

MAXIMIZING SAFETY UNDER NEXTGEN: APPORTIONMENT OF DUTY, THE FTCA, AND POLICY IN AVIATION

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INTRODUCTION

The air transportation system in the United States is among the safest and most efficient in the world. While the U.S. hosts 35 percent of the world’s commercial airspace traffic, the last decade has marked the safest period of aviation in U.S. history, with an average of two fatalities per 100 million passengers.¹ This incredible safety record is largely attributed to safety policy and regulation within the aviation industry.² Despite this milestone, the 70-year-old radar technology on which the

1. J. David Grizzle et al., *Navigating the Turbulence of Competing Interests: Principles and Practice of the Federal Aviation Administration*, 75 J. AIR L. & COM. 777, 825-26 (2010).

2. See generally Jad Mouawad & Christopher Drew, *Airline Industry at Its Safest Since the Dawn of the Jet Age*, N.Y. TIMES (Feb. 11, 2013), <http://www.nytimes.com/2013/02/12/business/2012-was-the-safest-year-for-airlines-globally-since-1945.html> (illustrating how improvements to safety policies and engineering have greatly improved air travel safety, and highlighting additional areas for improvement).

U.S. airspace system operates is unsustainable in its current condition.³ Much of the aviation infrastructure in the United States “has far exceeded its planned lifespan.”⁴ Airspace is facing unprecedented demand—the current airspace system is “stretched thin”⁵—and the limitations of radar technology prevent further expansion.

To meet growing demands in aviation, and to address the limitations of radar technology, Congress has mandated an overhaul of the domestic airspace system.⁶ This monumental project, called the Next Generation Air Transportation System (NextGen),⁷ will transform the domestic airspace system from a ground-based radar system to a satellite-based system. The shift from a manual, human-conducted system under radar to an automated system under NextGen raises novel considerations. The shift stands to alter government exposure to liability and change traditional legal responsibilities between the Federal Aviation Association (FAA), pilots, and airline carriers. Specifically, increased automation may mitigate the importance of the Federal Tort Claims Act (FTCA) in aviation because FAA actions or omissions will more frequently fall under exceptions of the FTCA.

Aviation has, and always will, incur human risk and potential casualties. The FTCA has been the sole recourse for victims of aviation accidents caused by government negligence since its inception in 1946.⁸ The FTCA allows for greater government accountability and individualized justice for citizens by exposing the government to tort liability. Because the FTCA only allows government liability under limited circumstances, the shift to an automated system raises questions about the future importance of the FTCA in aviation, and how to maintain the careful balance between measures that assure maximum safety and the financial costs associated with them.

This note explores the differences between radar and NextGen technology, and discusses the security concerns introduced by automated technology in aviation. Through analysis of the ramifications of NextGen

3. Jim Boulden, *GPS Tracking to Replace 70-Year-Old Radar Technology in Planes*, CNN (July 24, 2010, 9:25 AM), <http://www.cnn.com/2010/TECH/innovation/07/23/planes.gps.upgrade/index.html>.

4. Brian Legan, *Re-Imagining Aviation Infrastructure: Business Models for Achieving Transformation*, ATC GLOBAL (March 7, 2012), <http://www.boozallen.com/media/file/2012-Global-ATC-Conference-Legan-Address.pdf>.

5. FED. AVIATION ADMIN. FACT SHEET - A SYSTEM UNDER STRESS: AVIATION CONGESTION, (May 10, 2007) [hereinafter FED. AVIATION ADMIN. FACT SHEET], available at http://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=8807.

6. See FAA Modernization and Reform Act of 2012 (FMRA), Pub. L. No. 112-95, 126 Stat. 11 (2012).

7. *Id.* at § 201(1).

8. 28 U.S.C. § 1346(b) (2013).

technology in the existing legal system, this note argues that the shift to automated technology will mitigate the importance of the FTCA in aviation, and consequently will shift greater responsibility to airline carriers.

I. A NEW ERA IN AVIATION

A. *Limitations of the Radar System*

According to the FAA, the domestic air transportation system is currently straining to serve 750 million passengers every year⁹—and that number is expected to reach one billion by 2024.¹⁰ These increasing demands are creating more airport delays and congestion. On-time flight arrivals nationwide fell by 10 percent between 2002 and 2007, with only 65 percent of flights arriving on time at major international airports.¹¹ Airport congestion is partly attributed to “positional uncertainty”¹² and the limitations of radar technology.

Radar is a call-and-response system. Air Traffic Control sends a signal to an aircraft, and a transponder within the aircraft answers, identifying the aircraft to Air Traffic Controllers (controllers). Air Traffic Control radar sweeps terminal airspace every five seconds, and en route airspace every 10 to 12 seconds.¹³ The time lapse between the emission of a radar signal and the appearance of the aircraft’s position on the controller’s display produces a pulse or “blip.”¹⁴ During these blips there is a momentary lapse where the aircraft’s position is unknown.¹⁵ Because an aircraft can travel a long distance during this period, the aircraft’s position is uncertain and considerable spacing buffers are needed between each aircraft.¹⁶

The radar system uses VHF radio¹⁷ as a navigation aid for flight paths and landing systems, which further contributes to the positional

9. FED. AVIATION ADMIN. FACT SHEET, *supra* note 5.

10. U.S. DEP’T OF TRANSP., FED. AVIATION ADMIN., AVIATION POLICY AND PLANS: FAA AEROSPACE FORECASTS FY 2012-2032, at 1 (2014), *available at* http://www.faa.gov/about/office_org/headquarters_offices/apl/aviation_forecasts/aerospace_forecasts/2012-2032/media/2012%20FAA%20Aerospace%20Forecast.pdf.

