

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2019

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____ Commission file number 1-16411

NORTHROP GRUMMAN CORPORATION

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

80-0640649

(I.R.S. Employer
Identification Number)

2980 Fairview Park Drive

Falls Church, Virginia

(Address of principal executive offices)

22042

(Zip code)

(703) 280-2900

(Registrant's telephone number, including area code)

Securities registered pursuant to section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock	NOC	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or 15(d) of the Act

Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.

Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).

Yes No

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act:

Large Accelerated Filer Accelerated Filer Smaller Reporting Company

Non-accelerated Filer Emerging Growth Company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act).

Yes No

As of June 30, 2019, the aggregate market value of the common stock (based upon the closing price of the stock on the New York Stock Exchange) of the registrant held by non-affiliates was approximately \$54.5 billion.

As of January 27, 2020, 167,637,130 shares of common stock were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of Northrop Grumman Corporation's Proxy Statement to be filed with the Securities and Exchange Commission pursuant to Regulation 14A for the 2020 Annual Meeting of Shareholders are incorporated by reference in Part III of this Form 10-K.

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PART I

Item 1. Business

HISTORY AND ORGANIZATION

History

Northrop Grumman Corporation (herein referred to as “Northrop Grumman,” the “company,” “we,” “us,” or “our”) is a leading global security company. We offer a broad portfolio of capabilities and technologies that enable us to deliver innovative platforms, systems and solutions for applications that range from undersea to outer space and into cyberspace. We provide capabilities in autonomous systems; cyber; command, control, communications and computers, intelligence, surveillance and reconnaissance (C4ISR); space; strike; and logistics and modernization. We participate in many high-priority defense and government programs in the United States (U.S.) and abroad. We conduct most of our business with the U.S. government, principally the Department of Defense (DoD) and intelligence community. We also conduct business with foreign, state and local governments, as well as commercial customers. For a discussion of risks associated with our operations, see “Risk Factors.”

The company originally was formed in Hawthorne, California, in 1939, as Northrop Aircraft Incorporated and was reincorporated in Delaware in 1985, as Northrop Corporation. Northrop Corporation was a principal developer of flying wing technology, including the B-2 Spirit bomber. The company developed into one of the largest defense contractors in the world through a series of acquisitions, as well as organic growth. In 1994, we acquired Grumman Corporation (Grumman), after which time the company was renamed Northrop Grumman Corporation. Grumman was a premier military aircraft systems integrator and builder of the Lunar Module that first delivered humans to the surface of the moon. In 1996, we acquired the defense and electronics businesses of Westinghouse Electric Corporation, a world leader in the development and production of sophisticated radar and other electronic systems for the nation’s defense, civil aviation, and other U.S. and international applications. In 2001, we acquired Litton Industries, Inc., a global electronics and information technology company, and one of the nation’s leading full service shipbuilders. Also in 2001, we acquired Newport News Shipbuilding Inc., a leading designer and builder of nuclear-powered aircraft carriers and submarines. In 2002, we acquired TRW Inc., a leading developer of military and civil space systems and payloads, as well as a leading global integrator of complex, mission-enabling systems and services. In 2011, we completed the spin-off to our shareholders of Huntington Ingalls Industries, Inc. (HII). HII operates our former Shipbuilding business, comprised largely of a part of Litton Industries and Newport News Shipbuilding.

On June 6, 2018 (the “Merger date”), the company completed its acquisition of Orbital ATK, Inc. (“Orbital ATK”) (the “Merger”). On the Merger date, Orbital ATK became a wholly-owned subsidiary of the company and its name was changed to Northrop Grumman Innovation Systems, Inc., which we established as a new, fourth business sector (“Innovation Systems”). The operating results of Innovation Systems subsequent to the Merger date have been included in the company’s consolidated results of operations. See Note 2 to the consolidated financial statements for further information regarding the acquisition of Orbital ATK.

Organization

At December 31, 2019, the company was aligned in four operating sectors, which also comprise our reportable segments: Aerospace Systems, Innovation Systems, Mission Systems and Technology Services.

Subsequent Realignment – Effective January 1, 2020, the company reorganized its sectors to better align the company’s broad portfolio to serve its customers’ needs. The four new sectors are: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems. This realignment is not reflected in the business descriptions below or in any of the accompanying financial information contained in this report.

AEROSPACE SYSTEMS

Aerospace Systems, headquartered in Redondo Beach, California, is a leader in the design, development, integration and production of manned aircraft, autonomous systems, spacecraft, high-energy laser systems, microelectronics and other systems and subsystems. Aerospace Systems’ customers, primarily the DoD and other U.S. government agencies, use these systems in mission areas including intelligence, surveillance and reconnaissance (ISR), strike operations, communications, earth observation and space science. The sector is reported in three business areas, which reflect our core capabilities: Autonomous Systems, Manned Aircraft and Space.

Autonomous Systems – designs, develops, manufactures, integrates and sustains autonomous aircraft systems for tactical and strategic ISR missions. Key programs include high-altitude long-endurance (HALE) systems, such as the Global Hawk system, which provides near real-time high resolution imagery of land masses for theater awareness; the Triton system, which provides real-time ISR over vast ocean and coastal regions for maritime domain

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awareness; the North Atlantic Treaty Organization (NATO) Alliance Ground Surveillance (AGS) system for multinational theater operations; and the ship-based vertical take off and landing (VTOL) Fire Scout system, which provides situational awareness for maritime forces and precision targeting support.

Manned Aircraft – designs, develops, manufactures and integrates long-range strike aircraft systems, airborne C4ISR systems, tactical aircraft systems and directed energy systems. Key long-range strike aircraft programs include the B-21 Raider long-range strike bomber and modernization and sustainment services for the B-2 Spirit bomber. Key airborne C4ISR programs include the E-2D Advanced Hawkeye and Joint Surveillance Target Attack Radar System (JSTARS). Tactical aircraft programs include the design, development, manufacture and integration of F-35 Lightning II center fuselage and F/A-18 Super Hornet center/aft fuselage sections. Directed energy involves the design, development and integration of laser weapon systems for air, ground, and sea platforms and production of the Airborne Laser Mine Detection System for the U.S. Navy and international customers.

Space – designs, develops, manufactures and integrates spacecraft systems, subsystems, sensors and communications payloads in support of space C4ISR and science missions. Much of this business is performed through restricted programs. Key unrestricted programs include the James Webb Space Telescope (JWST), a large infrared telescope being built for the National Aeronautics and Space Administration (NASA) that will be deployed in space to study the origins of the universe; Advanced Extremely High Frequency (AEHF) and Enhanced Polar System (EPS) payloads providing survivable, protected communications to U.S. forces; and Next-Generation Overhead Persistent Infrared Program (OPIR) satellites and payloads and Space-Based Infrared System (SBIRS) payloads providing data for missile surveillance, missile defense, technical intelligence and battlespace characterization.

INNOVATION SYSTEMS

Innovation Systems, headquartered in Dulles, Virginia, is a leader in the design, development, integration and production of flight, armament and space systems to enable national security, civil government and commercial customers to achieve their critical missions. Major products include launch vehicles and related propulsion systems; missile products and defense electronics; precision weapons, armament systems and ammunition; satellites and associated space components and services; and advanced aerospace structures. The sector is reported in three business areas, which reflect our core capabilities: Defense Systems, Flight Systems and Space Systems.

Defense Systems – develops and produces small-, medium- and large-caliber ammunition; precision weapons and munitions; high-performance gun systems; and propellant and energetic materials. Operations include the Lake City Army Ammunition Plant in Independence, Missouri, and a Naval Sea Systems Command facility in Rocket Center, West Virginia. Competencies include tactical solid rocket motor development and production for a variety of air-, sea- and land-based missile systems propulsion control systems that support U.S. Missile Defense Agency (MDA) and NASA programs; airborne missile warning systems; advanced fuzes and defense electronics. Key programs include the U.S. Navy's Advanced Anti-Radiation Guided Missile (AARGM) and the development of advanced air-breathing propulsion systems and special-mission aircraft for defense applications.

Flight Systems – designs, develops and manufactures small- and medium-class space launch vehicles to place satellites into earth orbit and escape trajectories; interceptor and target vehicles for missile defense systems; and suborbital launch vehicles that place payloads into a variety of high-altitude trajectories. Competencies also include the production of medium- and large-class rocket propulsion systems for human and cargo launch vehicles; missile defense interceptors; and target vehicles. Key programs include the development and production of solid rocket motors for NASA's Space Launch System (SLS) heavy lift vehicle; interceptor boosters for the MDA Ground-based Midcourse Defense (GMD) system; the Antares rocket used in the execution of our Commercial Resupply Services (CRS) contracts with NASA; medium-class solid rocket motors for the U.S. Navy's Trident II Fleet Ballistic Missile program; and production of the majority of the composite fuselage stringers and frames for the Airbus A350 XWB wide-body passenger jetliner.

Space Systems – develops and produces small- and medium-class satellites for global and regional communications and broadcasting, space-related scientific research and national security; human-rated space systems for earth orbit and deep-space exploration, including delivering cargo to the International Space Station (ISS); and spacecraft components and subsystems as well as specialized engineering and operations services to U.S. government agencies. Key programs include the Cygnus spacecraft used in the execution of our CRS contracts with NASA, restricted national security space programs and science and environmental satellite programs.

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MISSION SYSTEMS

Mission Systems, headquartered in Linthicum, Maryland, is a leader in advanced end-to-end mission solutions and multifunction systems for DoD, intelligence community, international, federal-civil and commercial customers. Major products and services include C4ISR systems; radar, electro-optical/infrared (EO/IR) and acoustic sensors; electronic warfare systems; cyber solutions; space systems; intelligence processing systems; air and missile defense (AMD) integration; navigation; and shipboard missile and encapsulated payload launch systems. The sector is reported in three business areas, which reflect our core capabilities: Advanced Capabilities, Cyber and ISR and Sensors and Processing.

Advanced Capabilities – provides integration and interoperability of net-enabled battle management, sensors, targeting and surveillance systems; air and missile defense command and control (C2); and global battlespace awareness. It also delivers products, systems and services that support maritime platforms and embedded navigation and positioning sensors for a range of platforms including ships, aircraft, spacecraft and weapons. Competencies include advanced AMD integration with land, air and space assets; shipboard missile and encapsulated payload launch systems; unmanned maritime vehicles and high-resolution undersea sensors; and inertial navigation systems. Key programs include the Integrated Air and Missile Defense Battle Command System (IBCS); Ground-based Midcourse Defense (GMD) system; Surface Electronic Warfare Improvement Program (SEWIP) Block III; the Embedded Global Positioning System (GPS)/Inertial Navigation Systems-Modernization; AQS-24B Minehunting System; and Trident and Virginia-Class payload launch systems.

Cyber and ISR – delivers products, systems and services that support full-spectrum cyber solutions, space-based payload and exploitation systems, space-based communications, C2 and processing systems, and enterprise integration of multi-intelligence mission data across all domains. Competencies include cyber mission management; large-scale cyber solutions for national security applications; missile warning and defense systems; weather and satellite communications; ground software systems; and geospatial intelligence and data fusion, specializing in the collection, processing and exploitation of data. Key programs include exploitation and cyber programs; operational services to the United States Computer Emergency Readiness Team (US-CERT); worldwide IT coverage and support services through Solutions for the Information Technology Enterprise (SITE); the Enterprise Application Managed Services (EAMS) program; the Unified Platform System Coordinator program; and restricted programs.

Sensors and Processing – delivers products, systems and services that support ground-based and fixed wing and rotary wing aircraft platforms with radar, electronic warfare, C2, Signals Intelligence (SIGINT), and situational awareness mission systems. Competencies include targeting, surveillance, air defense and early warning & control radar systems; EO/IR and radio frequency (RF) self-protection, targeting and surveillance systems; electronic attack and electronic support systems; communications and intelligence systems; digitized cockpits; and multi-sensor processing. Key programs include Airborne Early Warning & Control (AEW&C) and air-to-ground sensors; Battlefield Airborne Communications Node (BACN); F-35 fire control radar, Distributed Aperture System (DAS), and Communications, Navigation and Identification (CNI) integrated avionics system; Ground/Air Task Oriented Radar (G/ATOR); Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW); RF and Infrared Countermeasures (IRCM) programs for both fixed wing and rotary wing platforms; EO/IR targeting and surveillance programs; Scalable Agile Beam Radar (SABR); UH-60V Black Hawk integrated mission equipment package; and restricted programs.

TECHNOLOGY SERVICES

Technology Services, headquartered in Herndon, Virginia, is a leader in delivering full life-cycle solutions and services in support of mission-critical networks and systems including: sustainment, modernization, training and simulation, software, engineering services, cyber, rapidly-deployable global logistics and information technology. Customers include the DoD, federal, civilian and health agencies, and international customers. The sector is reported in two business areas, which reflect our core capabilities: Global Logistics and Modernization and Global Services.

Global Logistics and Modernization – provides global logistics support, sustainment, operations and modernization for air, sea and ground systems and weapon system components. Competencies include aircraft, electronics and software sustainment and engineering; electronic warfare/attack and avionics/electronics subsystems modernization; supply chain management; manned and unmanned weapon systems deployed logistics support; field services, on-going maintenance and technical assistance; and rapid response in support of global customers. Capabilities include: integration, delivery and global support of unmanned special mission aircraft solutions for platforms such as the MQ-5B Hunter, Global Hawk and Triton autonomous systems; subsystem and component-level depot repair and modernization for electronic/avionic products such as AAQ-24, APN-241, ALQ-135 and ALQ-131A sensors; missile sustainment and modernization solutions for the Intercontinental Ballistic Missile Minuteman III; and weapon

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systems sustainment, refurbishment, overhaul, modernization and contractor logistics support for several unique small fleet, high-demand platforms, including the B-2 Spirit bomber, JSTARS E-8 surveillance aircraft, KC-30A multi-role tanker, C-27J transport, UK E-3D Airborne Early Warning and Control System, and special mission electronic surveillance aircraft.

Global Services – provides information technology and mission support services to our customers in defense, civil, health and restricted arenas; delivers technology differentiated services to modernize and sustain mission critical IT systems, improve the health of people, and strengthen the security of the U.S. and its allies. From an information technology perspective, Global Services supports the full software life cycle providing software development, sustainment and modernization services as well as delivering secure and resilient next generation information solutions that enable customer missions. Our services and solutions include agile/DevSecOps, legacy modernization, mission information processing and analytics, cybersecurity, cloud migration and services, and secure networks and infrastructure. From a mission support perspective, we deliver the people and services supporting cyber operations, systems engineering and scientific analysis. We also deliver the full range of training services, from individual training products and courseware to networked and integrated live, virtual and constructive training systems.

SELECTED FINANCIAL DATA

For a summary of selected consolidated financial information, see “Selected Financial Data” under Part II - Item 6.

CUSTOMER CONCENTRATION

Our largest customer is the U.S. government. Sales to the U.S. government accounted for 83 percent, 82 percent and 85 percent of sales during the years ended December 31, 2019, 2018 and 2017, respectively. For further information on sales by customer type, contract type and geographic region, see Note 6 to the consolidated financial statements. No single program accounted for more than ten percent of total sales during any period presented. See “Risk Factors” for further discussion regarding risks related to customer concentration.

COMPETITIVE CONDITIONS

We compete with many companies in the defense, intelligence and federal civil markets. BAE Systems, Boeing, Booz Allen Hamilton, General Dynamics, L3Harris Technologies, Leidos, Leonardo, Lockheed Martin, Raytheon and Thales are some of our primary competitors. Key characteristics of our industry include long operating cycles and intense competition, which is evident through the number of competitors bidding on program opportunities and the number of bid protests (competitor protests of U.S. government procurement awards).

It is common in the defense industry for work on major programs to be shared among a number of companies. A company competing to be a prime contractor may, upon ultimate award of the contract to another competitor, become a subcontractor to the ultimate prime contracting company. It is not unusual to compete for a contract award with a peer company and, simultaneously, perform as a supplier to or a customer of that same competitor on other contracts, or vice versa.

SEASONALITY

No material portion of our business is considered to be seasonal.

BACKLOG

At December 31, 2019, total backlog, which is equivalent to the company’s remaining performance obligations, was \$64.8 billion as compared with \$53.5 billion at December 31, 2018. For further information, see “Backlog” in “Management’s Discussion and Analysis of Financial Condition and Results of Operations” (MD&A) and Note 1 to the consolidated financial statements.

INTELLECTUAL PROPERTY

We routinely apply for and own a number of U.S. and foreign patents related to the technologies we develop. We also develop and protect intellectual property as trade secrets. In addition to owning a large portfolio of proprietary intellectual property, we license some intellectual property rights to third parties and we license or otherwise obtain access to intellectual property from third parties. The U.S. government typically holds licenses to patents developed in the performance of U.S. government contracts and may use or authorize others to use the inventions covered by these patents for certain purposes. See “Risk Factors” for further discussion regarding risks related to intellectual property.

RAW MATERIALS

We have not experienced significant delays in the supply or availability of raw materials, nor have we experienced a significant price increase for raw materials. See “Risk Factors” for further discussion regarding risks related to raw materials.

EMPLOYEE RELATIONS

We believe that we maintain good relations with our approximately 90,000 employees. Approximately 5,000 are covered by 17 collective agreements in the U.S., of which we negotiated two renewals and one new agreement in 2019 and expect to negotiate six renewals in 2020. See “Risk Factors” for further discussion regarding risks related to employee relations.

REGULATORY MATTERS

Government Contract Security Restrictions

We are prohibited by the U.S. government from publicly discussing the details of certain classified programs. These programs are generally referred to as “restricted” in this Annual Report. The consolidated financial statements and financial information in this Annual Report reflect the operating results of our entire company, including restricted programs.

