "a memory item that we expect crews would be able to react to and take action," thus suggesting a well-trained pilot would have

92. U.S. Congress, *Boeing 737 MAX*, 62.

intuitively known how to respond to MCAS failures without knowing the system existed.[93] Similarly, in an exchange with Rep. Carbajal, Hamilton contends that Boeing "assumed that pilots could recognize it [runaway stabilizer] and trim it out."[94] In an exchange with Rep. Brown, Muilenburg, like Hamilton, lucidly describes standard checklist procedures and suggests responding to MCAS's erroneous augmentation of the MAX's flight dynamics should have been second nature. He states, "the runaway stabilizer procedure, whether it is caused by MCAS or some other mode . . . is to trim the airplane, manage your power, and then hit the cutout switch if it continues," implying all the pilots need to know is how to turn off the automated system after the checklist procedure failed to produce results.[95] Muilenburg's assumption that a correctly-trained pilot could adequately handle the MAX is further exemplified by his agreement with Rep. Graves, who used his allotted time to grandstand his belief that future aircraft will need to be designed for "the least common denominator . . . internationally" and to suggest that American-trained pilots would have been better equipped to handle an MCAS emergency.[96] In response to Graves, Muilenburg agrees "longstanding industry assumptions" about pilot quality must be addressed with design, suggesting that if designs like MCAS need to be made known, it would not be because they were hidden but because pilots are no longer well-trained enough to work with reasonably blackboxed systems.[97] In all instances, by raising standard flight procedures, the Boeing representatives suggest a mental image in which the Ethiopian Airlines and Lion Air pilots were inadequately trained, thus offering an interpretation of events within which MCAS's blackboxed status is irrelevant as a causal factor.

93. U.S. Congress, *Boeing 737 MAX*, 62.
94. U.S. Congress, *Boeing 737 MAX*, 99.
95. U.S. Congress, *Boeing 737 MAX*, 106.
96. U.S. Congress, *Boeing 737 MAX*, 26-27.
97. U.S. Congress, *Boeing 737 MAX*, 26.

Muilenburg and Hamilton further emphasize error on the part of poorly trained pilots by directly referencing the flight deck design and how a qualified pilot should be able to seamlessly "read" a situation through it. This relationship is termed the "pilot-machine interface" by the Boeing representatives and refers to how pilots directly interact with the cockpit.[98] Drawing upon idealized assumptions about pilots, Boeing's characterization of the pilot-machine interface enhances their portrayal of expert pilots who intuitively understand what aircraft ask them to do and novice pilots who lack awareness of how to "read" affordances of an aircraft. The clearest example of this is DeFazio's exchange with Muilenburg about the presence of an MCAS indicator in the initial design of the MAX's flight deck. Undergirding DeFazio's confusion about removing an MCAS indicator from the MAX's flight deck is the unspoken assumption that the jetliner's controls should intuitively convey information to the pilot, calling pilots to visualize the aircraft in a particular manner and directing them to the correct checklist in a timely manner. As Hamilton suggests in an exchange with Rep. Plaskett, however, if a problem associated with MCAS materialized, it would activate through a variety of extent alerts "probably fairly closely linked together," thus suggesting a common cause to an experienced pilot.[99] These alerts would include "IAS Disagree" and "ALT disagree" lights, "stick shaker alerts," and other alarms associated with runaway stabilizers—the system within which Boeing blackboxed MCAS.[100] Through reacting to these alerts in a professional manner, pilots would necessarily respond to the MCAS emergency quickly and with a clear mental image of the jetliner. Importantly, this image again suggests that knowing of MCAS's existence was irrelevant and that pilot training was the clear culprit in both the Lion Air and Ethiopian Airlines crashes.

98. U.S. Congress, *Boeing 737 MAX*, 26, 38.
99. U.S. Congress, *Boeing 737 MAX*, 98.
100. U.S. Congress, *Boeing 737 MAX*, 58, 98.

While Rep. DeFazio and the T&I committee do not offer an explicit counter-depiction of an ideal pilot, the implications of their questions and reasoning suggest a stance on how a pilot's qualifications are built. Unlike Boeing's doubling down on idealized pilots, this approach looks to the least common denominator and portrays pilot effectiveness as an outcome of training and design. In this interpretation, pilots are essentially at the mercy of forces out of their control, like corporate policy, design affordances, and organizational culture. Like Boeing's depiction of pilots, this understanding of pilots layers over the T&I Committee's general depictions of Boeing as profit-driven and MCAS as a radical, hidden technology, as well-trained pilots have little control over design and corporate culture. More bluntly, the T&I Committee draws attention to the fact that pilot skill matters little when an aircraft is not designed in pilots' best interests.