11. FED. AVIATION ADMIN. FACT SHEET, *supra* note 5.

12. Naveen C. Rao, *The Promise and Challenges of NextGen*, 25 AIR & SPACE LAWYER (Issue 4) 18 (2013), *available at* <http://www.jonesday.com/files/Publication/c2c2cbb1-99df-4abd-a09c-8e856e00077e/Presentation/PublicationAttachment/eeab3be6-dc00-495d-a60e-92ebe854a16a/nextgen.pdf>.

13. *Id.*

14. *Id.*

15. *Id.*

16. *Id.*

17. In the frequencies between 108 and 137 MHz. 47 C.F.R. § 2.106.

uncertainty of an aircraft.¹⁸ Flight routes operate between radio navigation aids that emit VHF signals.¹⁹ Radio navigation aids are ground-based radio stations that each aircraft must follow as a flight path between destinations.²⁰ Because each aircraft must “zig-zag” between radio navigation aids, they are unable to take the most direct route to their destinations. This causes increased flight duration, fuel use, and air pollution.²¹ As an aircraft moves farther away from a radio navigation aid, the radio navigation aid’s VHF signal becomes imprecise, and the aircraft is likely to drift off-course.²² The imprecision of the current domestic airspace system requires air routes of approximately eight to ten nautical miles in width, causing inefficient use of airspace and exacerbating congestion problems.²³

B. *The Promise of NextGen*

To solve the problems of radar technology, the United States is overhauling its domestic airspace system and moving from radar to a Global Positioning System (GPS) satellite technology under NextGen.²⁴ NextGen will be the largest transformation of air transportation in U.S. history, with over \$1 billion invested during 2013 alone.²⁵ According to the FAA, NextGen will reduce flight delays by 41 percent, reduce carbon dioxide emissions by 16 million metric tons, and reduce fuel use by 1.6 billion gallons by the year 2020.²⁶ NextGen is also expected to provide an estimated \$38 billion in cumulative benefits to the FAA, aircraft operators, and passengers.²⁷

NextGen technology is expected to achieve these goals by increasing airspace efficiency. NextGen will use Automatic Dependent Surveillance Broadcast (ADS-B) technology to increase the positional accuracy of each aircraft. ADS-B uses a combination of satellites and receivers to broadcast an aircraft’s precise location at one-second

18. Rao, *supra* note 12.

19. *Id.*

20. Jessica Culler, *8 Questions about Next Gen, Part 1: How We’ll Get Where We’re Going Tomorrow*, NASA (Jan. 18, 2012), http://www.nasa.gov/topics/aeronautics/features/8q_nextgen.html.

21. *Id.*

22. Rao, *supra* note 12.

23. *Id.*

24. *Id.*

25. U.S. DEP’T OF TRANSP., BUDGET HIGHLIGHTS: FISCAL YEAR 2013 3, *available at* http://www.dot.gov/sites/dot.dev/files/docs/dot_budget_highlights_fy_2013_5MB.pdf.

26. FED. AVIATION ADMIN., NEXTGEN IMPLEMENTATION PLAN 7 (June 2013), *available at* http://www.faa.gov/nextgen/library/media/NextGen_Implementation_Plan_2013.pdf.

27. *Id.* at 5.

intervals, enabling FAA personnel²⁸ and pilots alike to receive real-time positions of all aircraft in the sky.²⁹ Instead of VHF radio navigation aid routes, NextGen uses GPS waypoints called Area Navigation (RNAV). RNAV technology does not splay like VHF signals, so the most direct route to a destination may be taken.³⁰ Increased positional accuracy will allow for closer spacing between each aircraft, thereby increasing airspace capacity. More direct flight routes will reduce flight time, allow for more efficient use of airspace, and reduce fuel use and emissions.

NextGen promises to give pilots other valuable data, including automated weather feed information, Air Traffic Management updates, and visuals of airspace.³¹ Currently, radar technology requires direct flight path control and surveillance by controllers and direct voice communication between controllers and pilots.³² Direct oversight and handling of each aircraft by controllers limits the number of aircraft that can operate within the system at any given time. In contrast, NextGen's Data Communication System will optimize flight information, weather data, and airspace capacity, taking into account a particular aircraft's capabilities and amalgamating data with other aircraft.³³ The Data Communication System can also provide a comprehensive flight path based on current air traffic and the pilot's requested time and destination.³⁴ This diverse and far-reaching information will be available in real-time on a pilot's display.

Under NextGen, pilots will receive information through the Data Communication System, rather than by voice communication with controllers. Rather than directly supervising and communicating with each aircraft, controllers will oversee trajectory and separation management of the automated system. Because automated systems will replace voice communication and direction by controllers, Air Traffic Control will be able to manage a larger number of aircraft and increase airspace efficiency.³⁵

C. *Security under NextGen*

While NextGen presents many positives, the automation of the system raises concerns about potential equipment failure and

28. "FAA personnel" is used in this note to refer to controllers, managers, and other FAA specialists.

29. Rao, *supra* note 12.

30. *Id.*

31. FED. AVIATION ADMIN., *supra* note 26, at 77.

32. *Id.* at 30.

33. *Id.*

34. *Id.* at 26.

35. *Id.* at 39.

interference. Current interference problems with GPS technology stem from weak satellite signals, the potential for remote hacking within the ADS-B system, and the unencrypted platform of NextGen technology.³⁶ These forms of interference stand as potential barriers to NextGen deployment and implementation.