Contracts

We generate the majority of our business from long-term contracts with the U.S. government for development, production and support activities. Unless otherwise specified in a contract, allowable and allocable costs are billed to contracts with the U.S. government pursuant to the Federal Acquisition Regulation (FAR) and U.S. government Cost Accounting Standards (CAS). Examples of costs incurred by us and not billed to the U.S. government in accordance with the FAR and CAS include, but are not limited to, certain legal costs, charitable donations, advertising costs, interest expense and unallowable employee compensation costs.

We monitor our contracts on a regular basis for compliance with our policies and procedures and applicable government laws and regulations. In addition, costs incurred and allocated to contracts with the U.S. government are routinely audited by the Defense Contract Audit Agency (DCAA).

Our long-term contracts typically fall into one of two contract types:

Cost-type contracts – Cost-type contracts include cost plus fixed fee, cost plus award fee and cost plus incentive fee contracts. Cost-type contracts generally provide for reimbursement of a contractor’s allowable costs incurred plus fee. As a result, cost-type contracts have less financial risk associated with unanticipated cost growth but generally provide lower profit margins than fixed-price contracts. Cost-type contracts typically require that the contractor use its best efforts to accomplish the scope of the work within some specified time and stated dollar limitation. Fees on cost-type contracts can be fixed in terms of dollar value or can be variable due to award and incentive fees, which are generally based on performance criteria such as cost, schedule, quality and/or technical performance. Award fees are determined and earned based on customer evaluation of the company’s performance against contractual criteria. Incentive fees are generally based on cost or schedule and provide for an initially negotiated fee to be adjusted later, based on the relationship of total allowable costs to total target costs or as schedule milestones are met. Award and incentive fees are included in total estimated sales to the extent it is probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. We estimate variable consideration as the most likely amount to which we expect to be entitled.

Fixed-price contracts – Firm fixed-price contracts include a specified scope of work for a price that is a pre-determined, negotiated amount and not generally subject to adjustment regardless of costs incurred by the contractor, absent changes in scope by the customer. As a result, fixed-price contracts have more financial risk associated with unanticipated cost growth, but generally provide the opportunity for higher profit margins than cost-type contracts. Certain fixed-price incentive fee contracts provide for reimbursement of the contractor’s allowable costs plus a fee up to a cost ceiling amount, typically through a cost-sharing ratio that affects profitability. These contracts effectively become firm fixed-price contracts once the cost-share ceiling is reached. Time-and-materials contracts are considered fixed-price contracts as they specify a fixed hourly rate for each labor hour charged.

Profit margins on our contracts may vary materially depending on, among other things, the contract type, contract phase (e.g., development, low-rate production or mature production), negotiated fee arrangements, achievement of performance objectives, and cost, schedule and technical performance.

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See Note 1 to the consolidated financial statements and “Risk Factors” for further information regarding our contracts and Note 6 to the consolidated financial statements for sales by contract type.

The following table summarizes sales for the year ended December 31, 2019, recognized by contract type and customer category:

<i>\$ in millions</i>	U.S. Government ⁽¹⁾		International ⁽²⁾		Other Customers		Total	Percentage of Total Sales
Cost-type contracts	\$	15,720	\$	683	\$	76	\$ 16,479	49%
Fixed-price contracts		12,214		4,471		677	17,362	51%
Total sales	\$	27,934	\$	5,154	\$	753	\$ 33,841	100%

⁽¹⁾ Sales to the U.S. government include sales from contracts for which we are the prime contractor, as well as those for which we are a subcontractor and the ultimate customer is the U.S. government. Each of the company’s segments derives substantial revenue from the U.S. government.

⁽²⁾ International sales include sales from contracts for which we are the prime contractor, as well as those for which we are a subcontractor and the ultimate customer is an international customer. These sales include foreign military sales contracted through the U.S. government.

Environmental

Our operations are subject to and affected by federal, state, local and foreign laws, regulations and enforcement actions relating to protection of the environment. In 2015, we announced our 2020 environmental sustainability goals: to reduce absolute greenhouse gas emissions by 30 percent from 2010 levels; to reduce potable water use by 20 percent from 2014 levels; and to achieve a 70 percent solid waste diversion rate (away from landfills).

We have incurred and expect to continue to incur capital and operating costs to comply with applicable environmental laws and regulations and to achieve our environmental sustainability commitments. See “Risk Factors” and Notes 1 and 12 to the consolidated financial statements for further information regarding environmental matters.

EXECUTIVE OFFICERS

See “Directors, Executive Officers and Corporate Governance” for information about our executive officers.

AVAILABLE INFORMATION

Our principal executive offices are located at 2980 Fairview Park Drive, Falls Church, Virginia 22042. Our telephone number is (703) 280-2900 and our home page is www.northropgrumman.com.

Our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and proxy statement for the annual shareholders’ meeting, as well as any amendments to those reports, are available free of charge through our website as soon as reasonably practicable after we file them with the U.S. Securities and Exchange Commission (SEC). You can learn more about us by reviewing our SEC filings on the investor relations page of our website.

The SEC also maintains a website at www.sec.gov that contains reports, proxy statements and other information about SEC registrants, including Northrop Grumman Corporation.

References to our website and the SEC’s website in this report are provided as a convenience and do not constitute, and should not be viewed as, incorporation by reference of the information contained on, or available through, such websites. Such information should not be considered a part of this report, unless otherwise expressly incorporated by reference in this report.

Item 1A. Risk Factors

Our consolidated financial position, results of operations and cash flows are subject to various risks, many of which are not exclusively within our control, that may cause actual performance to differ materially from historical or projected future performance. We encourage you to consider carefully the risk factors described below in evaluating the information contained in this report as the outcome of one or more of these risks could have a material adverse effect on our financial position, results of operations and/or cash flows.

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- ***We depend heavily on a single customer, the U.S. government, for a substantial portion of our business. Changes in this customer's priorities and spending could have a material adverse effect on our financial position, results of operations and/or cash flows.***

Our primary customer is the U.S. government, from which we derived 83 percent of our sales in 2019; we have a number of large programs with the U.S. Air Force, in particular. The U.S. government has been implementing significant changes and spending levels have fluctuated and may continue to fluctuate over time. We cannot predict the impact on existing, follow-on, replacement or future programs from potential changes in priorities due to changes in defense spending levels, the threat environment, procurement strategy, military strategy and planning and/or changes in social, economic or political priorities. The U.S. government also has the ability to delay, modify or cancel ongoing competitions, procurements and programs, as well as to change its acquisition strategy.

The U.S. government generally has the ability to terminate contracts, in whole or in part, for its convenience or for default based on performance. In the event of termination for the U.S. government's convenience, contractors are generally protected by provisions covering reimbursement for costs incurred on the contracts and profit on those costs up to the amount authorized under the contract, but not the anticipated profit that would have been earned had the contract been completed. Termination by the U.S. government of a contract due to default could require us to pay for re-procurement costs in excess of the original contract price, net of the value of work accepted from the original contract, as well as other damages. Termination of a contract due to our default could have a material adverse effect on our reputation, our ability to compete for other contracts and our financial position, results of operations and/or cash flows.

The U.S. government also has the ability to stop work under a contract for a limited period of time for its convenience. It is possible that the U.S. government could invoke this ability across a limited or broad number of contracts. In the event of a stop work order, contractors are typically protected by provisions covering reimbursement for costs incurred on the contract to date and for costs associated with the temporary stoppage of work on the contract plus a reasonable fee. However, such temporary stoppages and delays could introduce inefficiencies and result in financial and other damages for which we may not be able to negotiate full recovery from the U.S. government. They could also ultimately result in termination of a contract (or contracts) for convenience or reduced future orders.

A significant shift in government priorities, programs or acquisition strategies could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Significant delays or reductions in appropriations for our programs and U.S. government funding more broadly may negatively impact our business and programs and could have a material adverse effect on our financial position, results of operations and/or cash flows.***

U.S. government programs are subject to annual congressional budget authorization and appropriation processes. For many programs, Congress appropriates funds on an annual fiscal year basis even though the program performance period may extend over several years. Consequently, programs are often partially funded initially and additional funds are committed only as Congress makes further appropriations. If we incur costs in excess of funds obligated on a contract, we may be at risk for reimbursement of those costs unless and until additional funds are obligated to the contract. We cannot predict the extent to which total funding and/or funding for individual programs will be included, increased or reduced as part of the annual appropriations ultimately approved by Congress and the President or in separate supplemental appropriations or continuing resolutions, as applicable. Laws and plans adopted by the U.S. government relating to, along with pressures on and uncertainty surrounding the federal budget, potential changes in priorities and defense spending levels, sequestration, the appropriations process, use of continuing resolutions (with restrictions, e.g., on new starts) and the permissible federal debt limit, could adversely affect the funding for individual programs and delay purchasing or payment decisions by our customers. In the event government funding for our significant programs becomes unavailable, or is reduced or delayed, or planned orders are reduced, our contract or subcontract under such programs may be terminated or adjusted by the U.S. government or the prime contractor.

The U.S. continues to face an uncertain political environment and substantial fiscal and economic challenges, which affect funding for discretionary and non-discretionary budgets. The Budget Control Act of 2011 (BCA) mandated spending caps for all federal discretionary spending across a ten-year period (FY 2012 through FY 2021), including specific limits for defense and non-defense spending. In prior years, these spending caps have been revised by separate bills for specific fiscal years.

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In 2019, the President proposed an FY 2020 budget requesting \$750 billion for national security. The President's budget request addresses various capabilities highlighted in the U.S. National Security Strategy, the National Defense Strategy and the Missile Defense Review. On August 2, 2019, the Bipartisan Budget Act of 2019 was enacted, increasing spending caps under the Budget Control Act (BCA) for FY 2020 and FY 2021, the final two fiscal years covered by the BCA, and suspending the debt ceiling through July 31, 2021. On December 20, 2019, FY 2020 appropriations for all federal agencies were enacted, representing a 3 percent increase from FY 2019.

The budget environment and uncertainty surrounding the appropriations processes and the debt ceiling, remain significant short and long-term risks. Considerable uncertainty exists regarding how future budget and program decisions will unfold, including the defense spending priorities of the Administration and Congress, and what challenges budget reductions will present for the defense industry. If annual appropriations bills are not timely enacted, the U.S. government may continue to operate under a continuing resolution, restricting new contract or program starts, presenting resource allocation challenges and placing limitations on some planned program budgets, and we may face another government shutdown of unknown duration. If a prolonged government shutdown of the DoD were to occur, it could result in program cancellations, disruptions and/or stop work orders and could limit the U.S. government's ability effectively to progress programs and to make timely payments, and our ability to perform on our U.S. government contracts and successfully compete for new work.

We believe continued budget pressures would have serious negative consequences for the security of our country, the defense industrial base, including Northrop Grumman, and the customers, employees, suppliers, investors and communities that rely on companies in the defense industrial base. It is likely budget and program decisions made in this environment would have long-term implications for our company and the entire defense industry.

Funding for certain programs in which we participate may be reduced, delayed or cancelled. In addition, budget cuts globally could adversely affect the viability of our subcontractors and suppliers, and our employee base. While we believe that our business is well-positioned in areas that the DoD and other customers have indicated are areas of focus for future defense spending, other defense spending cuts, challenges in the appropriations process, the debt ceiling and the ongoing fiscal debates remain uncertain.

Significant delays or reductions in appropriations; long-term funding under a continuing resolution; an extended debt ceiling breach or government shutdown; and/or future budget and program decisions, among other items, may negatively impact our business and programs and could have a material adverse effect on our financial position, results of operations and/or cash flows.

•We are subject to various investigations, claims, disputes, enforcement actions, litigation, arbitration and other legal proceedings that could ultimately be resolved against us.

The size, nature and complexity of our business make us susceptible to investigations, claims, disputes, enforcement actions, prosecutions, litigation and other legal proceedings, particularly those involving governments (including federal, state and outside the U.S.). We are and may become subject to investigations, claims, disputes, enforcement actions and administrative, civil or criminal litigation, arbitration or other legal proceedings globally and across a broad array of matters, including, but not limited to, government contracts, commercial transactions, false claims, false statements, antitrust, mischarging, contract performance, fraud, procurement integrity, products liability, warranty liability, the use of hazardous materials, personal injury claims, environmental, shareholder derivative actions, prior acquisitions and divestitures, intellectual property, tax, employees, export/import, anti-corruption, labor, health and safety, accidents, launch failures and employee benefits and plans, including plan administration, and improper payments, as well as matters relating to the former Orbital ATK, Inc., and our acquisition of that company, including the FTC decision and order related to it. These matters could divert financial and management resources; result in administrative, civil or criminal fines, penalties or other sanctions (which terms include judgments or convictions and consent or other voluntary decrees or agreements), compensatory, treble or other damages, non-monetary relief or actions, or other liabilities; and otherwise harm our business and our ability to obtain and retain awards. Government regulations provide that certain allegations against a contractor may lead to suspension or debarment from government contracts or suspension of export privileges for the company or one or more of its components. Suspension or debarment or criminal resolutions in particular could have a material adverse effect on the company because of our reliance on government contracts and export authorizations. An investigation, claim, dispute, enforcement action or litigation, even if not substantiated or fully indemnified or insured, could also negatively impact our reputation among our customers and the public, and make it substantially more difficult for us to compete effectively for business, obtain and retain awards or obtain adequate insurance in the future. Investigations, claims, disputes, enforcement actions, litigation or other legal proceedings could have a material adverse effect on our financial position, results of operations and/or cash flows.

▪ ***We use estimates when accounting for contracts. Contract cost growth or changes in estimated contract revenues and costs could affect our profitability and our overall financial position.***

Contract accounting requires judgment relative to assessing risks, estimating contract revenues and costs, and making assumptions regarding performance. Due to the size and nature of many of our contracts, the estimation of total revenues and costs at completion is complex and subject to many variables. Incentives, awards and/or penalties related to performance on contracts are considered in estimating revenue and profit rates when there is sufficient information to assess anticipated performance. Suppliers' expected performance is also assessed and considered in estimating costs and profitability.

Our operating income can be adversely affected when estimated contract costs increase. Reasons for increased estimated contract costs may include: design issues; changes in estimates of the nature and complexity of the work to be performed, including technical or quality issues or requests to perform additional work at the direction of the customer; production challenges, including those resulting from the availability and timeliness of customer funding, unavailability or reduced productivity of qualified and timely cleared labor or the effect of any delays in performance; the availability, performance, quality or financial strength of significant subcontractors; supplier issues, including the costs, timeliness and availability of materials and components; the effect of any changes in laws or regulations; actions deemed necessary for long-term customer satisfaction; and natural disasters or environmental matters. We may file requests for equitable adjustment or claims to seek recovery in whole or in part for our increased costs and aim to protect against these risks through contract terms and conditions when practical.

Our risk varies with the type of contract. Due to their nature, fixed-price contracts inherently tend to have more financial risk than cost-type contracts. In 2019, approximately half of our sales were derived from fixed-price contracts. We typically enter into fixed-price contracts where costs can be more reasonably estimated based on actual experience, such as for production programs. In addition, our contracts contain provisions relating to cost controls and audit rights. If the terms specified in our contracts are not met, our profitability may be reduced and we may incur a loss.

Our fixed-price contracts may include fixed-price development work. This type of work is inherently more uncertain as to future events than production contracts, and, as a result, there is typically more variability in estimates of the costs to complete the development stage. As work progresses through the development stage into production, the risks associated with estimating the total costs of the contract are typically reduced. While management uses its best judgment to estimate costs associated with fixed-price development contracts, future events could result in adjustments to those estimates.

Under cost-type contracts, allowable costs incurred by the contractor are generally subject to reimbursement plus a fee. We often enter into cost-type contracts for development programs with complex design and technical challenges. These cost-type programs typically have award or incentive fees that are subject to uncertainty and may be earned over extended periods or towards the end of the contract. In these cases, the associated financial risks are primarily in recognizing profit, which ultimately may not be earned, or program cancellation if cost, schedule, or technical performance issues arise. We also may face additional financial risk due to an increasing number of contract solicitations requiring the contractor to bid on cost-type development work and related fixed-price production lots and/or options in one submission, or cost-type development work requiring the contractor to provide certain items to the customer at the contractor's expense or at little or no fee.

Because of the significance of management's judgments and the estimation processes described above, it is possible that materially different amounts could be obtained if different assumptions were used or if the underlying circumstances were to change. Changes in underlying assumptions, circumstances or estimates, and the failure to prevail on claims for equitable adjustments could have a material adverse effect on the profitability of one or more of the affected contracts and on our overall financial position, results of operations and/or cash flows. See "Critical Accounting Policies, Estimates and Judgments" in MD&A.

▪ ***Our international business exposes us to additional risks, including risks related to geopolitical and economic factors, laws and regulations.***

Sales to customers outside the U.S. are an increasingly important component of our strategy. Our international business (including our participation in joint ventures and other joint business arrangements, and our global supply chain) is subject to numerous political and economic factors, legal requirements, cross-cultural considerations and other risks associated with doing business globally. These risks differ in some respects from those associated with our U.S. business and our exposure to such risks may increase if our international business continues to grow as we anticipate.

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Our international business is subject to both U.S. and foreign laws and regulations, including, without limitation, laws and regulations relating to export/import controls, sanctions, technology transfer restrictions, government contracts and procurement, data privacy and protection, investment, exchange rates and controls, the Foreign Corrupt Practices Act (FCPA) and other anti-corruption laws, the anti-boycott provisions of the U.S. Export Administration Act, labor and employment, works councils and other labor groups, anti-human trafficking, taxes, environment, immunity, security restrictions and intellectual property. Failure by us, our employees, affiliates, partners or others with whom we work to comply with applicable laws and regulations could result in administrative, civil, commercial or criminal liabilities, including suspension or debarment from government contracts or suspension of our export/import privileges. Our customers outside of the U.S. generally have the ability to terminate contracts for default based on performance. Suspension or debarment, or termination of a contract due to default, in particular, could have a material adverse effect on our reputation, our ability to compete for other contracts and our financial position, results of operations and/or cash flows. New regulations and requirements, or changes to existing ones in the various countries in which we operate can significantly increase our costs and risks of doing business internationally.