Rep. Allred comments in a way that directly speaks to this description of pilots, stating the available evidence about MCAS tells a story that "is not about pilot error" but instead "about catastrophic design flaw and regulatory failure" that led to a lack of pilot control and loss of life.[101] Similarly, Rep. Lipinski scolds Muilenburg by suggesting he allowed the MAX to be designed with a "single point of failure" in MCAS because a safer approach would have resulted in a "potential pilot training impact"—suggesting that Boeing skirted regulations in a manner that directly led to intentional blackboxing and unprepared pilots.[102] From these viewpoints, pilots would have been required to undergo extensive training if MCAS were more visible and it was known how dramatically the system interfered with pilots' control over the MAX. Moreover, the viewpoints imply that Boeing dreamt up idealized pilot reactions to make MCAS seem like less of a radical system, building upon simultaneous depictions of Boeing as a profit-

101. U.S. Congress, *Boeing 737 MAX*, 85.
102. U.S. Congress, *Boeing 737 MAX*, 44.

driven corporation to demonstrate that, even if pilots were undertrained, the situation was still a direct result of Boeing's actions. Further underscoring how organizational priorities directly impact pilot qualifications, Rep. DeFazio reminds Muilenburg of an agreement Boeing made with Southwest Airlines that would have resulted in "a $1 million rebate per plane" if Southwest pilots became required to undertake simulator training to be certified to fly the MAX, offering a clear ulterior motive on the part of Boeing that could call it to have a vested interest in removing vital information from training manuals.

DeFazio and the T&I Committee also speak to assumptions made by Boeing about pilot-machine interface. For example, demonstrating a counter-understanding of the flight deck's affordances and referencing an NTSB study, DeFazio reminds Muilenburg that "multiple alerts and indications can increase a pilot's workload" and that, by using a variety of alerts embedded within other systems instead of a single one that indicated MCAS, Boeing created a workload for pilots that caused them to "not immediately" perform necessary procedures.[103] DeFazio's view—echoed by other members of the T&I Committee—centers need for intuitive design of the flight deck so that pilots can create a clear mental picture of their aircraft. From this view, a singular alert that identifies MCAS is more efficient than a series of tangentially related warnings. Whereas Boeing's argument supposes that pilots should be able to form a mental image regardless of design, Rep. DeFazio offers an alternative image that suggests, by hiding MCAS, Boeing actively destroyed this mental image by flooding it with a host of contending images.

Taken together, these characterizations of pilots' interaction with MCAS through the MAX's design demonstrate how emergent technical ekphrases characterize human actors in

103. U.S. Congress, *Boeing 737 MAX*, 44.

ways that justify making some technologies visible or invisible. By offering assumptions about qualified pilots, even if they are idealized, the Boeing representatives call their audience to hold mental images of Ethiopian Airlines and Lion Air pilots as unqualified by virtue of the fact their jetliners crashed. After all, in Boeing's view, any reasonably trained pilot would have properly responded to MCAS issues. The fault for the incidents is not in the blackboxing of MCAS but rather in supposedly lower standards of non-Western airlines. The loss of two aircraft is simply the logical endpoint of unqualified pilots flying a complex jetliner. Conversely, DeFazio and the T&I Committee suggest that a pilot's expertise hinges greatly on whether or not the aircraft is designed well and the corporation is honest about its capabilities. The depiction of pilots this approach suggests is one in which trained pilots are victimized by an aircraft that does not respond as predicted, demonstrating how corporate organizational practices and blackboxed designs actively make otherwise qualified pilots unqualified. Importantly, this depiction strongly suggests the need for visibility, regulation, and Boeing's commitment to transparency in aircraft design.