The threat of signal interference within the NextGen system is a significant concern.³⁷ Because GPS signals are satellite based, signals travel over 12,400 miles and are relatively weak compared to signals coming from the ground.³⁸ This distance makes the signals susceptible to interference from a range of terrestrial sources.³⁹ For example, at the end of 2009, GPS receivers used by aircraft at Newark Airport in New Jersey suffered daily reception interference, seemingly without cause.⁴⁰ After two months of investigation, the FAA discovered the culprit: a trucker who passed by a nearby turnpike each day was disrupting GPS reception with a GPS jammer he kept in his truck to prevent his employer from tracking his location.⁴¹ In 2012, GPS receivers at Newark Airport were impeded again after an employee at an engineering firm also used a GPS jammer to prevent his employer from tracking his whereabouts.⁴² Although it is illegal to market, sell, or use GPS in the United States, they can be easily purchased over the Internet.⁴³

Concerns about NextGen's security also stem from successful hacking attempts.⁴⁴ Brad Haines, director at Renderlabs, and Andrei Costin, a Romanian graduate student, have both published works showing security gaps in NextGen technology, and have successfully hacked a simulated NextGen system.⁴⁵ In addition to these hacking attempts, a publication by the University of Texas at Austin describes how the Radio Navigation Laboratory hacked a GPS receiver on a civilian drone (which uses similar technology as NextGen). The hackers demonstrated that they could gain control of the drone using equipment

36. Paul Rosenzweig, *On the Digging of Cyber Holes: The NextGen Air Traffic Control System*, LAWFARE (Jan. 3, 2013, 11:25 AM), <http://www.lawfareblog.com/2013/01/on-the-digging-of-cyber-holes-the-nextgen-air-traffic-control-system/>.

37. *Id.*

38. *No Jam Tomorrow*, ECONOMIST (Mar. 12, 2011), <http://www.economist.com/node/18304246>.

39. *Id.*

40. *Id.*

41. *Id.*

42. Gary P. Bojczak Whitehouse Station, New Jersey, *Notice of Apparent Liability for Forfeiture*, 28 FCC Rcd. 11,589 (2013).

43. *Id.*

44. Steven Henn, *Could the New Air Traffic Control System Be Hacked?*, NPR (Aug. 14, 2012, 5:22 PM), <http://www.npr.org/blogs/alltechconsidered/2012/08/16/158758161/could-the-new-air-traffic-control-system-be-hacked>.

45. *Id.*

that cost less than \$1,000.⁴⁶

Unfortunately, it is the platform's basic architecture that leaves NextGen open to attack by hackers. Because ADS-B technology broadcasts over unencrypted data links, aircraft information is relatively accessible.⁴⁷ According to government sources, NextGen requires unencrypted data links because increased ADS-B security would diminish the functionality of the system.⁴⁸ These security vulnerabilities make policy decisions instrumental to the successful implementation of NextGen. Specifically, regulatory incentive strategies are needed to maximize safety within this automated system.

II. CURRENT AVIATION REGULATION AND TORT LIABILITY

A. Aviation Regulation

Under the Federal Aviation Act of 1958, Congress empowered the FAA to promote aviation safety.⁴⁹ The FAA has used this authority to develop Federal Aviation Regulations that govern flight safety and operation and ensure efficient use of navigable airspace.⁵⁰ Federal Aviation Regulations have the force and effect of law and outline standards of reasonable care for airline carriers, pilots, FAA personnel, as well as airport and airfield landing owners and operators.

In the event of an aircraft collision, ordinary rules of negligence typically apply in determining who is at fault.⁵¹ Failure to adhere to the Federal Aviation Regulations provides evidence of negligence, a presumption of negligence, or indicates negligence *per se* depending on the jurisdiction.⁵² A finding of negligence requires that a party owed a duty of care to an injured claimant, that duty of care was breached, and the breach was the proximate cause of the resulting injury.⁵³ The Federal Aviation Act preempts all other legislation relating to air safety, and “a state may not expand federal standards by imposing a common law duty

46. John Roberts, *Drones Vulnerable to Terrorist Hijacking, Researchers Say*, FOX NEWS, (June 25, 2012), <http://www.foxnews.com/tech/2012/06/25/drones-vulnerable-to-terrorist-hijacking-researchers-say/>.

47. DONALD L. MCCALLIE, EXPLORING POTENTIAL ADS-B VULNERABILITIES IN THE FAA'S NEXTGEN AIR TRANSPORTATION SYSTEM 2 (2012), available at <http://apps.fcc.gov/ecfs/document/view.action?id=7021694523>.

48. *Id.*

49. Fed. Aviation Act of 1958, 49 U.S.C. §§ 1301-1542 (1988).

50. See James C. Wilson et al., *Aircraft Emergencies, the Potential Tort Liability of Pilots, Air Carriers, and the United States*, 24 THE BRIEF 12 (1995).

51. David E. Rigney, *Death or Injury to Occupant of Airplane from Collision or Near-Collision with Another Aircraft*, 64 A.L.R.5th 235 (1998).