Changes in laws, regulations, political leadership and environment, and/or security risks may dramatically affect our ability to conduct or continue to conduct business in international markets, including sales to customers outside the U.S. and purchases from suppliers outside the U.S. Our international business may be impacted by changes in U.S. and foreign national policies and priorities, and geopolitical relationships, any of which may be influenced by changes in the threat environment, political leadership, geopolitical uncertainties, world events, bilateral and multi-lateral relationships, government budgets, and economic and political factors more generally, and any of which could impact funding for programs, our ability to perform and/or export authorizations, or delay purchasing decisions or customer payments. We also could be affected by the legal, regulatory and economic impacts of Britain's anticipated exit from the European Union, the full impact of which is not known at this time. Global economic conditions and fluctuations in foreign currency exchange rates could further impact our business. For example, the tightening of credit in financial markets outside of the U.S. could adversely affect the ability of our customers and suppliers to obtain financing and could result in a decrease in or cancellation of orders for our products and services or impact the ability of our customers to make payments.

Our contracts with non-U.S. customers may also include terms and reflect legal requirements that create additional risks. They may include industrial cooperation agreements requiring specific in-country purchases, investments, manufacturing agreements or other operational or financial obligations, including offset obligations, and provide for significant penalties if we fail to meet such requirements. They may also require us to enter into letters of credit, performance or surety bonds, bank guarantees and/or other financial arrangements to secure our performance obligations. We also increasingly are dependent on in-country suppliers and we face risks related to their failure to perform in accordance with the contracts and applicable laws, particularly where we rely on a sole source supplier. Our ability to sell products outside the U.S. could be adversely affected if we are unable to design our products for export on a cost effective basis or to obtain and retain all necessary export licenses and authorizations on a timely basis. We face risks related to our products that are approved for export, but may be subject to the U.S. government changing or canceling the export license after the product is ordered. Our ability to conduct business outside of the U.S. also depends on our ability to attract and retain sufficient qualified personnel with the skills and/or security clearances in the markets in which we do business.

More broadly, our ability effectively to pursue and execute contracts outside the U.S. also may be impacted by our ability to partner successfully with non-U.S. companies, including through joint ventures, teaming agreements, co-production or other arrangements, in support of such pursuits. This risk includes the ability to timely identify and negotiate appropriate arrangements with local partners as well as potential exposure for their actions. This risk may increase, depending on local requirements regarding who we partner with and under what circumstances, particularly where we are effectively required to partner with government-affiliated entities.

The products and services we provide internationally, including those provided by subcontractors and joint ventures in which we have an interest, are sometimes in countries with unstable governments, economic or fiscal challenges, military or political conflicts and/or developing legal systems. This may increase the risk to our employees, subcontractors or other third parties, and/or increase the risk of a wide range of liabilities, as well as loss of property or damage to our products.

The occurrence and impact of these factors is difficult to predict, but one or more of them could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Our reputation, our ability to do business and our financial position, results of operations and/or cash flows may be impacted by the improper conduct of employees, agents, subcontractors, suppliers, business partners or joint ventures in which we participate.***

We have implemented policies, procedures, training and other compliance controls, and have negotiated terms designed to prevent misconduct by employees, agents or others working on our behalf or with us that would violate the applicable laws of the jurisdictions in which we operate, including laws governing improper payments to government officials, the protection of export controlled or classified information, false claims, procurement integrity, cost accounting and billing, competition, information security and data privacy, or the terms of our contracts. However, we cannot ensure that we will prevent all such misconduct committed by our employees, agents, subcontractors, suppliers, business partners or others working on our behalf or with us. We have in the past experienced and may in the future experience such misconduct, despite a vigorous compliance program. This risk of improper conduct may increase as we continue to expand globally and do business with new partners. In the ordinary course of our business we form and are members of joint ventures (with that term used throughout to refer to joint efforts or business arrangements of any type). We may be unable to prevent misconduct or violations of applicable laws by these joint ventures (including their officers, directors and employees) or our partners. Improper actions by those with whom or through whom we do business (including our employees, agents, subcontractors, suppliers, business partners and joint ventures) could subject us to administrative, civil or criminal investigations and enforcement actions; monetary and non-monetary penalties; liabilities; and the loss of privileges and other sanctions, including suspension and debarment, which could negatively impact our reputation and ability to conduct business and could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Our business could be negatively impacted by cyber and other security threats or disruptions.***

As a defense contractor, we face various cyber and other security threats, including attempts to gain unauthorized access to and to harm sensitive information and networks; insider threats; threats to the safety of our directors, officers and employees; threats to the security and viability of our facilities, infrastructure and supply chain; and threats from terrorist acts or other acts of aggression. Our customers and partners (including our supply chain and joint ventures) face similar threats and growing requirements. Although we utilize various procedures and controls to monitor and mitigate the risk of these threats, there can be no assurance that these procedures and controls will be sufficient. These threats could lead to losses or misuse of sensitive information or capabilities; theft of data; harm to personnel, infrastructure or products; and financial liabilities, as well as damage to our reputation as a government contractor and provider of cyber-related or cyber-protected goods and services.

Cyber threats are evolving and include, but are not limited to: malicious software, destructive malware, attempts to gain unauthorized access to data, disruption or denial of service attacks, and other electronic security breaches that could lead to disruptions in mission critical systems; unauthorized release of confidential, personal or otherwise protected information (ours or that of our employees, customers or partners); corruption of data, networks or systems; harm to individuals; and loss of assets. In addition, we could be impacted by cyber threats or other disruptions or vulnerabilities found in products we use or in our partners' or customers' systems that are used in connection with our business. These events, if not prevented or effectively mitigated, could damage our reputation, require remedial actions and lead to loss of business, regulatory actions, potential liability and other financial losses.

We provide systems, products and services to various customers (government and commercial) who also face cyber threats. Our systems, products and services may themselves be subject to cyber threats and/or they may not be able to detect or deter threats, or effectively to mitigate resulting losses. These losses could adversely affect our customers and our company.

The impact of these various factors is difficult to predict, but one or more of them could result in the loss of information or capabilities, harm to individuals or property, damage to our reputation, loss of business, contractual or regulatory actions and potential liabilities, any one of which could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Our earnings and profitability depend, in part, on subcontractor and supplier performance and financial viability as well as raw material and component availability and pricing.***

We rely on other companies to provide raw materials, chemicals and components and subsystems for our products and to produce hardware elements and sub-assemblies, provide software and intellectual property, provide information about the parts they supply to us, and perform some of the services we provide to our customers, and to do so in compliance with all applicable laws, regulations and contract terms. Disruptions or performance problems caused by our subcontractors and suppliers, or a misalignment between our contractual obligations to our customers

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and our agreement with our subcontractors and suppliers, could have various impacts on the company, including on our ability to meet our commitments to customers.

Our ability to perform our obligations on time could be adversely affected if one or more of our subcontractors or suppliers were unable to provide the agreed-upon products, materials or information, or perform the agreed-upon services in a timely, compliant and cost-effective manner or otherwise to meet the requirements of the contract. Changes in political or economic conditions, including changes in defense budgets or credit availability or sanctions, or other changes impacting a subcontractor or supplier (including changes in ownership or operations), as well as their ability to retain talent and other resources, and requirements or changes in requirements imposed on them by other customers, could adversely affect the financial stability of our subcontractors and suppliers and/or their ability to perform. The inability of our suppliers to perform, or their inability to perform adequately, could also result in the need for us to transition to alternate suppliers, which could result in significant incremental cost and delay or the need for us to provide other resources to support our existing suppliers. This risk may increase as the demands grow for our subcontractors and suppliers to meet extensive government-related cyber and other requirements.

In connection with our U.S. government contracts, we are required to procure certain materials, components and parts from supply sources approved by the customer. We also are facing increased and changing regulatory requirements, both domestically and internationally, many of which apply to our subcontractors and suppliers. In some cases, there may be only one supplier, or one domestic supplier, for certain components. For example, a single domestic source currently supplies us, as well as the U.S. domestic solid propellant industry, with a principal raw material used in the production of solid rocket motors. If a supplier cannot appropriately meet our needs, experiences disruptions to production or is otherwise unavailable or not fully available, we may be unable to find a suitable alternative.

Our procurement practices are intended to reduce the likelihood of our procurement of counterfeit, unauthorized or otherwise non-compliant parts or materials. We rely on our subcontractors and suppliers to comply with applicable laws, regulations and contract terms, including regarding the parts or materials we procure from them; in some circumstances, we rely on certifications provided by our subcontractors and suppliers regarding their compliance. We also rely on our subcontractors and suppliers effectively to mitigate the risk of cyber and security threats or other disruptions with respect to the products, components and services they deliver to us and the information entrusted to them by us or our customers and to comply with applicable contractual terms and laws and regulations, including cybersecurity requirements.

If our subcontractors or suppliers fail to perform or we are unable to procure, or experience significant delays in deliveries of, needed products, materials or services; or if they do not comply with all applicable laws, regulations, requirements and contract terms, including if what we receive is counterfeit or otherwise improper, our financial position, results of operations and/or cash flows could be materially adversely affected.

As a U.S. government contractor, we and our partners are subject to various procurement and other laws, regulations and contract terms applicable to our industry and we could be adversely affected by changes in such laws, regulations and terms, or any negative findings by the U.S. government as to our compliance with them. We also may be adversely affected by changes in our customers' business practices globally.

U.S. government contractors (including their subcontractors and others with whom they do business) must comply with many significant procurement regulations and other specific legal requirements. These regulations and other requirements, although often customary in government contracting, increase our performance and compliance costs and risks and are regularly evolving. New laws, regulations or procurement requirements or changes to current ones (including, for example, regulations related to cybersecurity, privacy, information protection, recovery of employee compensation costs, counterfeit parts, anti-human trafficking, specialty metals and conflict minerals) can significantly increase our costs and risks and reduce our profitability.

We operate in a highly regulated environment and are routinely audited and reviewed by the U.S. government and its agencies, such as the Defense Contract Audit Agency (DCAA), Defense Contract Management Agency (DCMA) and the DoD Inspector General. These agencies review performance under our contracts, our cost structure and our compliance with applicable laws, regulations, terms and standards, as well as the adequacy of our systems and processes in meeting government requirements. Costs ultimately found to be unallowable or improperly allocated to a specific contract will not be reimbursed or must be refunded if already reimbursed. If an audit uncovers improper or illegal activities, we may be subject to civil and criminal penalties, sanctions, forfeiture of profits or suspension or debarment. Whether or not illegal activities are alleged, the U.S. government has the ability to decrease or withhold certain payments when it deems systems subject to its review to be inadequate, with significant financial impact. In

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addition, we could suffer serious reputational harm if allegations of impropriety were made against us or our business partners.

Our industry has experienced, and we expect it will continue to experience, significant changes to business practices globally, largely as a result of an increased focus on affordability, efficiencies, business systems, recovery of costs and a reprioritization of available defense funds to key areas for future defense spending. We have experienced and may continue to experience an increased number of audits and challenges to government accounting matters and business systems for current and past years, as well as a lengthened period of time required to close open audits and the risk of withholding of payments. For example, the thresholds for certain allowable costs in the U.S., including compensation costs, have been significantly reduced; the allowability of other types of costs, including environmental, are being challenged, debated and, in certain cases, modified, all with potentially significant financial costs to the company. The U.S. government is also pursuing alternatives to shift additional responsibility and performance risks to the contractor. The U.S. government has been pursuing and may continue to pursue policies that could negatively impact our profitability. Changes in procurement practices favoring incentive-based fee arrangements; different award criteria; non-traditional contract provisions; and government contract negotiation offers that indicate what our costs should be, among others, also may affect our profitability and predictability.

We (again, including our subcontractors and others with whom we do business) also are subject to, and expected to perform in compliance with, a vast array of federal and state laws, regulations, contract terms and requirements related to our industry, our products and the businesses we operate. These laws and regulations include, but are not limited to, the Truth in Negotiations Act, False Claims Act, Procurement Integrity Act, Federal Communications Commission Act, CAS, FAR, International Traffic in Arms Regulations promulgated under the Arms Export Control Act, Export Administration Regulations promulgated under the Export Control Reform Act, Close the Contractor Fraud Loophole Act and FCPA, as well as rules and regulations administered by the Bureau of Alcohol, Tobacco, Firearms and Explosives. If we are found to have violated any such requirements, or are found not to have acted responsibly, we may be subject to reductions of the value of contracts; contract modifications or termination; the withholding of payments from our customer; the loss of export/import privileges; administrative or civil judgments and liabilities; criminal judgments or convictions, liabilities and consent or other voluntary decrees or agreements; other sanctions; the assessment of penalties, fines, or compensatory, treble or other damages or non-monetary relief or actions; or suspension or debarment.

If we or those with whom we do business do not comply with the laws, regulations, contract terms and processes to which we are subject or if customer business practices or requirements change significantly, including with respect to the thresholds for allowable costs, it could affect our ability to compete and have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Competition within our markets and bid protests may affect our ability to win new contracts and result in reduced revenues and market share.***

We operate in highly competitive markets and our competitors may have more financial capacity, more extensive or specialized engineering, manufacturing, or marketing capabilities in some areas, or be willing to accept more risk or lower profitability in competing for contracts. We have seen, and anticipate we will continue to see, increased competition in some of our core markets, especially as a result of budget pressures for many customers, a continued focus on affordability and competition, and our own success in winning business. We are facing increasing competition in the U.S. and outside the U.S. from U.S., foreign and multinational firms. In some instances outside the U.S., foreign companies may receive loans, marketing subsidies and other assistance from their governments that may not be available to U.S. companies and foreign companies may be subject to fewer restrictions on technology transfer. Additionally, some customers, including the DoD, may turn to commercial contractors, rather than traditional defense contractors, for some products and services, or may utilize small business contractors or determine to source work internally rather than hiring a contractor.

We are also seeing a significant number of bid protests from unsuccessful bidders on new program awards. Bid protests could result in contract modifications or the award decision being reversed and loss of the contract award. Even where a bid protest does not result in the loss of an award, the resolution can extend the time until the contract activity can begin, and delay earnings.

If we are unable to continue to compete successfully against our current or future competitors, or prevail in protests, or to prevail against other attempts to interfere with our ability to obtain and retain awards, we may experience declines in future revenues and market share, which could have a material adverse effect on our financial position, results of operations and/or cash flows.

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- ***Our ability to win new competitions and meet the needs of our customers depends, in part, on our ability to maintain a qualified workforce.***

Our operating results and growth opportunities are heavily dependent upon our ability to attract and retain sufficient personnel with security clearances and requisite skills in multiple areas, including science, technology, engineering and math. Additionally, as we grow our international business, it is increasingly important that we are able to attract and retain personnel with relevant local qualifications and experience. In addition, in a tightened labor market, we are facing increased competition for talent, both with traditional defense companies and commercial companies. If qualified personnel are scarce or difficult to attract or retain or if we experience a high level of attrition, generally or in particular areas, or if such personnel are unable to obtain security clearances on a timely basis, we could experience higher labor, recruiting or training costs in order to attract and retain necessary employees.

Certain of our employees are covered by collective agreements. We generally have been able to renegotiate renewals to expiring agreements without significant disruption of operating activities. If we experience difficulties with renewals and renegotiations of existing collective agreements or if our employees pursue new collective representation, we could incur additional expenses and may be subject to work stoppages, slow-downs or other labor-related disruptions. Any such expenses or delays could adversely affect our programs served by employees who are covered by such agreements or representation.

If we are unable to attract and retain a qualified workforce, we may be unable to maintain our competitive position and our future success could be materially adversely affected.

- ***Many of our contracts contain performance obligations that require innovative design capabilities, are technologically complex, require state-of-the-art manufacturing expertise or are dependent upon factors not wholly within our control. Failure to meet our contractual obligations could adversely affect our profitability, reputation and future prospects.***

We design, develop and manufacture technologically advanced and innovative products and services, which are applied by our customers in a variety of environments, including some under highly demanding operating conditions, to accomplish challenging missions. Problems and delays in development or delivery, or system failures, as a result of issues with respect to design, technology, intellectual property rights, labor, inability to achieve learning curve assumptions, inability to manage effectively a broad array of programs, manufacturing materials or components, or subcontractor performance could prevent us from meeting requirements and create significant risk and liabilities. Similarly, failures to perform on schedule or otherwise to fulfill our contractual obligations could negatively impact our financial position, reputation and ability to win future business.

In addition, our products cannot be tested and proven in all situations and are otherwise subject to unforeseen problems. Examples of unforeseen problems that could negatively affect revenue, schedule and profitability include loss on launch or flight of spacecraft, loss of aviation platforms, premature failure of products that cannot be accessed for repair or replacement, unintended explosions or similar events, problems with design, quality and workmanship, country of origin of procured materials, inadequate delivery of subcontractor components or services and degradation of product performance. These failures could result, either directly or indirectly, in loss of life or property. Among the factors that may affect revenue and profitability could be inaccurate cost estimates, design issues, human factors, unforeseen costs and expenses not covered by insurance or indemnification from the customer, diversion of management focus in responding to unforeseen problems, loss of follow-on work, and, in the case of certain contracts, repayment to the government customer of contract cost and fee payments we previously received, or replacement obligations.

Certain contracts, primarily involving space satellite systems, contain provisions that also entitle the customer to recover fees in the event of failure of the system upon launch or subsequent deployment for less than a specified period of time. Under such terms, we could be required to forfeit fees previously recognized and/or collected.

If we are unable to meet our obligations, including due to issues regarding the design, development or manufacture of our products or services, or we experience launch, platform or satellite system failures, it could have a material adverse effect on our reputation, our ability to compete for other contracts and our financial position, results of operations and/or cash flows.