Conclusion

In the years since the Lion Air and Ethiopian Airlines crashes, the 737 MAX and Boeing have repeatedly borne the brunt of public scorn. The suicide of whistleblower John Barnett, who publicly criticized development and production standards of both the 737 MAX and the 787 Dreamliner, highlights just how widely public mistrust has spread, including speculation that Boeing stakeholders had Barnett murdered. Such widespread public mistrust toward Boeing underscores not only public reception of the company's priorities during the past two decades but also the prominence of depictions of Boeing as a global corporation chiefly concerned with

shareholder value. Faced with scrutiny, Boeing increasingly appeals to its past as an engineers' firm in an effort repair its image.

Public appeals to Boeing's more ethical past, however, bely questionable tactics at play by the appealers. Boeing's overarching goal is not to respond to public scrutiny but to prevent it by leaving little in the light for the public to scrutinize—what I refer to as intentional blackboxing. This goal is evidenced not only by Boeing's noncooperation with government regulators but also in its track record of whistle blower intimidation, arguments for self-regulation, and tendency to blame contractors and users for incidents involving its aircraft.[104] In TBM specifically, it is evidenced by Boeing's decision to omit MCAS from regulatory certification processes and from pilot training manuals. However, Boeing's push to erase MCAS's existence did not start in the wake of the Lion Air and Ethiopian Airlines incidents. Rather, it began long before via a campaign that mobilized public trust in the company and regulatory willingness to trust Boeing's decisions. Rather than affirm this trust, Boeing instead used it as a smokescreen to shoehorn in untested technologies and rush production in the name of profit. They crafted an image of themselves that effectively blackboxed the entire corporation by lulling regulators and the public into complacency.

The loss of two MAX jetliners was a rude awakening for those lulled to sleep. More importantly, it prompted lawmakers and regulators alike to begin peering through Boeing's self-crafted blackbox into the inner workings of the company itself. Thus, Boeing's strategy came to a head with Congress during TBM and other subsequent hearings, wherein Boeing officials doubled down on ekphrastic depictions of a virtuous Boeing while lawmakers picked through the

evidence. Fortunately, and despite Boeing's attempts to obscure deliberation with myriad documents and materials, T&I Committee members led by Rep. DeFazio arrived armed with information that not only made MCAS visible but also raised questions about its design and Boeing's priorities. Their clear challenges to Boeing's self-depiction opened avenues to question any assumptions based on it, including the blackboxing of MCAS as a technical component and expectations of how pilots would interact with the system. Thus, to justify opening or closing various blackboxes, TBM participants collectively crafted contrasting ekphrases of Boeing, MCAS, and pilots who operated the aircraft. More succinctly, they used technical ekphrases to engage in a layered dialectic of visibility/invisibility. To this end, the lines of debate in TBM suggest distinct rhetorical strategies that emerge from the relationship between ekphrastic language and blackboxing. My analysis of TBM suggests two strategies: 1) use of technical ekphrasis by stakeholders interested in the opacity of a given technology to invite blackboxing and 2) calling for technical ekphrasis by regulators to resist blackboxing and encourage public deliberation about design. Both strategies draw upon ekphrasis' ability to highlight choice aspects of a technological phenomenon while overlooking others. Yet, each rhetorical strategy uses that affordance for strikingly different purposes.

To be sure, it is the different purposes to which blackboxing and technical ekphrases can be deployed that make venues like TBM of vital importance. While it is easy to dismiss them as contextually bound moments of rhetorical strategy, what is ultimately at stake is the reliability and efficacy of public regulation of technocratic corporations. As TBM demonstrates, the blackboxing of highly complex technical objects hinges on broad ekphrastic descriptions of context, potential users, and the organizations that produce them. As lawmakers and regulators encounter more and more complex technologies, the amount of effort required to effectively

legislate those technologies skyrockets and the impulse to trust crafted corporate perceptions grows; this is precisely what happened with MCAS and the MAX. The reality of this situation can be disheartening for those concerned with ethical technology adoption. However, recognizing broad ekphrastic descriptions as a mode through which blackboxing occurs can enable lawmakers and regulators to identify such situations and prompt them to craft their own counter-depictions that call for casting open corporate blackboxes. Thus, technical ekphrasis' presence in a regulatory setting as impactful as TBM suggests crucial importance and immense possibility. Ekphrastic language enables corporate interests to rhetorically blackbox their products *and* empowers public representatives to cast light upon murky details. If we are to achieve a democratic balance between technological development and public oversight of that development, then deliberators must be knowledgeable and know how to recognize and employ rhetoric that enables ethical and effective deliberation about technology.