52. Wilson et al., *supra* note 50 at 13.

53. *Budden v. United States*, 15 F.3d 1444, 1449 (8th Cir. 1994).

of care.”⁵⁴

Generally, “sovereign immunity” protects government entities from legal action.⁵⁵ The principle of sovereign immunity is historically rooted in English feudal law and based on the tenet that “the King can do no wrong.”⁵⁶ Sovereign immunity is considered necessary to protect the government treasury, to prevent government standstill caused by excessive litigation, and to maintain separation of powers by protecting the government from undue interference by the judiciary.⁵⁷ While sovereign immunity is historically an absolute immunity, the U.S. Government may waive immunity and consent to liability. In 1946, after a B-25 bomber crashed into the Empire State Building, Congress passed the Federal Torts Claims Act (FTCA) as a limited waiver of sovereign immunity.⁵⁸ The FTCA enabled the families of victims of the tragedy to initiate a lawsuit against the U. S. Government for the first time.⁵⁹

B. Tort Liability

1. Federal Tort Claims Act (FTCA)

The FTCA allows government liability for tort claims that meet six elements: there must be (1) a claim for money damages against the United States; (2) for injury, death, or property loss; (3) caused by the negligent or wrongful act or omission; (4) by a government employee acting within the scope of office or employment; (5) where a private person would be liable to the claimant in similar circumstances; (6) in accordance with the law of the place where the act or omission occurred.⁶⁰ If a private person under similar circumstances would not be liable for the alleged conduct under state law where the act or omission occurred, a court may not assert jurisdiction over the claim.⁶¹ If a court has jurisdiction over a claim, all defenses and protections available to private persons under state law where the omission occurred, including monetary caps on damages, may be raised by the United States.⁶²

54. *Booth v. Santa Barbara Biplanes, LLC.*, 70 Cal. Rptr. 3d 660, 666 (Cal. Ct. App. 2008).

55. BLACK’S LAW DICTIONARY (9th ed. 2009).

56. Erwin Chemerinsky, *Against Sovereign Immunity*, 53 STAN. L. REV. 1201, 1201 (2001).

57. *Id.* at 1217-18.

58. Joe Richman, *The Day a Bomber Hit the Empire State Building*, NPR (July 28, 2008), <http://www.npr.org/templates/story/story.php?storyId=92987873>.

59. *Id.*

60. *F.D.I.C. v. Meyer*, 510 U.S. 471, 477 (1994); *Brown v. United States*, 653 F.2d 196, 201 (5th Cir. 1981) (element six “refers exclusively to state law”).

61. 28 U.S.C. § 1346(b)(1) (2013).

62. *Id.*

While the FTCA seemingly exposes the government to expansive liability, it contains numerous exceptions that limit that liability's scope. For example, the United States may not be held liable under a theory of strict liability;⁶³ also, members of the armed forces and their families may not bring claims under the FTCA for injuries arising from activity related to military service.⁶⁴ One of the most significant exceptions of the FTCA is the "discretionary function" exception. The discretionary function exception provides that the United States may not be held liable under:

Any claim based upon an act or omission of an employee of the Government, exercising due care, in the execution of a statute or regulation, whether or not such statute or regulation be valid, or based upon the exercise or performance or the failure to exercise or perform a discretionary function or duty on the part of a federal agency or an employee of the Government, whether or not the discretion involved be abused.⁶⁵

In essence, the government retains sovereign immunity if an action or omission involves discretion, such as the selection of a government contractor. This exception is expansive and acts to protect agencies from interference by the judiciary by making discretionary agency decisions immune from liability.⁶⁶

In 1991, the Supreme Court held in *United States v. Gaubert* that a negligent act or omission falls within the discretionary function exception if the act or omission involves an element of judgment or choice in furtherance of a social, economic, or political policy consideration.⁶⁷ In *Gaubert*, a shareholder of a savings and loan company filed suit after the Federal Home Loan Bank Board (FHLBB) threatened to close the company unless management and directors were replaced. A federal agency under the FHLBB became involved in the day-to-day operation of the savings and loan company and, as a result, the company lost substantial net worth. The *Gaubert* Court held that because the Home Owner's Loan Act of 1933 authorized the FHLBB to proscribe industry rules and regulations, the FHLBB's involvement in the management of the savings and loan company was in furtherance of policy and within the government agency's discretion.⁶⁸

Conversely, in *Kennewick Irrigation District v. United States*, the

63. *Laird v. Nelms*, 406 U.S. 797, 798 (1972).

64. *Feres v. United States*, 340 U.S. 135, 146 (1950).

65. 28 U.S.C. § 2680(a) (2006).

66. *See id.*

67. 499 U.S. 315, 322-23, 325 (1991).

68. *Id.* at 334.

9th Circuit Court of Appeals held that the United States was not entitled to immunity under the discretionary function exception after an irrigation canal designed by the government broke and caused property damage and injury. The *Kennewick* court held that the United States was not entitled to immunity because the design of the canal was not in accordance with agency safety standards.⁶⁹ In *Kennewick*, the court stated, “[o]nce the government, having balanced economic, social and political policy considerations, adopts safety standards in the form of specific and mandatory regulations or policy, employees do not have any discretion to violate these standards.”⁷⁰

As *Gaubert* and *Kennewick* illustrate, a claim will only fall outside the purview of the FTCA’s discretionary function exception when the government creates and fails to adhere to specific oversight it imposes upon itself.⁷¹ Despite this scope-limiting exception, the FTCA has played an instrumental role in providing relief to victims of aviation accidents caused by government negligence. The attenuation of sovereign immunity, even in a limited context, has notable practical and symbolic importance. It discredits the notion that the government “can do no wrong” and ensures greater accountability for government wrongdoing.⁷² With increased accountability, government agencies are more likely to conduct a cost-benefit analysis and engage in safe decision making. Additionally, exposure to liability allows recourse for wronged individuals who otherwise bear the entire cost of the injury.⁷³

In order to recover under the FTCA, an injured claimant must prove that a government act or omission breached the government’s duty of care. Accordingly, a comprehensive understanding of the scope of the FTCA requires an understanding of how responsibility, or duty of care, is apportioned between relevant stakeholders in aviation.