- ***Environmental matters, including unforeseen costs associated with compliance and remediation efforts, and government and third party claims, could have a material adverse effect on our reputation and our financial position, results of operations and/or cash flows.***

Our operations are subject to and affected by a variety of federal, state, local and foreign environmental laws and regulations, including as they may be changed or enforced differently over time. Compliance with these

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environmental laws and regulations requires, and is expected to continue to require, significant operating and capital costs. We may be subject to substantial administrative, civil or criminal fines, penalties or other sanctions (including suspension and debarment) for violations. If we are found to be in violation of the Federal Clean Air Act or the Clean Water Act, the facility or facilities involved in the violation could be placed by the Environmental Protection Agency on a list maintained by the General Services Administration of facilities that generally cannot be used in performing on U.S. government contracts until the violation is corrected.

We incur, and expect to continue to incur, substantial remediation costs related to the cleanup of pollutants previously released into the environment. Stricter or different enforcement of existing laws and regulations; new laws, regulations or cleanup requirements; discovery of previously unknown or more extensive contamination or new contaminants; imposition of fines, penalties, compensatory or other damages (including natural resource damages); a determination that certain environmental costs are unallowable; rulings on allocation or insurance coverage; and/or the insolvency or other inability or unwillingness of other parties to pay their share of such costs could require us to incur material additional costs in excess of those anticipated.

We also are and may become a party to various legal proceedings and disputes involving government and private parties (including individual and class actions) relating to alleged impacts from pollutants released into the environment. These matters could result in compensatory or other damages, fines, penalties, and non-monetary relief, and adverse determinations on allowability or insurance coverage.

We are engaged in remediation activities relating to environmental conditions allegedly resulting from historic operations at the former United States Navy and Grumman facilities in Bethpage, New York. We have incurred, and expect to continue to incur, substantial remediation and other costs and liabilities related to environmental conditions in Bethpage. The remediation standards or requirements to which we are subject are being reconsidered and may change and costs may increase materially. The State of New York has notified us that it intends to seek to impose additional remedial requirements and, among other things, is evaluating natural resource damages. In addition, we are a party to various, and expect to become a party to additional, legal proceedings and disputes related to remediation, costs, allowability and/or alleged environmental impacts in Bethpage, including with federal and state entities, the United States Navy, local municipalities and water districts, and insurance carriers, as well as class action and individual plaintiffs alleging personal injury and property damage and seeking both monetary and non-monetary relief. These Bethpage matters could result in additional costs, fines, penalties, sanctions, compensatory or other damages (including natural resource damages), determinations on allocation, allowability and coverage, and non-monetary relief.

In addition, government and private parties could seek to hold us responsible for liabilities or obligations related to former operations that have been divested or spun-off (including our former shipbuilding business) and/or for which other parties have agreed to be responsible and/or to indemnify us, directly or indirectly. The indemnity related rights we have may not be sufficient to protect us against such liabilities.

The impact of these factors is difficult to predict, but one or more of them could harm our reputation and business and have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Our business is subject to disruption caused by natural disasters that could adversely affect our profitability and our overall financial position.***

We have significant operations, including centers of excellence, located in regions that may be exposed to hurricanes, earthquakes, other damaging storms, water levels, forest fires and other natural disasters. Our subcontractors and suppliers are also subject to natural disasters that could affect their ability to deliver or perform under a contract, including as a result of disruptions to their workforce and critical industrial infrastructure needed for normal business operations. Although preventative measures may help to mitigate damage, the damage and disruption resulting from natural disasters and delays in recovery may be significant.

If insurance or other risk transfer mechanisms are unavailable or insufficient to recover all costs or if we experience a significant disruption to our business due to a natural disaster, it could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Our insurance coverage, customer indemnifications or other liability protections may be unavailable or inadequate to cover all of our significant risks or our insurers may deny coverage of or be unable to pay for material losses we incur, which could adversely affect our profitability and overall financial position.***

We endeavor to obtain insurance agreements from financially solid, responsible, highly rated counterparties in established markets to cover significant risks and liabilities (including, for example, natural disasters, space launches, hazardous operations and products liability). Not every risk or liability can be insured, and for risks that

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are insurable, the policy limits and terms of coverage reasonably obtainable in the market may not be sufficient to cover all actual losses or liabilities incurred. Even if insurance coverage is available, we may not be able to obtain it at a price or on terms acceptable to us. Disputes with insurance carriers, including over policy terms, reservation of rights, the applicability of coverage (including exclusions), compliance with provisions (including notice) and/or the insolvency of one or more of our insurers may significantly affect the availability or timing of recovery, and may impact our ability to obtain insurance coverage at reasonable rates in the future.

In some circumstances we may be entitled to certain legal protections or indemnifications from our customers through contractual provisions, laws, regulations or otherwise. However, these protections are not always available, can be difficult to obtain, are typically subject to certain terms or limitations, including the availability of funds, and may not be sufficient to cover all losses or liabilities incurred.

If insurance coverage, customer indemnifications and/or other legal protections are not available or are not sufficient to cover our risks or losses, it could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***We provide products and services related to hazardous and high risk operations, which subjects us to various environmental, regulatory, financial, reputational and other risks.***

We provide products and services related to hazardous and high risk operations. Among other such operations, our products and services are used in nuclear-related activities (including nuclear-powered platforms) and used in support of nuclear-related operations of third parties. In addition, certain of our products are provided with space launch services. With our acquisition of legacy Orbital ATK in 2018, we have expanded our portfolio to include energetic materials, including products that involve highly explosive or flammable elements. All of these activities subject us to various extraordinary risks, including potential liabilities relating to nuclear or launch-related incidents or unintended initiation of energetic materials, including risk of personal injury and property damage; to the harmful effects on the environment and human health that may result from nuclear-related activities, operations or incidents, as well as the storage, handling and disposal of radioactive materials; and to failed launches of spacecraft. We may be subject to reputational harm and potential liabilities arising out of a nuclear, launch or explosive incident, among others, whether or not the cause was within our control. Under some circumstances, the U.S. government and prime contractors may provide for certain indemnification and other protection under certain of our government related contracts, including pursuant to, or in connection with, Public Law 85-804, the Price-Anderson Nuclear Industries Indemnity Act and the Terrorism Risk Insurance Reauthorization Act, for certain risks, but those protections may not be available and they are limited in scope.

Certain of our products, such as small, medium and large caliber ammunition and solid rocket motors and liquid propulsion engines, involve the use, manufacture and/or handling of a variety of explosive and flammable materials. From time to time, these activities have resulted in incidents, such as an explosion at the Lake City Army Ammunition Plant in 2017, that have caused workplace injuries and fatalities, the temporary shut down or other disruption of manufacturing processes, production delays, environmental harm and expense, fines and liability to third parties. We have safety and loss prevention programs which provide for pre-construction reviews of process changes and new operations, along with safety audits of operations involving explosive materials, to attempt to mitigate such incidents, as well as insurance coverage. We and our customers may experience similar or more serious incidents in the future which could result in various liabilities and production delays.

In addition, our customers may otherwise use our products and services in connection with hazardous activities, or in ways that can be unusually hazardous or risky, creating potential liabilities to our customers and/or our company as the provider of such products and services. In the event of an incident, if our customers fail to use our products properly or if our products or services do not operate as intended, we could be subject to reputational harm and potential liabilities.

If there was a nuclear incident or other nuclear-related damages, an incident related to launch activities, an incident related to the use of energetics or an incident or other damages related to or caused by the use of our products and services in connection with hazardous activities or risks, and if insurance coverage or indemnification or other protection was not fully available to cover our losses and liabilities, it could adversely affect our reputation and have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Pension and other postretirement benefit (OPB) obligations and related expenses recorded in our financial statements may fluctuate significantly depending upon investment performance of plan assets, changes in actuarial assumptions, and legislative or other regulatory actions.***

A substantial portion of our current and retired employee population is covered by pension and OPB plans. Defined benefit pension and OPB obligations and related expenses as recorded in our financial statements are dependent upon the investment performance of plan assets and various assumptions, including discount rates applied to future payment obligations, mortality assumptions, estimated long-term rates of return on plan assets, rates of future cost growth and trends for future costs. In addition, funding requirements for benefit obligations of our pension plans, including Pension Benefit Guaranty Corporation premiums for certain of our defined benefit plans, are subject to legislative and other government regulatory actions.

In accordance with government regulations, pension plan cost recoveries under our U.S. government contracts may occur in different periods from when those pension costs are recognized for financial statement purposes or when pension funding is made. These timing differences could have a material adverse effect on our cash flows. The cost accounting rules have been revised in order to partially harmonize the measurement and period of assignment of defined benefit pension plan costs allocable to U.S. government contracts and minimum required contributions under the Employee Retirement Income Security Act of 1974 (ERISA), as amended by the Pension Protection Act (PPA) of 2006. These rules better align, but do not eliminate, mismatches between ERISA funding requirements and CAS pension costs for U.S. government CAS covered contracts.

Investment performance of plan assets, changes in assumptions associated with our pension and OPB plans, and government challenges could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***We may be unable fully to exploit or adequately to protect intellectual property rights, which could materially affect our ability to compete, our reputation and our financial position, results of operations and/or cash flows.***

To perform on our contracts and to win new business, we depend on our ability to develop, protect and exploit our intellectual property and also to access the intellectual property of others under reasonable terms. We may not be able adequately to exploit, protect or access intellectual property and the conduct of our customers, competitors and suppliers may make it more difficult for us to do so.

We own many forms of intellectual property, including U.S. and foreign patents, trademarks, copyrights and trade secrets and we license or otherwise obtain access to various intellectual property rights of third parties. The U.S. government and certain foreign governments hold licenses or other rights to certain intellectual property that we develop in performance of government contracts, and may seek to use or authorize others to use such intellectual property, including in competition with us and including where we do not believe they have, or should have, the right to do so. Governments continue to increase efforts to assert or obtain more extensive rights in intellectual property, which could reduce our ability to develop, protect and exploit certain of our intellectual property rights and to compete. Governments also decline at times to make intellectual property of others available to us under acceptable terms.

We also rely significantly upon proprietary technology, information, processes and know-how. We typically seek to protect this information, including by entering into confidentiality agreements with our employees and other parties such as consultants, teammates and subcontractors. These agreements and other measures may not provide adequate protection for our trade secrets and other proprietary information. In the event of an infringement of such intellectual property rights, a breach of a confidentiality agreement, a misuse or theft of our intellectual property or divulgence of proprietary information, we may not have adequate legal remedies. In addition, our trade secrets or other proprietary information may otherwise become known or be independently developed by competitors.

In some instances, our ability to seek, win or perform contracts may require us to access and use third party intellectual property. This may require that the government or our customer is willing and able to provide rights to such third party intellectual property, or that we are able to negotiate directly to obtain necessary rights on reasonable terms.

Our intellectual property is subject to challenge, invalidation, misappropriation or circumvention by third parties. Our access to and use of intellectual property licensed or otherwise obtained from third parties is also subject to challenges. Litigation to determine the scope of intellectual property rights, even if ultimately successful, could be costly and could divert management's attention away from other aspects of our business. Moreover, the laws concerning intellectual property rights vary among countries and the protection provided to our intellectual property by foreign laws and courts may not be the same as the remedies available under U.S. law.

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If we are unable adequately to exploit our intellectual property rights, to protect our intellectual property rights, or to obtain rights to intellectual property of others, it could have a material adverse effect on our reputation, ability to compete for and perform on contracts, financial position, results of operations and/or cash flows.

▪ ***Our future success depends, in part, on our ability to develop new products and new technologies and maintain technologies, facilities and equipment to win new competitions and meet the needs of our customers.***

Many of the markets in which we operate are characterized by rapidly changing technologies. The product, program and service needs of our customers change and evolve regularly. Our success in the competitive defense industry depends upon our ability to identify emerging technological trends, develop technologically advanced, innovative and cost-effective products and services and market these products and services to our customers in the U.S. and internationally. In addition, our ability to develop innovative and technologically advanced products depends, in part, on continued funding for, and investment in, research and development projects. Our success also depends on our continued access to assured suppliers of important technologies and components and our ability to provide the people, technologies, facilities, equipment and financial capacity needed to deliver those products and services with maximum efficiency. If we are unable to develop new products and technologies, or if we fail to achieve market acceptance more rapidly than our competitors, we may be unable to maintain our competitive position and our future success could be materially adversely affected. If we fail to maintain our competitive position, we could lose a significant amount of future business to our competitors, which could have a material adverse effect on our ability to generate favorable financial results and maintain market share.

▪ ***Unanticipated changes in our tax provisions or exposure to additional tax liabilities could affect our profitability and cash flow.***

We are subject to income and other taxes in the U.S. and foreign jurisdictions. Changes in applicable U.S. or foreign tax laws and regulations, or their interpretation and application, including the possibility of retroactive effect, could affect our tax expense and profitability as they did in 2017 upon passage of the Tax Cuts and Jobs Act. In addition, the final determination of any tax audits or related litigation could be materially different from our historical income tax provisions and accruals.

The distribution (Distribution) by Alliant Techsystems Inc. (ATK) of the shares of Vista Outdoor Inc. (Vista) and ATK's acquisition of Orbital Sciences Corporation (Orbital) to create then Orbital ATK (the Orbital-ATK Merger) were intended to qualify as tax-free to ATK, ATK's stockholders, Vista and Orbital for U.S. income tax purposes. However, there can be no assurance that the IRS or the courts will agree with the conclusion of the parties and their counsel regarding the tax treatment of the Distribution and Orbital-ATK Merger. If the Distribution or certain related transactions were taxable, ATK's shareholders immediately prior to the Distribution could be required to recognize income on their receipt of Vista Outdoor stock in the Distribution, ATK could be considered to have made a taxable sale of certain of its assets to Vista Outdoor and Vista could be subject to income taxes.

Under the tax matters agreement between Orbital ATK and Vista (the Tax Matters Agreement), in certain circumstances, and subject to certain limitations, Vista is required to indemnify Orbital ATK against taxes on the Distribution that arise as a result of actions or failures to act by Vista, or as a result of Section 355(e) of the Internal Revenue Code applying due to acquisitions of Vista stock after the Distribution. In other cases, however, we might recognize a taxable gain on the Distribution without being entitled to an indemnification payment under the Tax Matters Agreement. If such tax is imposed on Vista, then we may, depending on the circumstances, be required to indemnify Vista for that tax.

Changes in our tax provision or an increase in our tax liabilities, whether due to changes in applicable laws and regulations, the interpretation or application thereof, or a final determination of tax audits or litigation, could have a material adverse effect on our financial position, results of operations and/or cash flows.

▪ ***Changes in future business conditions could cause business investments and/or recorded goodwill and other long-lived assets to become impaired, resulting in substantial losses and write-downs that would reduce our operating income.***

Goodwill accounts for approximately 46 percent of our total assets. Although we currently have excess fair value of our reporting units over their respective carrying values, market-based inputs to the calculations in our goodwill impairment test, such as weighted average cost of capital and terminal value (based on market comparisons) could change significantly from our current assumptions. Additionally, we acquired a significant amount of purchased intangible and other long-lived assets in the Merger, whose recovery is dependent, in part, on future business conditions. We continue to monitor the recoverability of the carrying value of our goodwill and other long-lived

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assets. Significant write-offs of goodwill or other long-lived assets could have a material adverse effect on our financial condition and/or results of operations.

Item 1B. Unresolved Staff Comments

None.

FORWARD-LOOKING STATEMENTS AND PROJECTIONS

This Annual Report on Form 10-K and the information by reference contain statements that constitute “forward-looking statements” within the meaning of the Private Securities Litigation Reform Act of 1995. Words such as “will,” “expect,” “anticipate,” “intend,” “may,” “could,” “should,” “plan,” “project,” “forecast,” “believe,” “estimate,” “outlook,” “trends,” “goals” and similar expressions generally identify these forward-looking statements. Forward-looking statements include, among other things, statements relating to our future financial condition, results of operations and/or cash flows. Forward-looking statements are based upon assumptions, expectations, plans and projections that we believe to be reasonable when made, but which may change over time. These statements are not guarantees of future performance and inherently involve a wide range of risks and uncertainties that are difficult to predict. Specific risks that could cause actual results to differ materially from those expressed or implied in these forward-looking statements include, but are not limited to, those identified under “Risk Factors” and other important factors disclosed in this report and from time to time in our other filings with the SEC. They include:

- our dependence on the U.S. government for a substantial portion of our business
- significant delays or reductions in appropriations for our programs, and U.S. government funding and program support more broadly
- investigations, claims, disputes, enforcement actions, litigation and/or other legal proceedings
- the use of estimates when accounting for our contracts and the effect of contract cost growth and/or changes in estimated contract revenues and costs
- our exposure to additional risks as a result of our international business, including risks related to geopolitical and economic factors, suppliers, laws and regulations
- the improper conduct of employees, agents, subcontractors, suppliers, business partners or joint ventures in which we participate and the impact on our reputation and our ability to do business
- cyber and other security threats or disruptions faced by us, our customers or our suppliers and other partners
- the performance and financial viability of our subcontractors and suppliers and the availability and pricing of raw materials and components
- changes in procurement and other laws, regulations, contract terms and practices applicable to our industry, findings by the U.S. government as to our compliance with such requirements, and changes in our customers’ business practices globally
- increased competition within our markets and bid protests
- the ability to maintain a qualified workforce with the required security clearances and requisite skills
- our ability to meet performance obligations under our contracts, including obligations that require innovative design capabilities, are technologically complex, require certain manufacturing expertise or are dependent on factors not wholly within our control
- environmental matters, including unforeseen environmental costs and government and third party claims
- natural disasters
- the adequacy and availability of our insurance coverage, customer indemnifications or other liability protections
- products and services we provide related to hazardous and high risk operations, including the production and use of such products, which subject us to various environmental, regulatory, financial, reputational and other risks

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- the future investment performance of plan assets, changes in actuarial assumptions associated with our pension and other postretirement benefit plans and legislative or other regulatory actions impacting our pension and postretirement benefit obligations
- our ability appropriately to exploit and/or protect intellectual property rights
- our ability to develop new products and technologies and maintain technologies, facilities, and equipment to win new competitions and meet the needs of our customers
- unanticipated changes in our tax provisions or exposure to additional tax liabilities
- changes in business conditions that could impact business investments and/or recorded goodwill or the value of other long-lived assets

We urge you to consider the limitations on, and risks associated with, forward-looking statements and not unduly rely on the accuracy of forward-looking statements. These forward-looking statements speak only as of the date this report is first filed or, in the case of any document incorporated by reference, the date of that document. We undertake no obligation to publicly update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by applicable law.

Item 2. Properties

At December 31, 2019, we had approximately 54 million square feet of floor space at 545 separate locations, primarily in the U.S., for manufacturing, warehousing, research and testing, administration and various other uses.

At December 31, 2019, we leased to third parties approximately 304,000 square feet of our owned and leased facilities.

At December 31, 2019, we had major operations at the following locations:

Aerospace Systems

Azusa, Carson, El Segundo, Manhattan Beach, Mojave, Oxnard, Palmdale, Redondo Beach and San Diego, CA; Melbourne and St. Augustine, FL; Devens, MA; Moss Point, MS; and Oklahoma City, OK.

Innovation Systems

Chandler, Gilbert, Mesa and Tempe, AZ; Los Angeles and San Diego, CA; Beltsville, Cumberland and Elkton, MD; Eden Prairie, Elk River and Plymouth, MN; Independence, MO; Iuka, MS; Beavercreek, OH; Fort Worth, TX; Brigham City, Clearfield, Magna, Salt Lake City and Tremonton, UT; Dulles, Radford and Sterling, VA; and Keyser, WV.

Mission Systems

Huntsville, AL; McClellan, Redondo Beach, San Diego, Sunnyvale and Woodland Hills, CA; Aurora and Colorado Springs, CO; Apopka, FL; Rolling Meadows, IL; Annapolis, Annapolis Junction, Elkridge, Halethorpe, Linthicum and Sykesville, MD; Bethpage and Williamsville, NY; Beavercreek and Cincinnati, OH; Salt Lake City, UT; and Chantilly, Charlottesville, Fairfax, McLean and Richmond, VA. Locations outside the U.S. include Germany, Italy and the United Kingdom.

Technology Services

Sierra Vista, AZ; Warner Robins, GA; Lake Charles, LA; and Herndon, VA. Locations outside the U.S. include Australia and France.

Corporate

Falls Church and Lebanon, VA and Irving, TX.

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The following is a summary of our floor space at December 31, 2019:

<i>Square feet (in thousands)</i>	Owned	Leased	U.S. Government Owned/Leased	Total
Aerospace Systems	6,884	6,774	3,255	16,913
Innovation Systems	6,161	6,748	5,388	18,297
Mission Systems	8,584	5,757	—	14,341
Technology Services	434	2,689	—	3,123
Corporate	614	492	—	1,106
Total	22,677	22,460	8,643	53,780

We maintain our properties in good operating condition and believe the productive capacity of our properties is adequate to meet current contractual requirements and those for the foreseeable future.

Item 3. Legal Proceedings

We have provided information about certain legal proceedings in which we are involved in Notes 11 and 12 to the consolidated financial statements.

We are a party to various investigations, lawsuits, arbitration, claims, enforcement actions and other legal proceedings, including government investigations and claims, that arise in the ordinary course of our business. These types of matters could result in administrative, civil or criminal fines, penalties or other sanctions (which terms include judgments or convictions and consent or other voluntary decrees or agreements); compensatory, treble or other damages; non-monetary relief or actions; or other liabilities. Government regulations provide that certain allegations against a contractor may lead to suspension or debarment from future government contracts or suspension of export privileges for the company or one or more of its components. The nature of legal proceedings is such that we cannot assure the outcome of any particular matter. For additional information on pending matters, please see Notes 11 and 12 to the consolidated financial statements, and for further information on the risks we face from existing and future investigations, lawsuits, arbitration, claims, enforcement actions and other legal proceedings, please see "Risk Factors."

Item 4. Mine Safety Disclosures

No information is required in response to this item.

PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

COMMON STOCK

We have 800,000,000 shares authorized at a \$1 par value per share, of which 167,848,424 shares and 170,607,336 shares were issued and outstanding as of December 31, 2019 and 2018, respectively.

PREFERRED STOCK

We have 10,000,000 shares authorized at a \$1 par value per share, of which no shares were issued and outstanding as of December 31, 2019 and 2018.

MARKET INFORMATION

Our common stock is listed on the New York Stock Exchange and trades under the symbol NOC.

HOLDERS

As of January 27, 2020, there were 21,374 common shareholders of record.

PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

The table below summarizes our repurchases of common stock during the three months ended December 31, 2019:

Period	Total Number of Shares Purchased	Average Price Paid per Share ⁽¹⁾	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet Be Purchased under the Plans or Programs (\$ in millions)
September 28, 2019 - October 25, 2019	216,962	\$ 361.84	216,962	\$ 3,553
October 26, 2019 - November 22, 2019	286,241	350.08	286,241	3,453
November 23, 2019 - December 31, 2019	356,900	346.23	356,900	3,330
Total	860,103	\$ 351.45	860,103	\$ 3,330

⁽¹⁾ Includes commissions paid.

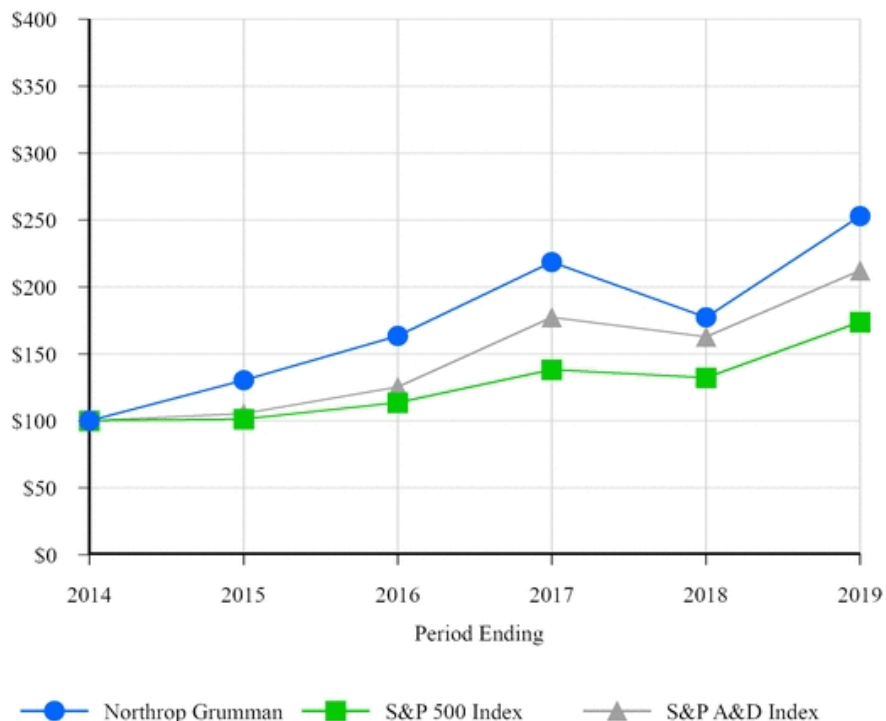
Share repurchases take place from time to time, subject to market conditions and management’s discretion, in the open market or in privately negotiated transactions. The company retires its common stock upon repurchase and, in the periods presented, has not made any purchases of common stock other than in connection with these publicly announced repurchase programs.

See Note 3 to the consolidated financial statements for further information on our share repurchase programs.

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STOCK PERFORMANCE GRAPH

Comparison of Cumulative Five Year Total Return
Among Northrop Grumman, the S&P 500 Index and the S&P Aerospace & Defense (A&D) Index



- Assumes \$100 invested at the close of business on December 31, 2014, in Northrop Grumman Corporation common stock, Standard & Poor's (S&P) 500 Index and the S&P Aerospace & Defense Index.
- The cumulative total return assumes reinvestment of dividends.
- The S&P Aerospace & Defense Index is comprised of Arconic, Inc., The Boeing Company, General Dynamics Corporation, Huntington Ingalls Industries Inc., L3Harris Technologies, Inc., Lockheed Martin Corporation, Northrop Grumman Corporation, Raytheon Company, Textron, Inc., TransDigm Group and United Technologies Corporation.
- The total return is weighted according to market capitalization of each company at the beginning of each year.
- This graph is not deemed to be "filed" with the U.S. Securities and Exchange Commission (SEC) or subject to the liabilities of Section 18 of the Securities Exchange Act of 1934 (the Exchange Act), and should not be deemed to be incorporated by reference into any of our prior or subsequent filings under the Securities Act of 1933 or the Exchange Act.

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Item 6. Selected Financial Data

The data presented in the following table is derived from the audited consolidated financial statements and other information.

SELECTED FINANCIAL DATA

<i>\$ in millions, except per share amounts</i>	Year Ended December 31				
	2019	2018 ⁽¹⁾	2017	2016	2015 ⁽²⁾
Sales	\$ 33,841	\$ 30,095	\$ 26,004	\$ 24,706	\$ 23,526
Operating income	3,969	3,780	3,218	3,277	2,984
Net earnings	2,248	3,229	2,869	2,043	2,119
Basic earnings per share	\$ 13.28	\$ 18.59	\$ 16.45	\$ 11.42	\$ 11.19
Diluted earnings per share	13.22	18.49	16.34	11.32	11.06
Cash dividends declared per common share	5.16	4.70	3.90	3.50	3.10
Year-End Financial Position					
Total assets ⁽³⁾	\$ 41,089	\$ 37,653	\$ 35,128	\$ 25,815	\$ 24,424
Notes payable to banks and long-term debt	13,879	14,400	15,266	7,070	6,496
Other long-term obligations ⁽³⁾⁽⁴⁾	10,066	7,309	6,505	7,667	7,059
Financial Metrics					
Net cash provided by operating activities	\$ 4,297	\$ 3,827	\$ 2,613	\$ 2,813	\$ 2,162
Free cash flow ⁽⁵⁾	3,033	2,578	1,685	1,893	1,691
Other Information					
Company-sponsored research and development expenses	\$ 953	\$ 764	\$ 639	\$ 705	\$ 712
Total backlog ⁽⁶⁾	64,840	53,500	42,629	45,339	35,923
Square footage at year-end (in thousands)	53,780	53,283	35,379	34,112	34,392
Number of employees at year-end	90,000	85,000	70,000	67,000	65,000

⁽¹⁾ Selected financial data includes the operating results of Innovation Systems subsequent to the Merger date.

⁽²⁾ Years prior to 2016 do not reflect the effects from our January 1, 2018 adoption of ASC Topic 606, *Revenue from Contracts with Customers*.

⁽³⁾ We adopted ASC Topic 842, *Leases*, on January 1, 2019 using the optional transition method and, as a result, did not recast prior period consolidated comparative financial statements.

⁽⁴⁾ Other long-term obligations include pension and other postretirement benefit (OPB) plan liabilities, operating lease liabilities, deferred tax liabilities and other non-current liabilities, including unrecognized tax benefits, deferred compensation and environmental liabilities.

⁽⁵⁾ Free cash flow is a non-GAAP measure. See "Liquidity and Capital Resources" – "Free Cash Flow" in Management's Discussion and Analysis of Financial Conditions and Results of Operations (MD&A) for our definition of this measure, including a reconciliation of free cash flow to net cash provided by operating activities.

⁽⁶⁾ We applied the ASC Topic 606 transition practical expedient related to remaining performance obligations for reporting periods presented before the date of initial application. As such, years prior to 2017 have not been restated for the adoption of ASC Topic 606. For comparative purposes, we have recast our backlog as of December 31, 2017 to reflect the impact of ASC Topic 606.

Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations

OVERVIEW

The following discussion should be read along with the financial statements included in this Form 10-K, as well as Part II, “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations” of our Form 10-K for the year ended December 31, 2018, which provides additional information on comparisons of years 2018 and 2017.

Acquisition of Orbital ATK

On June 6, 2018 (the “Merger Date”), the company completed its previously announced acquisition of Orbital ATK, Inc. (“Orbital ATK”) (the “Merger”). On the Merger date, Orbital ATK became a wholly-owned subsidiary of the company and its name was changed to Northrop Grumman Innovation Systems, Inc. We established Innovation Systems as a new, fourth business sector. The operating results of Innovation Systems subsequent to the Merger Date have been included in the company’s consolidated financial results. See Note 2 to the consolidated financial statements for further information regarding the acquisition of Orbital ATK.

In June 2018, the U.S. Federal Trade Commission (FTC) issued a Decision and Order enabling the acquisition to proceed and providing for solid rocket motors to be available on a non-discriminatory basis under certain circumstances and processes. The company has taken and continues to take robust actions to help ensure compliance with the terms of the Order. Similarly, the Compliance Officer, appointed under the Order, and the FTC have taken and continue to take various actions to oversee compliance. In October 2019, the company received a civil investigative demand from the FTC requesting certain information relating to a potential issue of the company’s compliance with the Order in connection with a pending strategic missile competition. The company has provided information in response to the request. We believe the company has been and continues to be in full compliance with the Order, but we cannot predict any potential impact on the procurement.

Global Security and Economic Environment

The U.S. and its allies continue to face a global security environment of heightened tensions and instability, threats from state and non-state actors as well as terrorist organizations, emerging nuclear tensions, diverse regional security concerns and political instability. Global threats persist across all domains, from undersea to space to cyber. The market for defense products, services and solutions globally is driven by these complex and evolving security challenges, considered in the broader context of political and socioeconomic priorities.

The global geopolitical and economic environments also continue to be impacted by uncertainty. Geopolitical relationships are changing and global economic growth is expected to remain in the low single digits in 2020, reflecting the impact of and uncertainty surrounding geopolitical tensions globally and financial market volatility. The global economy may also be affected by Britain’s anticipated exit from the European Union, the full impact of which is not known at this time. Additionally, economic tensions and changes in international trade policies, including higher tariffs on imported goods and materials and renegotiation of free trade agreements, could impact the global market for defense products, services and solutions.

U.S. Political and Economic Environment

The U.S. continues to face an uncertain political environment and substantial fiscal and economic challenges, which affect funding for discretionary and non-discretionary budgets. The Budget Control Act of 2011 (BCA) mandated spending caps for all federal discretionary spending across a ten-year period (FY 2012 through FY 2021), including specific limits for defense and non-defense spending. In prior years, these spending caps have been revised by separate bills for specific fiscal years.

In 2019, the President proposed an FY 2020 budget requesting \$750 billion for national security. The President’s budget request addresses various capabilities highlighted in the U.S. National Security Strategy, the National Defense Strategy and the Missile Defense Review. On August 2, 2019, the Bipartisan Budget Act of 2019 was enacted, increasing spending caps under the Budget Control Act (BCA) for FY 2020 and FY 2021, the final two fiscal years covered by the BCA, and suspending the debt ceiling through July 31, 2021. On December 20, 2019, FY 2020 appropriations for all federal agencies were enacted, representing a 3 percent increase from FY 2019. We believe our capabilities, particularly in space, missiles, missile defense, hypersonics, counter-hypersonics, low observable technology and cyber will allow us to continue to profitably grow our business in support of our customers’ needs.

The political environment, federal budget and debt ceiling are expected to continue to be the subject of considerable debate, which could have significant impacts on defense spending broadly and the company’s programs in particular.

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For further information on the risks we face from the current political and economic environment, see “Risk Factors.”

Operating Performance Assessment and Reporting

We manage and assess our business based on our performance on contracts and programs (typically larger contracts or two or more closely-related contracts). We recognize sales from our portfolio of long-term contracts as control is transferred to the customer, primarily over time on a cost-to-cost basis (cost incurred relative to costs estimated at completion). As a result, sales tend to fluctuate in concert with costs incurred across our large portfolio of contracts. Due to Federal Acquisition Regulation (FAR) rules that govern our U.S. government business and related Cost Accounting Standards (CAS), most types of costs are allocable to U.S. government contracts. As such, we do not focus on individual cost groupings (such as manufacturing, engineering and design labor, subcontractor, material, overhead and general and administrative (G&A) costs), as much as we do on total contract cost, which is the key driver of our sales and operating income.

In evaluating our operating performance, we look primarily at changes in sales and operating income. Where applicable, significant fluctuations in operating performance attributable to individual contracts or programs, or changes in a specific cost element across multiple contracts, are described in our analysis. Based on this approach and the nature of our operations, the discussion of results of operations below first focuses on our four segments before distinguishing between products and services. Changes in sales are generally described in terms of volume, while changes in margin rates are generally described in terms of performance and/or contract mix. For purposes of this discussion, volume generally refers to increases or decreases in sales or cost from production/service activity levels and performance generally refers to non-volume related changes in profitability. Contract mix generally refers to changes in the ratio of contract type and/or life cycle (e.g., cost-type, fixed-price, development, production, and/or sustainment).

CONSOLIDATED OPERATING RESULTS

For purposes of the operating results discussion below, we assess our performance using certain financial measures that are not calculated in accordance with GAAP. These non-GAAP financial measures exclude Mark-to-market pension and OPB (“MTM”) (expense) benefit and related tax impacts, and are described as MTM-adjusted net earnings and MTM-adjusted diluted earnings per share. These non-GAAP measures may be useful to investors and other users of our financial statements as supplemental measures in evaluating the company’s underlying financial performance by presenting the company’s operating results before the non-operational impact of pension and OPB actuarial gains and losses. These measures are also consistent with how management views the underlying performance of the business as the impact of MTM accounting is not considered in management’s assessment of the company’s operating performance or in its determination of incentive compensation awards. We reconcile these non-GAAP financial measures to their most directly comparable GAAP financial measures below. These non-GAAP measures may not be defined and calculated by other companies in the same manner and should not be considered in isolation or as an alternative to operating results presented in accordance with GAAP.