2. Apportionment of Duty

Pilots, airline carriers, aircraft owners, FAA personnel, and airport and airfield landing owners and operators each owe a duty of care. Currently, an airline carrier is obliged to provide a safe and well-equipped plane, a skilled pilot, and “owes a duty of utmost care and vigilance of a very cautious person towards its passengers.”⁷⁴ “Act[s] of

69. *Kennewick Irrigation Dist. v. United States*, 880 F.2d 1018, 1031 (9th Cir. 1989).

70. *Id.* at 1026-27.

71. *See* *McMichael v. United States*, 856 F.2d 1026, 1033 (8th Cir. 1988) (holding that acts of government inspectors were not discretionary where the inspectors failed to follow a 51-part checklist for safety compliance).

72. Chemerinsky, *supra* note 56, at 1202.

73. *Id.* at 1217.

74. Romualdo P. Enclavea & Barbara J. Van Arsdale, *Civil Liability for Injuries from*

God” and “inevitable accident[s]” are not within the scope of an airline carrier’s responsibility when the airline carrier has responded to a situation with a degree of care and skill.⁷⁵ Airline carriers may be found responsible for the negligence of a pilot through vicarious liability. Vicarious liability is a tort doctrine that assigns liability to a party that did not cause the injury, but who has a particular legal relationship to the party that acted negligently. The employer-employee relationship is one of the particular legal relationships that implicates vicarious liability.⁷⁶

A pilot’s duty of care is established under Federal Aviation Regulations and the FAA *Airman’s Information Manual*. Under this duty, a pilot is directly responsible⁷⁷ and has final authority for the operation of the aircraft.⁷⁸ However, before a pilot can be held legally responsible for the aircraft “he must know, or be held to have known, those facts which were then material to its safe operation.”⁷⁹ Controllers must warn pilots of dangers that are reasonably apparent to a controller but not apparent to the pilot in the exercise of due care, even if the controller is not required to do so under Federal Aviation Regulations and Air Traffic Control manuals.⁸⁰

Controllers and other FAA personnel also owe a duty of reasonable care⁸¹ to provide for the “safe, orderly, and expeditious flow of air traffic.”⁸² Air Traffic Control manuals impose a duty to provide clearance and information to pilots and impose a duty to warn pilots of dangerous situations.⁸³ Controllers are not under a duty to act in emergency situations and are required to “exercise [their] best judgment”⁸⁴ when confronted by a situation not accounted for in aviation manuals.⁸⁵

When a controller has provided a pilot with sufficient information, a controller is usually found to have met his duty of care. For example, in

Operation of Aircraft, 8A AM. JUR. 2D AVIATION § 117 (2014).

75. Mary G. Leary, *Handling Aviation Disaster Cases*, 82 AM. JUR. TRIALS 243§ 4 (2002).

76. BLACK’S LAW DICTIONARY 1055 (9th ed. 2009).

77. Pilots may be found directly liable for negligence and airline carriers may be found vicariously liable for pilot negligence.

78. *Am. Airlines, Inc. v. United States*, 418 F.2d 180, 193 (5th Cir. 1969).

79. *Id.* at 192 (citing *Hartz v. United States*, 387 F.2d 870, 873 (5th Cir. 1968)). A “pilot is charged with that knowledge which in the exercise of the highest degree of care he should have known.” *Id.* at 193.

80. *Id.*

81. Wilson et al., *supra* note 50, at 12.

82. 14 C.F.R. § 65.45(a).

83. Eclavea & Van Arsdale, *supra* note 74.

84. *Dyer v. United States*, 551 F. Supp. 1266, 1276 (W.D. Mich. 1982) (citing *Ward v. United States*, 462 F. Supp. 667 (N.D. Tex. 1978)); *Deal v. United States*, 413 F. Supp. 630, 639 (W.D. Ark. 1976); *see also Daley v. United States*, 792 F.2d 1081, 1085 (11th Cir. 1986).

85. Wilson et al., *supra* note 50, at 12.

American Airlines, Inc. v. United States, a commercial aircraft descended 225 feet below its intended elevation while trying to land in poor weather conditions.⁸⁶ FAA personnel were not held liable because there was no external force that caused the crash and controllers did not mislead or adversely affect the pilot's ability to exercise the "highest degree of care."⁸⁷ Because controllers informed the pilot of the poor weather conditions, the District Judge affirmed that controllers neither transmitted nor omitted information that caused the aircraft to descend to a low altitude and crash.⁸⁸ Since the pilot has final authority for the operation of the aircraft and knew the facts that were material to its safe operation, the pilot's negligence was held to be the sole cause of the crash and the airline was found liable.⁸⁹

A federal district court reached the opposite conclusion in the 1994 case *Webb v. United States*.⁹⁰ In *Webb*, FAA personnel failed to warn a pilot of dangerous weather and airport conditions.⁹¹ The pilot contacted Air Traffic Control and received misleading and inaccurate information concerning the weather and airport conditions.⁹² The *Webb* court held that while the pilot of the aircraft is responsible for apprising himself of weather information before and during the flight, controllers have a duty to provide the pilot with an accurate and complete response to information that the pilot requests.⁹³ Accordingly, the *Webb* court found the FAA negligent under the FTCA.⁹⁴

Webb and *American Airlines* illustrate that the government is exposed to liability under the FTCA when controllers and other FAA personnel mislead or adversely affect a pilot's ability to exercise a high duty of care, or neglect to provide a pilot with an accurate and complete response to requested information. Under the radar system, FAA personnel play an instrumental role in ensuring aircraft safety. Pilots depend on FAA personnel for weather and positioning information through voice communication, and the FTCA serves to ensure that controllers relay accurate information. Given the instrumental role of FAA personnel, the FTCA appropriately incentivizes safe decision making by exposing the government to limited liability in the event of negligence by FAA personnel.