Selected financial highlights are presented in the table below:

<i>\$ in millions, except per share amounts</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Sales	\$ 33,841	\$ 30,095	\$ 26,004	12 %	16 %
Operating costs and expenses	29,872	26,315	22,786	14 %	15 %
<i>Operating costs and expenses as a % of sales</i>	88.3%	87.4%	87.6%		
Operating income	3,969	3,780	3,218	5 %	17 %
<i>Operating margin rate</i>	11.7%	12.6%	12.4%		
Mark-to-market pension and OPB (expense) benefit	(1,800)	(655)	536	175 %	NM
Federal and foreign income tax expense	300	513	1,360	(42)%	(62)%
<i>Effective income tax rate</i>	11.8%	13.7%	32.2%		
Net earnings	2,248	3,229	2,869	(30)%	13 %
Diluted earnings per share	13.22	18.49	16.34	(29)%	13 %

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Sales

2019 sales increased \$3.7 billion reflecting a full year of sales from Innovation Systems as well as higher sales at Aerospace Systems and Mission Systems, partially offset by lower sales at Technology Services.

See “Segment Operating Results” below for further information by segment and “Product and Service Analysis” for product and service detail. See Note 6 to the consolidated financial statements for information regarding the company’s sales by customer type, contract type and geographic region for each of our segments.

Operating Income and Margin Rate

2019 operating income increased \$189 million, or 5 percent, primarily due to a \$462 million increase in segment operating income, which includes a full year of operating income from Innovation Systems. This was partially offset by a \$148 million decrease in the net FAS (service)/CAS pension adjustment and a \$125 million increase in unallocated corporate expense, all of which are further discussed in “Segment Operating Results.” Operating margin rate declined to 11.7 percent from 12.6 percent due to the pension and unallocated corporate expense items noted above, partially offset by a higher segment operating margin rate as described in “Segment Operating Results.”

2019 G&A costs as a percentage of sales decreased to 9.7 percent from 10.0 percent, primarily due to higher sales as well as cost management, including cost synergies realized in connection with the 2018 acquisition of Orbital ATK.

For further information regarding product and service operating costs and expenses, see “Product and Service Analysis” below.

Mark-to-Market Pension and OPB (Expense) Benefit

The primary components of pre-tax MTM (expense) benefit are presented in the table below:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Actuarial (losses) gains on projected benefit obligation	\$ (4,866)	\$ 2,772	\$ (1,570)
Actuarial gains (losses) on plan assets	3,066	(3,426)	2,119
Other	—	(1)	(13)
MTM (expense) benefit	\$ (1,800)	\$ (655)	\$ 536

2019 MTM expense of \$1.8 billion was primarily driven by a 92 basis point decrease in the discount rate from year end 2018 as well as a change in our mortality assumptions, partially offset by actual net plan asset returns of approximately 19.1 percent compared to our 8.0 percent asset return assumption.

Federal and Foreign Income Taxes

The 2019 effective tax rate decreased to 11.8 percent from 13.7 percent in 2018. MTM expense reduced the 2019 effective tax rate by 3.7 percentage points and the 2018 effective tax rate by 1.1 percentage points. See Note 7 to the consolidated financial statements for additional information.

Net Earnings

The table below reconciles net earnings to MTM-adjusted net earnings:

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Net earnings	\$ 2,248	\$ 3,229	\$ 2,869	(30)%	13%
MTM expense (benefit)	1,800	655	(536)	175 %	NM
MTM-related deferred state tax (benefit) expense ⁽¹⁾	(81)	(29)	24	179 %	NM
Federal tax (benefit) expense of items above ⁽²⁾	(361)	(131)	108	176 %	NM
MTM expense (benefit), net of tax	1,358	495	(404)	174 %	NM
MTM-adjusted net earnings	\$ 3,606	\$ 3,724	\$ 2,465	(3)%	51%

⁽¹⁾ Deferred state taxes are recorded in unallocated corporate expense within operating income.

⁽²⁾ Based on a 21% federal statutory tax rate.

Net earnings decreased \$981 million in 2019 principally due to an \$863 million increase in our MTM expense, net of tax. Excluding these impacts, MTM-adjusted net earnings decreased by \$118 million, or 3 percent, primarily due to a \$397 million decrease in the total net FAS/CAS pension adjustment and \$170 million of higher intangible asset

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amortization and PP&E step-up depreciation. These decreases were partially offset by \$462 million of higher segment operating income.

Diluted Earnings Per Share

The table below reconciles diluted earnings per share to MTM-adjusted diluted earnings per share:

	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Diluted earnings per share	\$ 13.22	\$ 18.49	\$ 16.34	(29)%	13%
MTM expense (benefit) per share	10.59	3.76	(3.06)	182 %	NM
MTM-related deferred state tax (benefit) expense per share ⁽¹⁾	(0.48)	(0.17)	0.14	182 %	NM
Federal tax (benefit) expense of items above per share ⁽²⁾	(2.12)	(0.75)	0.62	183 %	NM
MTM expense (benefit) per share, net of tax	7.99	2.84	(2.30)	181 %	NM
MTM-adjusted diluted earnings per share	\$ 21.21	\$ 21.33	\$ 14.04	(1)%	52%

⁽¹⁾ Deferred state taxes are recorded in unallocated corporate expense within operating income.

⁽²⁾ Based on a 21% federal statutory tax rate.

Diluted earnings per share decreased \$5.27, or 29 percent, principally due to a \$5.15 reduction associated with our MTM expense, net of tax. Excluding these impacts, MTM-adjusted diluted earnings per share decreased \$0.12, or 1 percent, reflecting a 3 percent decrease in MTM-adjusted net earnings and a 3 percent decrease in weighted-average diluted shares outstanding.

SEGMENT OPERATING RESULTS

Basis of Presentation

The company is aligned in four operating sectors, which also comprise our reportable segments: Aerospace Systems, Innovation Systems, Mission Systems and Technology Services. The segment operating results below include sales and operating income for Innovation Systems subsequent to the Merger date. For a more complete description of each segment's products and services, see "Business."

We present our sectors in the following business areas, which are reported in a manner reflecting core capabilities:

Aerospace Systems	Innovation Systems	Mission Systems	Technology Services
Autonomous Systems	Defense Systems	Advanced Capabilities	Global Logistics and Modernization
Manned Aircraft	Flight Systems	Cyber and ISR	Global Services
Space	Space Systems	Sensors and Processing	

Effective January 1, 2019, the former Advanced Defense Services and System Modernization and Services business areas of Technology Services were merged to create the Global Services business area. This change had no impact on the prior segment operating results of Technology Services as a whole.

In September 2019, the company announced changes effective January 1, 2020, which are intended to better align the company's broad portfolio to serve its customers' needs. The four new sectors are: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems. This realignment is not reflected in any of the accompanying financial information.

This section discusses segment sales, operating income and operating margin rates. A reconciliation of segment operating income to total operating income is provided below.

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Segment Operating Income and Margin Rate

Segment operating income, as reconciled in the table below, and segment operating margin rate (segment operating income divided by sales) are non-GAAP (accounting principles generally accepted in the United States of America) measures that reflect total earnings from our four segments, including allocated pension expense we have recognized under FAR and CAS, and excluding FAS pension expense and unallocated corporate items (certain corporate-level expenses, which are not considered allowable or allocable under applicable CAS or FAR, and costs not considered part of management's evaluation of segment operating performance). These non-GAAP measures may be useful to investors and other users of our financial statements as supplemental measures in evaluating the financial performance and operational trends of our sectors. These measures may not be defined and calculated by other companies in the same manner and should not be considered in isolation or as alternatives to operating results presented in accordance with GAAP.

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Segment operating income	\$ 3,909	\$ 3,447	\$ 2,903	13 %	19 %
Segment operating margin rate	11.6%	11.5%	11.2%		
CAS pension expense	832	1,017	1,026	(18)%	(1)%
Less: FAS (service) pension expense	(367)	(404)	(388)	(9)%	4 %
Net FAS (service)/CAS pension adjustment	465	613	638	(24)%	(4)%
Intangible asset amortization and PP&E step-up depreciation	(390)	(220)	—	NM	NM
MTM-related deferred state tax benefit (expense) ⁽¹⁾	81	29	(24)	179 %	NM
Other unallocated corporate expense	(96)	(89)	(299)	8 %	(70)%
Unallocated corporate expense	(405)	(280)	(323)	45 %	(13)%
Total operating income	\$ 3,969	\$ 3,780	\$ 3,218	5 %	17 %

⁽¹⁾ Represents the deferred state tax impact of MTM (expense) benefit, which is recorded in unallocated corporate expense consistent with other changes in deferred state taxes.

Segment Operating Income and Margin Rate

2019 segment operating income increased \$462 million, or 13 percent, reflecting a full year of Innovation Systems operating income as well as higher operating income at the other three sectors. Segment operating margin rate of 11.6 percent was comparable to the prior year.

Net FAS (service)/CAS Pension Adjustment

The decrease in our 2019 net FAS (service)/CAS pension adjustment is primarily due to lower CAS expense largely as a result of changes in actuarial assumptions as of December 31, 2018, partially offset by increased CAS expense due to the addition of Innovation Systems.

Unallocated Corporate Expense

The increase in 2019 unallocated corporate expense is primarily due to the absence in 2019 of a \$223 million benefit recognized for the finalization of certain prior year cost claims, as well as \$170 million of higher intangible asset amortization and PP&E step-up depreciation. This increase was partially offset by \$140 million of lower deferred state taxes and an \$89 million benefit recognized in 2019 related to the favorable resolution of a cost accounting litigation matter.

Net Estimate-At-Completion (EAC) Adjustments - We record changes in estimated contract earnings at completion (net EAC adjustments) using the cumulative catch-up method of accounting. Net EAC adjustments can have a significant effect on reported sales and operating income and the aggregate amounts are presented in the table below:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Favorable EAC adjustments	\$ 1,040	\$ 1,019	\$ 717
Unfavorable EAC adjustments	(560)	(442)	(357)
Net EAC adjustments	\$ 480	\$ 577	\$ 360

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Net EAC adjustments by segment are presented in the table below:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Aerospace Systems	\$ 135	\$ 309	\$ 250
Innovation Systems ⁽¹⁾	133	34	—
Mission Systems	150	175	104
Technology Services	77	76	19
Eliminations	(15)	(17)	(13)
Net EAC adjustments	\$ 480	\$ 577	\$ 360

⁽¹⁾ Amounts reflect EAC adjustments after the percent complete on Innovation Systems contracts was reset to zero as of the Merger date.

For purposes of the discussion in the remainder of this Segment Operating Results section, references to operating income and operating margin rate reflect segment operating income and segment operating margin rate, respectively.

AEROSPACE SYSTEMS

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Sales	\$ 13,862	\$ 13,096	\$ 12,131	6%	8%
Operating income	1,434	1,411	1,289	2%	9%
Operating margin rate	10.3%	10.8%	10.6%		

Sales

2019 sales increased \$766 million, or 6 percent, due in large part to higher volume on restricted programs. In addition, manned aircraft sales reflect a higher rate of F-35 production activity and higher volume on the E-2 program. Space sales reflect higher volume on Next Generation Overhead Persistent Infrared (Next Gen OPIR) programs and the James Webb Space Telescope (JWST). Autonomous systems sales include higher Global Hawk volume and lower NATO AGS volume as that program nears completion.

Operating Income

2019 operating income increased \$23 million, or 2 percent, due to higher sales. 2019 operating margin rate decreased to 10.3 percent from 10.8 percent principally due to lower net favorable EAC adjustments.

INNOVATION SYSTEMS

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Sales	\$ 6,119	\$ 3,276	—	NM	—
Operating income	671	343	—	NM	—
Operating margin rate	11.0%	10.5%	—		

The sales and operating income in the table above reflect the operating results of Innovation Systems subsequent to the Merger date. In our comparative discussion below, we reference pro forma sales prepared in accordance with Article 11 of Regulation S-X and computed as if the Merger had been completed as of January 1, 2017. Refer to Note 2 to the consolidated financial statements for additional supplemental consolidated pro forma financial information. This pro forma financial information should not be considered indicative of the results that would have actually occurred if the Merger had been consummated on January 1, 2017, nor are they indicative of future results.

Sales

2019 sales increased \$541 million, or 10 percent, compared with 2018 pro forma sales of \$5.6 billion due to higher sales in all three business areas. Flight Systems sales reflect higher volume on military aerospace structures and launch vehicles. Space Systems sales reflect higher volume on national security satellite systems. Defense Systems sales increased due to higher volume on tactical missiles and subsystems, including the AARGM-ER and Guided Multiple Launch Rocket System programs.

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Operating Income

2019 operating income totaled \$671 million and operating margin rate was 11.0 percent. Year to date results benefited from favorable negotiations on certain contracts.

MISSION SYSTEMS

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Sales	\$ 12,263	\$ 11,709	\$ 11,470	5%	2%
Operating income	1,639	1,520	1,442	8%	5%
<i>Operating margin rate</i>	13.4%	13.0%	12.6%		

Sales

2019 sales increased \$554 million, or 5 percent, due to higher sales in all three business areas. Advanced Capabilities sales increased principally due to higher volume on restricted and marine systems programs. Sensors and Processing sales increased principally due to higher volume on airborne radar and restricted programs, partially offset by lower volume on communications programs. Cyber and ISR sales increased principally due to higher volume on space and restricted programs.

Operating Income

2019 operating income increased \$119 million, or 8 percent, due to higher sales and a higher operating margin rate. Operating margin rate increased to 13.4 percent from 13.0 percent primarily due to improved performance on Advanced Capabilities and Sensors and Processing programs, partially offset by lower performance on Cyber and ISR programs.

TECHNOLOGY SERVICES

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Sales	\$ 4,110	\$ 4,297	\$ 4,687	(4)%	(8)%
Operating income	457	443	449	3%	(1)%
<i>Operating margin rate</i>	11.1%	10.3%	9.6%		

Sales

2019 sales decreased \$187 million, or 4 percent, primarily due to program completions across the sector. Global Services sales declined principally due to the 2018 completions of a state and local services contract and the JRDC program, partially offset by higher volume on a civil program. Global Logistics and Modernization sales declined primarily due to the 2018 completion of the KC-10 program, partially offset by higher volume on electronic systems sustainment programs.

Operating Income

2019 operating income increased \$14 million, or 3 percent, and operating margin rate increased to 11.1 percent from 10.3 percent primarily due to improved performance in both business areas, including a favorable adjustment on a Global Logistics and Modernization sustainment program.

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PRODUCT AND SERVICE ANALYSIS

The following table presents product and service sales and operating costs and expenses by segment:

<i>\$ in millions</i>	Year Ended December 31					
	2019		2018		2017	
Segment Information:	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses
Aerospace Systems						
Product	\$ 11,778	\$ 10,609	\$ 11,087	\$ 9,889	\$ 10,064	\$ 8,988
Service	2,084	1,819	2,009	1,796	2,067	1,854
Innovation Systems						
Product	5,467	4,873	2,894	2,582	—	—
Service	652	575	382	351	—	—
Mission Systems						
Product	7,711	6,632	7,329	6,335	7,012	6,088
Service	4,552	3,992	4,380	3,854	4,458	3,940
Technology Services						
Product	554	507	485	450	391	360
Service	3,556	3,146	3,812	3,404	4,296	3,878
Segment Totals						
Total Product	\$ 25,510	\$ 22,621	\$ 21,795	\$ 19,256	\$ 17,467	\$ 15,436
Total Service	10,844	9,532	10,583	9,405	10,821	9,672
Intersegment eliminations	(2,513)	(2,221)	(2,283)	(2,013)	(2,284)	(2,007)
Total Segment ⁽¹⁾	\$ 33,841	\$ 29,932	\$ 30,095	\$ 26,648	\$ 26,004	\$ 23,101

⁽¹⁾ A reconciliation of segment operating income to total operating income is included in "Segment Operating Results."

Product Sales and Costs

2019 product sales increased \$3.7 billion, or 17 percent, primarily due to a full year of product sales from Innovation Systems and higher volume on restricted, F-35 and Next Gen OPIR programs at Aerospace Systems.

2019 product costs increased \$3.4 billion, or 17 percent, consistent with the higher product sales described above.

Service Sales and Costs

2019 service sales increased \$261 million, or 2 percent. The increase was primarily driven by a full year of service sales from Innovation Systems and higher service sales at Mission Systems, partially offset by lower service sales at Technology Services principally due to program completions.

2019 service costs increased \$127 million, or 1 percent, consistent with the higher service sales described above and reflects improved margin rates on service contracts at each sector.

BACKLOG

Backlog represents the future sales we expect to recognize on firm orders received by the company and is equivalent to the company's remaining performance obligations at the end of each period. It comprises both funded backlog (firm orders for which funding is authorized and appropriated) and unfunded backlog. Unexercised contract options and indefinite delivery indefinite quantity (IDIQ) contracts are not included in backlog until the time the option or IDIQ task order is exercised or awarded. Backlog is converted into sales as costs are incurred or deliveries are made.

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Backlog consisted of the following at December 31, 2019 and 2018:

<i>\$ in millions</i>	2019			2018	% Change in 2019
	Funded	Unfunded	Total Backlog	Total Backlog	
Aerospace Systems	\$ 11,587	\$ 21,875	\$ 33,462	\$ 26,440	27%
Innovation Systems	5,575	3,905	9,480	8,207	16%
Mission Systems	10,317	7,806	18,123	15,408	18%
Technology Services	2,798	977	3,775	3,445	10%
Total backlog	\$ 30,277	\$ 34,563	\$ 64,840	\$ 53,500	21%

LIQUIDITY AND CAPITAL RESOURCES

We endeavor to ensure the most efficient conversion of operating income into cash for deployment in our business and to maximize shareholder value through cash deployment activities. In addition to our cash position, we use various financial measures to assist in capital deployment decision-making, including cash provided by operating activities and free cash flow, a non-GAAP measure described in more detail below.

As of December 31, 2019, we had cash and cash equivalents of \$2.2 billion; approximately \$269 million was held outside of the U.S. by foreign subsidiaries. Cash and cash equivalents and cash generated from operating activities, supplemented by borrowings under credit facilities, commercial paper and/or in the capital markets, if needed, are expected to be sufficient to fund our operations for at least the next 12 months. Capital expenditure commitments were \$790 million at December 31, 2019, and are expected to be paid with cash on hand.