86. *Am. Airlines, Inc. v. United States*, 418 F.2d 180, 193 (5th Cir. 1969).

87. *Id.*

88. *Id.* at 195.

89. *Id.* at 193.

90. *Webb v. United States*, 840 F. Supp. 1484 (D. Utah 1994).

91. The *Webb* Court found the FAA concurrently negligent based on the actions and omissions of flight service specialists and controllers, both of which are FAA personnel.

92. *Webb*, 840 F. Supp. at 1491.

93. *Id.* at 1514.

94. *Id.* at 1521.

Yet, under NextGen, the role of pilots, airline carriers, and FAA personnel will shift drastically. Since an owed duty of care is a necessary condition of relief under the FTCA, a shift in the apportionment of duty between airline carriers, pilots, and FAA personnel affects the ability to receive relief under the FTCA. A shift in the apportionment of duty could change the outcome in cases like *Webb* and transform the importance of the FTCA in aviation.

III. THE IMPACT OF NEXTGEN ON REGULATION

A. Shifting Apportionment of Duty under NextGen

The Data Communication System within NextGen will shift responsibilities among pilots, FAA personnel, and airline carriers and redefine each party's duty of care. Automated weather feed information, Air Traffic Management updates, and real-time visuals of airspace will give pilots more decision making control and autonomy. Instead of relying on controllers to provide accurate weather feeds, in-flight positioning, and clearance and runway approach guidance, pilots will have to use information provided through Data Communication technology to make their own decisions.

The changing duty owed by pilots under NextGen places increased demands on pilots and creates new responsibilities for airline carriers. According to the National Transportation Safety Board, pilot error is already the leading cause of aircraft accidents.⁹⁵ Ensuring a low probability of pilot error in the face of increased pilot responsibility under NextGen intensifies the importance of pilot training and education requirements.

While increasing standards for pilot training and education may seem simple, many obstacles stand in the way of ensuring a workforce of competent pilots under NextGen. Declining salary and benefits for industry pilots have already led to a deficit in pilot availability.⁹⁶ Additionally, pilot scarcity is expected to increase over the next decade because greater use of unmanned drones in the military has decreased conventional pilot recruitment and training.⁹⁷ The military-to-industry

95. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-13-36, GENERAL AVIATION SAFETY: ADDITIONAL FAA EFFORTS COULD HELP IDENTIFY AND MITIGATE SAFETY RISKS 31 (2012), <http://www.gao.gov/assets/650/649219.pdf>.

96. Justin Bachman, *Yes, There's a Pilot Shortage: Salaries Starting at \$21,000*, BUSINESSWEEK (Feb. 11, 2014), <http://www.businessweek.com/articles/2014-02-11/yes-theres-a-pilot-shortage-salaries-start-at-21-000>.

97. Joe Wolverton II, *U.S. Air Force Training More Drone, Than Traditional, "Pilots"*, NEW AMERICAN (Aug. 4, 2012 2:30 PM), <http://www.thenewamerican.com/tech/item/12322-drone-technology-accelerates-usaf-turns-attention-to-training-drone-pilots>.

pilot pipeline has traditionally played an integral role in ensuring competent and experienced industry pilots. Accordingly, the reduction in military trained pilots is expected to have a substantial impact on commercial pilot availability in the next decade.⁹⁸

Declining supply of military-trained pilots, along with increased educational requirements, will likely require airline carriers to invest more than ever before in pilot recruitment and training. Because airline carriers have a duty to provide a skilled pilot, and because pilots will have more responsibility under NextGen, airline carriers will probably also increase investment in training to mitigate potential liability due to pilot error. The increase in pilot responsibility under NextGen will likely increase pilot salaries and present insurance premium changes for airline carriers.

Under NextGen, controller duties will shift from direct aircraft oversight to systems management. The most common mistakes by controllers in 2010 included errors in directing aircraft landing, spacing, altitude, and coordination errors between controllers.⁹⁹ Under NextGen, Data Communication technology will direct landing, aircraft spacing, pilot guidance, and altitude, and will eliminate the need for controller coordination over each individual aircraft. While NextGen will eliminate the potential of many controller mistakes, the drastic shift in controller duties also stands to impact the importance of the FTCA in aviation.

The shifting duties of controllers under NextGen may reduce government exposure to tort liability. A pilot has final authority for the operation of the aircraft as long as the pilot has knowledge material to the pilot's ability to exercise a high degree of care.¹⁰⁰ Under NextGen, all weather feed information will be automated and directly available to the pilot. Instead of a controller's failure to share requested weather information to a pilot, as in *Webb*,¹⁰¹ under NextGen, interference would likely take the form of a technical failure or a security breach. This is significant because the FTCA exposes the U.S. to tort liability for a negligent or wrongful act or omission by a government employee acting within the scope of employment.¹⁰² If a technical failure or security breach occurred under NextGen and the incident resulted from poor policy decisions or because of technological limitations, the incident

98. *Id.*

99. Ashley Halsey III, *FAA: Air Traffic Controllers Responsible for 7 'Catastrophic' Errors*, THE WASHINGTON POST (Sept. 12, 2013), <http://www.washingtonpost.com/blogs/dr-gridlock/wp/2013/09/12/faa-air-traffic-controllers-responsible-for-7-catastrophic-errors/>.

100. *Am. Airlines, Inc. v. United States*, 418 F.2d 180, 193 (5th Cir. 1969).

101. *Webb v. United States*, 840 F. Supp. 1484, 1518 (D. Utah 1994).

102. *F.D.I.C. v. Meyer*, 510 U.S. 471, 477 (1994); *Brown v. United States*, 653 F.2d 196, 201 (5th Cir. 1981) (element six "refers exclusively to state law.").

would likely fall under the discretionary function exception, making it unlikely that the government would be exposed to tort liability under the FTCA.

B. Marginalization of the FTCA under NextGen

As the role of FAA personnel shifts from direct aircraft oversight to systems management, and as safety concerns in aviation shift with the transition from radar to GPS technology, the FTCA will likely serve a less important role in aviation. It is unlikely that the FTCA will provide relief for aviation accidents resulting from technical limitations, and security protocol will likely fall within an exception of the FTCA.

In *Wojciechowicz et al. v. United States*, a suit was brought against Air Traffic Control after a family was killed when an aircraft crashed into a mountain.¹⁰³ The crash could have been avoided if FAA personnel had installed and used an Emergency Obstruction Video Map (EOVM) at the regional Air Traffic Control Facility, as required by FAA order.¹⁰⁴ The government argued that the FAA order was vague because it only required EOVM in Air Traffic Control facilities that provide services in “mountainous terrain.”¹⁰⁵ The *Wojciechowicz* court reasoned that the decision not to install the EOVM was based on “a genuine incertitude . . . within the FAA as to whether or not installation was mandated.”¹⁰⁶ The court asserted that the pilot was free to choose the plane’s course, speed, and altitude and that controllers had no duty to issue a weather report to the pilot or alert the pilot as to the plane’s unsafe proximity to terrain without the pilot’s request.¹⁰⁷ Because the pilot flew into a cloud with low visibility against FAA regulations and did not ask for assistance, the court found that omissions by controllers were not the immediate and proximate cause of the crash.¹⁰⁸

The *Wojciechowicz* case illustrates how technology has been treated in relation to the narrow scope of the FTCA. Not only will many decisions regarding NextGen fall under the discretionary function exception, but under the reasoning in *Wojciechowicz*, misinterpretations and misapplications of NextGen mandates could also fall outside the purview of government liability. Under NextGen, FAA personnel are still involved in making important decisions that impact the safety of aviation; yet, the decisions they make are more likely to fall under

103. *Wojciechowicz et al. v. United States*, 576 F. Supp. 2d 241 (D.P.R. 2008), *aff’d*, 582 F.3d 57 (1st Cir. 2009).

104. *Id.* at 263-64.

105. *Id.* at 264.

106. *Id.*

107. *Id.* at 260.

108. *Id.* at 277-78.

exceptions to the FTCA than under the radar paradigm. This enhanced discretion arguably reduces government accountability and reduces incentives for safe decision making.

For example, if a terrorist successfully hacked into the ADS-B system because the government failed to develop security protocols, the failure would likely fall under the discretionary function exception—even if the government knew of a security vulnerability and failed to act because of cost or efficiency concerns related to the potential security protocol. The government could argue that additional security protocol would diminish the functionality of the system and present monumental cost. Following the reasoning in *Kennewick*, because the decision was based on policy considerations and did not breach internal protocol, this argument would likely prevail. Essentially, the only way the government would be exposed to liability in this hypothetical is if it mandated its own security protocol but did not follow it. Yet, as *Wojciechowicz* illustrates, even a breach of an internal mandate would not necessarily expose the government to liability.

Consider the following hypothetical situation. The FAA issues an order to prohibit unauthorized commercial vehicles from entering a specified radius of an airport. This order is designed to prevent a situation where commercial vehicles with jamming equipment could inadvertently interfere with GPS signals, similar to what occurred at Newark Airport in 2009 and 2012. Because existing freeway and toll roads are within the specified radius at Newark Airport, and because rebuilding the airport or the freeway would not be economically feasible, personnel at Newark Airport interpret this rule to only apply to future road and airport development. Accordingly, the FAA personnel make no changes. A year following the FAA order, a commercial vehicle using jamming equipment stops for a break along the freeway turnpike and inadvertently interferes with the satellite signal upon which NextGen depends. An aircraft crashes as a result.

Under the FTCA, victims of the crash may only claim money damages against the United States for loss caused by a negligent or wrongful act or omission by a government employee acting within the scope of office or employment.¹⁰⁹ FAA personnel owe a duty to follow FAA orders, and in this hypothetical, FAA personnel breached this duty by finding the rule inapplicable. However, under the reasoning in *Wojciechowicz*, the government could argue that, like the FAA's failure to install EOVM safety technology pursuant to an FAA order, the failure to prevent unauthorized commercial vehicles within the specified radius

109. *F.D.I.C. v. Meyer*, 510 U.S. 471, 477 (1994); *Brown v. United States*, 653 F.2d 196, 201 (5th Cir. 1981).

of the airport was based on genuine incertitude, and was therefore not negligent. Furthermore, victims of the accident would have considerable difficulty proving causation. Both the failure to install EOVM technology in *Wojciechowicz*, and the failure to prohibit unauthorized commercial vehicles in the hypothetical, are not the proximate cause of the injury. Accordingly, a negligence claim under the FTCA would likely fail. These hypotheticals are examples of how NextGen technology will likely reduce the FTCA's importance in aviation.