Operating Cash Flow

The table below summarizes key components of cash flow provided by operating activities:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Net earnings	\$ 2,248	\$ 3,229	\$ 2,869
Non-cash items ⁽¹⁾	2,683	1,775	1,018
Changes in assets and liabilities:			
Trade working capital	128	(65)	(285)
Retiree benefits, excluding MTM (expense) benefit	(703)	(1,083)	(946)
Other, net	(59)	(29)	(43)
Net cash provided by operating activities	\$ 4,297	\$ 3,827	\$ 2,613

⁽¹⁾ Includes depreciation and amortization, MTM (expense) benefit, non-cash lease expense, stock based compensation expense and deferred income taxes.

2019 cash provided by operating activities increased \$470 million principally due to improved trade working capital and lower pension contributions.

Free Cash Flow

Free cash flow, as reconciled in the table below, is a non-GAAP measure defined as net cash provided by operating activities less capital expenditures, and may not be defined and calculated by other companies in the same manner. We use free cash flow as a key factor in our planning for, and consideration of, acquisitions, the payment of dividends and share repurchases. This non-GAAP measure may be useful to investors and other users of our financial statements as a supplemental measure of our cash performance, but should not be considered in isolation, as a measure of residual cash flow available for discretionary purposes, or as an alternative to operating cash flows presented in accordance with GAAP.

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The table below reconciles net cash provided by operating activities to free cash flow:

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2019	2018	2017	2019	2018
Net cash provided by operating activities	\$ 4,297	\$ 3,827	\$ 2,613	12%	46%
Less: capital expenditures	(1,264)	(1,249)	(928)	1%	35%
Free cash flow	\$ 3,033	\$ 2,578	\$ 1,685	18%	53%

2019 free cash flow increased \$455 million principally driven by an increase in net cash provided by operating activities.

Investing Cash Flow

2019 net cash used in investing activities decreased to \$1.2 billion from \$8.9 billion principally due to \$7.7 billion paid in 2018 for the acquisition of Orbital ATK, net of cash acquired.

Financing Cash Flow

2019 net cash used in financing activities decreased to \$2.4 billion from \$4.6 billion principally due to lower debt and credit facility repayments of \$2.1 billion and lower share repurchases, partially offset by net repayments of commercial paper in 2019 as compared to net borrowings in 2018.

Share Repurchases – See Note 3 to the consolidated financial statements for further information on our share repurchase programs.

Commercial Paper, Credit Facilities and Unsecured Senior Notes – See Note 10 to the consolidated financial statements for further information on our commercial paper, credit facilities and unsecured senior notes.

Financial Arrangements – See Note 12 to the consolidated financial statements for further information on our use of standby letters of credit and guarantees.

Other Sources of Capital – We believe we can obtain additional capital, if necessary for long-term liquidity, from such sources as the public or private capital markets, the sale of assets, sale and leaseback of operating assets, and leasing rather than purchasing new assets. We have an effective shelf registration statement on file with the SEC, which allows us to access capital in a timely manner.

Contractual Obligations

At December 31, 2019, we had contractual commitments to repay debt with interest, make payments under operating leases, settle obligations related to agreements to purchase goods and services and make payments on various other liabilities. Payments due under these obligations and commitments, and the estimated timing of those payments, are as follows:

<i>\$ in millions</i>	Total	2020	2021- 2022	2023- 2024	2025 and beyond
Long-term debt	\$ 13,945	\$ 1,110	\$ 2,247	\$ 1,056	\$ 9,532
Interest payments on long-term debt	6,632	524	956	830	4,322
Operating leases	1,992	300	486	331	875
Purchase obligations ⁽¹⁾	15,126	8,089	2,839	2,213	1,985
Other long-term liabilities ⁽²⁾	1,516	490	341	176	509
Total contractual obligations	\$ 39,211	\$ 10,513	\$ 6,869	\$ 4,606	\$ 17,223

⁽¹⁾ A “purchase obligation” is defined as an agreement to purchase goods or services that is enforceable and legally binding on us and that specifies all significant terms, including: fixed or minimum quantities to be purchased; fixed, minimum, or variable price provisions; and the approximate timing of the transaction. These amounts are primarily comprised of open purchase order commitments to suppliers and subcontractors pertaining to funded contracts.

⁽²⁾ Other long-term liabilities, including their current portions, primarily consist of total accrued environmental reserves, deferred compensation, and other miscellaneous liabilities. It excludes obligations for uncertain tax positions of \$1.2 billion as we are not able to reasonably estimate the timing of future cash flows related to such positions.

The table above excludes estimated minimum funding requirements for the company’s pension and OPB plans, as set forth by the Employee Retirement Income Security Act, as amended. For further information about future minimum contributions for these plans, see Note 13 to the consolidated financial statements. Further details

regarding long-term debt and operating leases can be found in Notes 10 and 15, respectively, to the consolidated financial statements.

CRITICAL ACCOUNTING POLICIES, ESTIMATES AND JUDGMENTS

Our consolidated financial statements are based on GAAP, which requires us to make estimates and assumptions about future events that affect the amounts reported in our consolidated financial statements. We employ judgment in making our estimates in consideration of historical experience, currently available information and various other assumptions that we believe to be reasonable under the circumstances. Actual results could differ from our estimates and assumptions, and any such differences could be material to our consolidated financial statements. We believe the following accounting policies are critical to the understanding of our consolidated financial statements and require the use of significant management judgment in their application. For a summary of our significant accounting policies, see Note 1 to the consolidated financial statements.

Revenue Recognition

Due to the long-term nature of our contracts, we generally recognize revenue over time using the cost-to-cost method, which requires us to make reasonably dependable estimates regarding the revenue and cost associated with the design, manufacture and delivery of our products and services.

Contract sales may include estimates of variable consideration, including cost or performance incentives (such as award and incentive fees), contract claims and requests for equitable adjustment (REAs). Variable consideration is included in total estimated sales to the extent it is probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. We estimate variable consideration as the most likely amount to which we expect to be entitled.

Our cost estimation process is based on the professional knowledge of our engineering, program management and financial professionals, and draws on their significant experience and judgment. We prepare EACs for our contracts and calculate an estimated contract profit based on total estimated contract sales and cost. Since our contracts typically span a period of several years, estimation of revenue, cost, and progress toward completion requires the use of judgment. Factors considered in these estimates include our historical performance, the availability, productivity and cost of labor, the nature and complexity of work to be performed, the effect of change orders, availability and cost of materials, components and subcontracts, the effect of any delays in performance and the level of indirect cost allocations.

We generally review and reassess our sales, cost and profit estimates for each significant contract at least annually or more frequently as determined by the occurrence of events, changes in circumstances and evaluations of contract performance to reflect the latest reliable information available. The company performs on a broad portfolio of long-term contracts, including the development of complex and customized military platforms and systems, as well as advanced electronic equipment and software, that often include technology at the forefront of science. Cost estimates on fixed-price development contracts are inherently more uncertain as to future events than production contracts, and, as a result, there is typically more variability in those estimates, as well as financial risk associated with unanticipated cost growth. Changes in estimates occur for a variety of reasons, including changes in contract scope, the resolution of risk at lower or higher cost than anticipated, unanticipated performance and other risks affecting contract costs, performance issues with subcontractors or suppliers, changes in indirect cost allocations, such as overhead and G&A costs, and changes in estimated award and incentive fees. Identified risks typically include technical, schedule and/or performance risk based on our evaluation of the contract effort. Similarly, the changes in estimates may include changes in, or resolution of, identified opportunities for operating margin improvement.

For the impacts of changes in estimates on our consolidated statements of earnings and comprehensive income, see "Segment Operating Results" and Note 1 to the consolidated financial statements.

Retirement Benefits

Overview – The determination of projected benefit obligations, the fair value of plan assets, and pension and OPB expense for our retirement benefit plans requires the use of estimates and actuarial assumptions. We perform an annual review of our actuarial assumptions in consultation with our actuaries. As we determine changes in the assumptions are warranted, or as a result of plan amendments, future pension and OPB expense and our projected benefit obligation could increase or decrease. The principal estimates and assumptions that have a significant effect on our consolidated financial position and annual results of operations are the discount rate, cash balance crediting rate, expected long-term rate of return on plan assets, estimated fair market value of plan assets, and the mortality rate of those covered by our pension and OPB plans. The effects of actual results differing from our assumptions and

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the effects of changing assumptions (i.e. actuarial gains or losses) are recognized immediately through earnings upon annual remeasurement in the fourth quarter, or on an interim basis as triggering events warrant remeasurement.

Discount Rate – The discount rate represents the interest rate used to determine the present value of future cash flows currently expected to be required to settle our pension and OPB obligations. The discount rate is generally based on the yield of high-quality corporate fixed-income investments. At the end of each year, we determine the discount rate using a theoretical bond portfolio model of bonds rated AA or better to match the notional cash outflows related to projected benefit payments for each of our significant benefit plans. Taking into consideration the factors noted above, our weighted-average composite pension discount rate was 3.39 percent at December 31, 2019, and 4.31 percent at December 31, 2018.

The effects of a hypothetical change in the discount rate may be nonlinear and asymmetrical for future years as the discount rate changes. Holding all other assumptions constant, an increase or decrease of 25 basis points in the December 31, 2019 discount rate assumption would have the following estimated effects on 2019 pension and OPB obligations, which would be reflected in the 2019 MTM expense (benefit), and 2020 expected pension and OPB expense:

<i>\$ in millions</i>	25 Basis Point Decrease in Rate	25 Basis Point Increase in Rate
2020 pension and OPB (benefit) expense	\$ (34)	\$ 31
2019 pension and OPB obligation and MTM expense (benefit)	1,297	(1,230)

Cash Balance Crediting Rate – A portion of the company’s pension obligation and resulting pension expense is based on a cash balance formula, where participants’ hypothetical account balances are accumulated over time with pay-based credits and interest. Interest is credited monthly using the current 30-Year Treasury bond rate. The interest crediting rate is part of the cash balance formula and independent of actual pension investment earnings. The cash balance crediting rate tends to move in concert with the discount rate but has an offsetting effect on pension benefit obligations and the related MTM expense (benefit). The minimum cash balance crediting rate allowed under the plan is 2.25 percent. The cash balance crediting rate assumption has been set to its current level of 2.39 percent as of December 31, 2019, growing to 2.64 percent by 2025. Holding all other assumptions constant, an increase or decrease of 25 basis points in the December 31, 2019 cash balance crediting rate assumption would have the following estimated effects on the 2019 pension benefit obligation, which would be reflected in the 2019 MTM expense (benefit), and 2020 expected pension expense:

<i>\$ in millions</i>	25 Basis Point Decrease in Rate	25 Basis Point Increase in Rate
2020 pension (benefit) expense	\$ (11)	\$ 12
2019 pension obligation and MTM expense (benefit)	(136)	151

Expected Long-Term Rate of Return on Plan Assets – The expected long-term rate of return on plan assets (EROA) assumption reflects the average rate of net earnings we expect on current and future benefit plan investments. EROA is a long-term assumption, which we review annually and adjust to reflect changes in our long-term view of expected market returns and/or significant changes in our plan asset investment policy. Due to the inherent uncertainty of this assumption, we consider multiple data points at the measurement date including the plan’s target asset allocation, historical asset returns and third party projection models of expected long-term returns for each of the plans’ strategic asset classes. In addition to the data points themselves, we consider trends in the data points, including changes from the prior measurement date. The EROA assumptions we use for pension benefits are consistent with those used for OPB plans; however, we reduce the EROA for OPB plans to allow for the impact of tax on investment earnings, as certain Voluntary Employee Beneficiary Association trusts are taxable.

During 2019, the Investment Committee of the company’s benefit plans reviewed and approved the plans’ major asset class allocations. The current asset allocation is approximately 40% public equities, 30% fixed-income and 30% alternatives, which reflects a shift of approximately 5% from public equities to alternatives. At this time, the Investment Committee is not contemplating any significant changes to that mix. For further information on plan asset investments, see Note 13 to the consolidated financial statements.

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While historical market returns are not necessarily predictive of future market returns, given our long history of plan performance supported by the stability in our investment mix, investment managers, and active asset management, we believe our actual historical performance is a reasonable metric to consider when developing our EROA. Our average annual rate of return from 1976 to 2019 was approximately 11.1 percent and our 20-year and 30-year rolling average rates of return were approximately 7.1 percent and 9.7 percent, respectively, each determined on an arithmetic basis and net of expenses. Our 2019 actual net plan asset returns were approximately 19.1 percent.

Consistent with our past practice, we obtained long-term capital market forecasting models from several third parties and, using our target asset allocation, developed an expected rate of return on plan assets from each model. We considered not only the specific returns projected by those third party models, but also changes in the models year-to-year when developing our EROA.

For determining 2019 FAS expense, we assumed an expected long-term rate of return on pension plan assets of 8.0 percent and an expected long-term rate of return on OPB plan assets of 7.67 percent. For 2020 FAS expense, we have assumed an expected long-term rate of return on pension plan assets of 8.0 percent and 7.66 percent on OPB plans. Holding all other assumptions constant, an increase or decrease of 25 basis points in our December 31, 2019 EROA assumption would have the following estimated effects on 2020 expected pension and OPB expense:

<i>\$ in millions</i>	25 Basis Point Decrease	25 Basis Point Increase
2020 pension and OPB expense (benefit)	\$ 78	\$ (78)

In addition, holding all other assumptions constant, an increase or decrease of 100 basis points in actual versus expected return on plan assets would have the following estimated effects on our 2020 MTM expense (benefit):

<i>\$ in millions</i>	100 Basis Point Decrease	100 Basis Point Increase
2020 MTM expense (benefit)	\$ 312	\$ (312)

Estimated Fair Market Value of Plan Assets – For certain plan assets where the fair market value is not readily determinable, such as real estate, private equity, hedge funds and opportunistic investments, we develop estimates of fair value using the best information available. Estimated fair values on these plan assets are based on redemption values and net asset values, as well as valuation methodologies that include third party appraisals, comparable transactions, discounted cash flow valuation models and public market data.

Mortality Rate – Mortality assumptions are used to estimate life expectancies of plan participants. In October 2014, the Society of Actuaries (SOA) issued updated mortality tables and a mortality improvement scale, which reflected longer life expectancies than previously projected. In October 2019, the SOA issued an updated mortality base table (the Private Retirement Plans Mortality table for 2012 (Pri-2012)) as well as an updated mortality improvement scale (MP-2019). The updated model is based on a comprehensive study, which shifted the blue/white collar mix in prior tables more toward blue collar in the Pri-2012 table. Considering our employee population, we performed a study of our recent actual pension plan mortality experience to determine whether the Pri-2012 table's shift toward blue collar was appropriate for our company. After considering the additional information released by the SOA in October 2019, and after reviewing our own historical mortality experience, we adopted the Pri-2012 White Collar table along with their projection scale, but with a long-term improvement rate of 0.75% versus 1.0% assumed by the SOA. Accordingly, we updated the mortality assumptions used in calculating our pension and OPB obligations recognized at December 31, 2019, and the amounts estimated for our 2020 pension and OPB expense.

For further information regarding our pension and OPB plans, see "Risk Factors" and Notes 1 and 13 to the consolidated financial statements.

Litigation, Commitments and Contingencies

We are subject to a range of claims, disputes, enforcement actions, investigations, lawsuits, overhead cost claims, environmental matters, income tax matters and administrative proceedings that arise in the ordinary course of business. Estimating liabilities and costs associated with these matters requires judgment based upon the professional knowledge and experience of management. We determine whether to record a reserve and, if so, what amount based on consideration of the facts and circumstances of each matter as then known to us. Determinations regarding whether to record a reserve and, if so, of what amount, reflect management's assessment regarding what is likely to occur; they do not necessarily reflect what management believes should occur. The ultimate resolution of

any such exposure to us may vary materially from earlier estimates as further facts and circumstances develop or become known to us.

Environmental Matters – We are subject to environmental laws and regulations in the jurisdictions in which we do or have done business. Factors that could result in changes to the assessment of probability, range of reasonably estimated costs and environmental accruals include: modification of planned remedial actions; changes in the estimated time required to conduct remedial actions; discovery of more or less extensive (or different) contamination than anticipated; information regarding the potential causes and effects of contamination; results of efforts to involve other responsible parties; financial capabilities of other responsible parties; changes in laws and regulations, their interpretation or application; contractual obligations affecting remediation or responsibilities; and improvements in remediation technology. As we expect to be able to recover a portion of environmental remediation liabilities through overhead charges on government contracts, such amounts are deferred in prepaid expenses and other current assets (current portion) and other non-current assets until charged to contracts. We use judgment to evaluate the recoverability of our environmental remediation costs, assessing, among other things, U.S. government regulations, our U.S. government contract mix and past practices. Portions of the company’s environmental liabilities we do not expect to be recoverable have been expensed.

Income Tax Matters – The evaluation of tax positions taken in a filed tax return, or planned to be taken in a future tax return or claim, requires the use of judgment. We establish reserves for uncertain tax positions when, despite the belief that our tax positions are supportable, there remains uncertainty in a tax position taken in our filed tax returns or planned to be taken in a future tax return or claim. The company follows a recognition and measurement approach, considering the facts, circumstances, and information available at the reporting date. Judgment is exercised by the company in determining the level of evidence necessary and appropriate to support its assessment using all available information. The technical merits of its position are derived from sources of authority in the tax law and their applicability to the facts and circumstances of the tax position. In measuring the tax position, the company considers the amounts and probabilities of the outcomes that could be realized upon settlement. When it is more likely than not that a tax position will be sustained, we record the largest amount of tax benefit with a greater than 50 percent likelihood of being realized upon ultimate settlement with a taxing authority. To the extent we prevail in matters for which reserves have been established or are required to pay amounts in excess of reserves, there could be a significant impact on our consolidated financial position and annual results of operations. During 2019, we increased our unrecognized tax benefits by approximately \$319 million related to our methods of accounting associated with the timing of revenue recognition and related costs, and the 2017 Tax Act.