IV. MAXIMIZING SAFETY IN AVIATION THROUGH POLICY

Sovereign immunity is considered necessary to protect the government treasury, prevent a government standstill caused by excessive litigation, and maintain separation of powers.¹¹⁰ Absolute sovereign immunity, however, reduces government accountability and individualized justice for citizens.¹¹¹ Limited waivers of sovereign immunity, such as that provided by the FTCA, allow for greater government accountability and justice while protecting the government from excessive liability. The transition to NextGen technology in aviation upsets the delicate balance between these competing interests traditionally provided by the FTCA.

The revolving duties of controllers, pilots, and airline carriers under NextGen will likely increase sovereign immunity and place increased liability on pilots and airline carriers. Increased sovereign immunity brought by NextGen technology reduces government accountability, individualized access to justice, and does not adequately deter wrongdoing in the future. Government officials will not have incentives to adequately weigh the costs and benefits of safety infrastructure under NextGen because unsafe decisions will likely fall under an exception to the FTCA.

It may be argued that democracy and the media adequately incentivize safe decision making by the government. No government official or agency desires a large-scale catastrophe in aviation; the shaming effect alone of such a disaster on the official or agency seems likely to deter unsafe decision making. Yet, competing interests of cost management and budget maintenance could lead to sacrifices in safety. While a tragic event would undoubtedly have a shaming effect on an

110. Elizabeth Kunderling Hocking, *Federal Facility Violations of the Resource Conservation and Recovery Act and the Questionable Role of Sovereign Immunity*, 5 ADMIN. L.J. 203, 204-205 (1991).

111. See Debra L. Stephens & Bryan P. Harnetiaux, *The Value of Government Tort Liability: Washington State's Journey from Immunity to Accountability*, 30 SEATTLE U. L. REV. 35, 36 (2006).

agency, costly decisions that may consume much of an agency's budget are difficult to make without the benefit of hindsight.

It could also be argued that the FTCA does not actually influence safe decision making in government agencies. It seems unlikely that an agency would choose safer equipment because of a potential lawsuit under the very narrow circumstances of liability under the FTCA. Yet, at the same time, agencies do take great strides to avoid liability. A primary aim of tort law is to deter future wrongdoing and provide relief for victims. While the actual influence of the FTCA on government decision making would be difficult to quantify, the FTCA currently has great practical and symbolic importance in aviation, especially to victims of government negligence. If harm is caused by a negligent decision made by an agency or official, it seems to violate basic notions of fairness for the cost of that harm to remain squarely on the victim.

The Supreme Court has established that sovereign immunity does not preclude an individual suit against a government official for personal wrongdoing.¹¹² It could be argued that this exposure to personal liability serves as an incentive for safe decision making. However, this argument has two flaws. First, it would be difficult to prove that a decision made by a single government official was the cause of interference or a security breach. Agency budgetary constraints, protocol, and policy considerations would further frustrate the ability to hold an individual accountable. Second, even if it were possible to pinpoint an individual government official, injured claimants would probably not receive adequate relief for the injury, especially in the event of a large-scale tragedy.

The security threats presented by the NextGen system are grave. Under radar technology, if a pilot does not receive positioning or weather information, the pilot is usually aware of the absent information and may request the absent information from a controller or the airline carrier.¹¹³ If the controller responds to the request with inaccurate or misleading information, recourse is available through the FTCA.¹¹⁴ However, under NextGen, all information relating to positioning and weather is available on a pilot's Data Communication display. If a hacker successfully added ghost planes or removed planes from the Data Communication System, the pilot would be unaware of missing material information and would not know to request additional information. Furthermore, because the misleading information did not come from the controller or agency, the FTCA would likely not provide recourse for victims, even if the security

112. *See* Kentucky v. Graham, 473 U.S. 159, 165 (1985).

113. *See* Webb v. United States, 840 F. Supp. 1484, 1512 (D. Utah 1994).

114. Gill v. United States, 429 F.2d 1072, 1075 (5th Cir. 1970).

vulnerability resulted from an agency decision. Given the dramatic changes that NextGen technology brings to aviation, law and policy should account for these changes and maintain the same incentives for safe decision making and access to individualized justice that are available under the radar system.

CONCLUSION

The need for more efficient use of U.S. airspace to meet growing demands in aviation requires a departure from the aging and limited radar system. However, the departure from the radar system presents a paradigm shift in aviation. NextGen brings new concerns regarding security and shifts duties among airline carriers, pilots, and FAA personnel. Airline carriers will likely take on more responsibility to ensure pilots receive a heightened level of education and training. Because pilot autonomy will increase under NextGen, airline carriers will likely face greater exposure to liability and government exposure to liability will likely decline. Reduced government exposure to liability has notable practical and symbolic importance. Reduced government liability limits accountability and recourse for individual citizens, and fails to deter future wrongdoing. With reduced accountability, government agencies will have fewer incentives to adequately weigh the costs and benefits of safety infrastructure. Given the considerable security concerns relating to the NextGen system, solutions should be explored to incentivize safe decision making and increase accountability under NextGen.