For further information on litigation, commitments and contingencies, see “Risk Factors” and Note 1, Note 7, Note 11 and Note 12 to the consolidated financial statements.

Goodwill and Other Purchased Intangible Assets

Overview – We allocate the purchase price of acquired businesses to the underlying tangible and intangible assets acquired and liabilities assumed based upon their respective fair values, with the excess recorded as goodwill. Such fair value assessments require judgments and estimates that can be affected by contract performance and other factors over time, which may cause final amounts to differ materially from original estimates. Adjustments to the fair value of purchased assets and liabilities after the initial measurement period are recognized in net earnings.

We recognize purchased intangible assets in connection with our business acquisitions at fair value on the acquisition date. The most significant purchased intangible assets recognized from our acquisitions are generally customer-related intangible assets, including customer contracts and commercial customer relationships. We determine the fair value of those customer-related intangible assets based on estimates and judgments, including the amount and timing of expected future cash flows, long-term growth rates and discount rates. In some cases, we use discounted cash flow analyses, which are based on estimates of future sales, earnings and cash flows after considering such factors as general market conditions, customer budgets, existing firm and future orders, changes in working capital, long term business plans and recent operating performance.

Impairment Testing – We test for impairment of goodwill annually at each of our reporting units, which comprise our operating segments. The results of our annual goodwill impairment tests as of December 31, 2019 and 2018, respectively, indicated that the estimated fair value of each reporting unit exceeded its respective carrying value. There were no impairment charges recorded in the years ended December 31, 2019, 2018 and 2017.

In addition to performing an annual goodwill impairment test, we may perform an interim impairment test if events occur or circumstances change that suggest goodwill in any of our reporting units may be impaired. Such indicators may include, but are not limited to, the loss of significant business, significant reductions in federal government appropriations or other significant adverse changes in industry or market conditions.

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When testing goodwill for impairment, we compare the fair values of each of our reporting units to their respective carrying values. To determine the fair value of our reporting units, we primarily use the income approach based on the cash flows that the reporting unit expects to generate in the future, consistent with our operating plans. This income valuation method requires management to project sales, operating expenses, working capital, capital spending and cash flows for the reporting units over a multi-year period, as well as to determine the weighted-average cost of capital (WACC) used as a discount rate and terminal value assumptions. The WACC takes into account the relative weights of each component of our consolidated capital structure (equity and debt) and represents the expected cost of new capital adjusted as appropriate to consider lower risk profiles associated with longer-term contracts and barriers to market entry. The terminal value assumptions are applied to the final year of the discounted cash flow model. We use industry multiples (including relevant control premiums) of operating earnings to corroborate the fair values of our reporting units determined under the market valuation method of the income approach.

We test for impairment of our purchased intangible assets when events or changes in circumstances indicate that the carrying amount of these assets may not be recoverable. Our assessment is based on our projection of the undiscounted future operating cash flows of the related asset group. If such projections indicate that future undiscounted cash flows are not sufficient to recover the carrying amount, we recognize a non-cash impairment charge to reduce the carrying amount to fair value. There were no impairment charges recorded in the years ended December 31, 2019, 2018 and 2017.

Impairment assessment inherently involves management judgments as to assumptions about expected future cash flows and the impact of market conditions on those assumptions. Due to the many variables inherent in the estimation of a business' fair value and the relative size of our recorded goodwill and other purchased intangible assets, differences in assumptions may have a material effect on the results of our impairment analysis.

OTHER MATTERS

Off-Balance Sheet Arrangements

As of December 31, 2019, we had no significant off-balance sheet arrangements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

EQUITY RISK

We are exposed to market risk with respect to our portfolio of marketable securities with a fair value of \$382 million at December 31, 2019. These securities are exposed to market volatilities, changes in price and interest rates.

INTEREST RATE RISK

We are exposed to interest rate risk on variable-rate, short-term borrowings under our credit facilities, for which there was \$60 million (the equivalent of approximately \$78 million as of December 31, 2019) outstanding at December 31, 2019. At December 31, 2019, we have \$13.9 billion of long-term debt, primarily consisting of fixed-rate debt, with a fair value of approximately \$15.1 billion. The terms of our fixed-rate debt obligations do not generally allow investors to demand payment of these obligations prior to maturity. Therefore, we do not have significant exposure to interest rate risk for our fixed-rate debt; however, we do have exposure to fair value risk if we repurchase or exchange long-term debt prior to maturity.

FOREIGN CURRENCY RISK

In certain circumstances, we are exposed to foreign currency risk. We enter into foreign currency forward contracts to manage a portion of the exchange rate risk related to receipts from customers and payments to suppliers denominated in foreign currencies. We do not hold or issue derivative financial instruments for trading purposes. At December 31, 2019, foreign currency forward contracts with a notional amount of \$98 million were outstanding. At December 31, 2019, a 10 percent unfavorable foreign exchange rate movement would not have a material impact on our consolidated financial position, annual results of operations and/or cash flows.

INFLATION RISK

We have generally been able to anticipate increases in costs when pricing our contracts. Bids for longer-term firm fixed-price contracts typically include assumptions for labor and other cost escalations in amounts that historically have been sufficient to cover cost increases over the period of performance.

Item 8. Financial Statements and Supplementary Data

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of
Northrop Grumman Corporation
Falls Church, Virginia

Opinion on the Financial Statements

We have audited the accompanying consolidated statements of financial position of Northrop Grumman Corporation and subsidiaries (the "Company") as of December 31, 2019 and 2018, and the related consolidated statements of earnings and comprehensive income, changes in shareholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with accounting principles generally accepted in the United States of America.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on the criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated January 29, 2020 expressed an unqualified opinion on the Company's internal control over financial reporting.

Change in Accounting Principle

As discussed in Note 1 to the financial statements, the Company has changed its method of accounting for leases in 2019 due to the adoption of ASC 842 *Leases*.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matters

The critical audit matters communicated below are matters arising from the current-period audit of the financial statements that were communicated or required to be communicated to the audit committee and that (1) relate to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matters below, providing separate opinions on the critical audit matters or on the accounts or disclosures to which they relate.

Revenue Recognition - Cost and Revenue Estimates for Development Contracts - Refer to Note 1 to the financial statements

Critical Audit Matter Description

As more fully described in Note 1 to the financial statements, the Company recognizes substantially all revenue as control is transferred to the customer on their long-term contracts over time using the cost-to-cost method (cost incurred relative to total cost estimated at completion). Use of the cost-to-cost-method requires the Company to

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make reasonably dependable estimates regarding the revenue and costs associated with the design, manufacture and delivery of their products or services. The Company estimates profit on these contracts as the difference between total estimated sales and total estimated costs at completion and recognizes that profit as costs are incurred. Cost estimates on contracts requiring development work are inherently more uncertain as to future events than production contracts, and, as a result, there is typically more variability in those estimates. Certain of these contracts are fixed price in nature, which results in greater financial risk associated with unanticipated cost growth. Alternatively, cost-type contracts may have award or incentive fees that are subject to uncertainty and may be earned over extended periods or towards the end of the contract. As a result, the estimation of costs required to complete these contracts and the expected revenues that will be earned is complex and requires significant judgment.

Given the judgment necessary to make reasonably dependable estimates regarding the revenue and costs associated with such contracts, auditing these estimates required extensive audit effort due to the complexity of the underlying programs and a high degree of auditor judgment when performing audit procedures and evaluating the results of those procedures.

How the Critical Audit Matter Was Addressed in the Audit

Our auditing procedures related to the cost and revenue estimates for these development contracts included the following, among others:

- We tested the effectiveness of controls over the estimates of total costs and revenues on such contracts, including development costs and any related award or incentive fee estimates for the relevant performance obligations.
- We selected certain long-term contracts for testing and performed the following procedures:
 - Evaluated whether the recognition of revenue over time on such contracts was appropriate based on the terms and conditions of each contract, including whether continuous transfer of control to the customer occurred as progress was made toward fulfilling the performance obligation.
 - Tested management’s identification of distinct performance obligations by evaluating whether the underlying goods and services were highly interdependent and interrelated.
 - Tested management’s determination of the transaction price, including any award or incentive fees, based on the consideration expected to be received in accordance with the rights and obligations established under the contracts and any contractual modifications.
 - Evaluated the estimates of total cost and revenue for the performance obligation by:
 - Conducting site visits to the relevant program locations and directly observing the contract status, as well as making inquiries regarding any challenges related to the program.
 - Comparing costs incurred to date to the costs management estimated to be incurred to date.
 - Evaluating management’s ability to achieve the estimates of total cost and revenue by performing corroborating inquiries with the Company’s program and business management, and testing management’s process used to develop the estimates based on their work plans, engineering specifications, program labor, and supplier contracts.
 - Comparing management’s estimates for the selected contracts to costs and revenues of similar performance obligations, when applicable.
 - Tested the mathematical accuracy of management’s calculation of revenue recognized during the period for the performance obligations.

Income Taxes - Uncertain Tax Positions - Refer to Notes 1 and 7 to the financial statements

Critical Audit Matter Description

The Company files income tax returns in the U.S. federal jurisdiction and in various state and foreign jurisdictions. Uncertain tax positions reflect the Company’s expected treatment of tax positions taken in a filed tax return, or planned to be taken in a future tax return or claim, which have not been reflected in measuring income tax expense or taxes payable for financial reporting purposes. Until these positions are sustained by the taxing authorities or the statute of limitations concerning such issues lapses, the Company does not generally recognize the tax benefits resulting from such positions and reports the tax effects as a liability for uncertain tax positions in its consolidated

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statements of financial position. The Company has recognized increased uncertain tax positions in recent years principally related to the methods of accounting associated with the timing of revenue recognition and related costs, and the 2017 Tax Act. Until the matters are resolved, the outcome is inherently uncertain and the Company discloses a summary of changes in their uncertain tax positions within the notes to their financial statements.

Auditing the assumptions associated with the Company's uncertain tax positions involved especially challenging judgments given the complexity and inherent subjectivity involved in evaluating the potential outcomes of these matters.

How the Critical Audit Matter Was Addressed in the Audit

Our audit procedures related to the assumptions used in determining uncertain tax positions included the following, among others:

- We tested the effectiveness of internal controls relating to the identification and completeness of, and recognition for, uncertain tax positions, including management's controls over the underlying key assumptions and inputs used to derive the estimates.
- With the assistance of our income tax specialists, we selected specific uncertain tax positions for testing and performed the following procedures:
 - Performed inquiries of the Company's tax department, financial reporting department, and other personnel directly involved in the development of the estimates.
 - Obtained supporting documentation and evaluated how the Company supported the position, including the assumptions and estimates used for measurement, and how the taxing authorities have historically challenged the tax position, if applicable.
 - Obtained and read opinions provided by external counsel, as applicable, regarding the tax position taken by the Company.
 - Evaluated whether the uncertain tax position met the "more likely than not" recognition threshold.
 - Evaluated the appropriateness and consistency of the methodologies and assumptions used by management when developing these estimates.
- We tested the mathematical accuracy of management's calculations.

/s/ Deloitte & Touche LLP
McLean, Virginia
January 29, 2020
We have served as the Company's auditor since 1975.

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CONSOLIDATED STATEMENTS OF EARNINGS AND COMPREHENSIVE INCOME

<i>\$ in millions, except per share amounts</i>	Year Ended December 31		
	2019	2018	2017
Sales			
Product	\$ 23,852	\$ 20,469	\$ 16,364
Service	9,989	9,626	9,640
Total sales	33,841	30,095	26,004
Operating costs and expenses			
Product	18,675	15,785	12,527
Service	7,907	7,519	7,547
General and administrative expenses	3,290	3,011	2,712
Operating income	3,969	3,780	3,218
Other (expense) income			
Interest expense	(528)	(562)	(360)
FAS (non-service) pension benefit	800	1,049	699
Mark-to-market pension and OPB (expense) benefit	(1,800)	(655)	536
Other, net	107	130	136
Earnings before income taxes	2,548	3,742	4,229
Federal and foreign income tax expense	300	513	1,360
Net earnings	\$ 2,248	\$ 3,229	\$ 2,869
Basic earnings per share	\$ 13.28	\$ 18.59	\$ 16.45
Weighted-average common shares outstanding, in millions	169.3	173.7	174.4
Diluted earnings per share	\$ 13.22	\$ 18.49	\$ 16.34
Weighted-average diluted shares outstanding, in millions	170.0	174.6	175.6
Net earnings (from above)	\$ 2,248	\$ 3,229	\$ 2,869
Other comprehensive loss			
Change in unamortized prior service credit, net of tax expense of \$15 in 2019, \$19 in 2018 and \$35 in 2017	(47)	(60)	(44)
Change in cumulative translation adjustment and other, net	2	(14)	(2)
Other comprehensive loss, net of tax	(45)	(74)	(46)
Comprehensive income	\$ 2,203	\$ 3,155	\$ 2,823

The accompanying notes are an integral part of these consolidated financial statements.

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CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

<i>\$ in millions, except par value</i>	December 31	
	2019	2018
Assets		
Cash and cash equivalents	\$ 2,245	\$ 1,579
Accounts receivable, net	1,326	1,448
Unbilled receivables, net	5,334	5,026
Inventoried costs, net	783	654
Prepaid expenses and other current assets	997	973
Total current assets	10,685	9,680
Property, plant and equipment, net of accumulated depreciation of \$5,850 for 2019 and \$5,369 for 2018	6,912	6,372
Operating lease right-of-use assets	1,511	—
Goodwill	18,708	18,672
Intangible assets, net	1,040	1,372
Deferred tax assets	508	94
Other non-current assets	1,725	1,463
Total assets	\$ 41,089	\$ 37,653
Liabilities		
Trade accounts payable	\$ 2,226	\$ 2,182
Accrued employee compensation	1,865	1,676
Advance payments and billings in excess of costs incurred	2,237	1,917
Other current liabilities	3,106	2,499
Total current liabilities	9,434	8,274
Long-term debt, net of current portion of \$1,109 for 2019 and \$517 for 2018	12,770	13,883
Pension and other postretirement benefit plan liabilities	6,979	5,755
Operating lease liabilities	1,308	—
Deferred tax liabilities	—	108
Other non-current liabilities	1,779	1,446
Total liabilities	32,270	29,466
Commitments and contingencies (Note 12)		
Shareholders' equity		
Preferred stock, \$1 par value; 10,000,000 shares authorized; no shares issued and outstanding	—	—
Common stock, \$1 par value; 800,000,000 shares authorized; issued and outstanding: 2019—167,848,424 and 2018—170,607,336	168	171
Paid-in capital	—	—
Retained earnings	8,748	8,068
Accumulated other comprehensive loss	(97)	(52)
Total shareholders' equity	8,819	8,187
Total liabilities and shareholders' equity	\$ 41,089	\$ 37,653

The accompanying notes are an integral part of these consolidated financial statements.

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CONSOLIDATED STATEMENTS OF CASH FLOWS

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Operating activities			
Net earnings	\$ 2,248	\$ 3,229	\$ 2,869
Adjustments to reconcile to net cash provided by operating activities:			
Depreciation and amortization	1,018	800	475
Mark-to-market pension and OPB expense (benefit)	1,800	655	(536)
Non-cash lease expense	247	—	—
Stock-based compensation	127	86	94
Deferred income taxes	(509)	234	985
Changes in assets and liabilities:			
Accounts receivable, net	122	202	(209)
Unbilled receivables, net	(335)	(297)	(422)
Inventoried costs, net	(135)	(37)	25
Prepaid expenses and other assets	(78)	(56)	(92)
Accounts payable and other liabilities	617	381	570
Income taxes payable, net	(63)	(258)	(157)
Retiree benefits	(703)	(1,083)	(946)
Other, net	(59)	(29)	(43)
Net cash provided by operating activities	4,297	3,827	2,613
Investing activities			
Acquisition of Orbital ATK, net of cash acquired	—	(7,657)	—
Capital expenditures	(1,264)	(1,249)	(928)
Other, net	57	28	39
Net cash used in investing activities	(1,207)	(8,878)	(889)
Financing activities			
Payments of long-term debt	(500)	(2,276)	—
Net proceeds from issuance of long-term debt	—	—	8,245
Payments to credit facilities	(31)	(320)	(13)
Net (repayments of) borrowings on commercial paper	(198)	198	—
Common stock repurchases	(744)	(1,263)	(393)
Cash dividends paid	(880)	(821)	(689)
Payments of employee taxes withheld from share-based awards	(65)	(85)	(92)
Other, net	(6)	(28)	(98)
Net cash (used in) provided by financing activities	(2,424)	(4,595)	6,960
Increase (decrease) in cash and cash equivalents	666	(9,646)	8,684
Cash and cash equivalents, beginning of year	1,579	11,225	2,541
Cash and cash equivalents, end of year	\$ 2,245	\$ 1,579	\$ 11,225

The accompanying notes are an integral part of these consolidated financial statements.

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

<i>\$ in millions, except per share amounts</i>	Year Ended December 31		
	2019	2018	2017
Common stock			
Beginning of year	\$ 171	\$ 174	\$ 175
Common stock repurchased	(3)	(4)	(2)
Shares issued for employee stock awards and options	—	1	1
End of year	168	171	174
Paid-in capital			
Beginning of year	—	44	—
Common stock repurchased	—	(34)	—
Stock compensation	—	(10)	44
End of year	—	—	44
Retained earnings			
Beginning of year	8,068	6,913	5,141
Impact from adoption of ASU 2018-02 and ASU 2016-01	—	(21)	—
Common stock repurchased	(751)	(1,225)	(371)
Net earnings	2,248	3,229	2,869
Dividends declared	(880)	(822)	(687)
Stock compensation	63	(6)	(39)
End of year	8,748	8,068	6,913
Accumulated other comprehensive (loss) income			
Beginning of year	(52)	1	47
Impact from adoption of ASU 2018-02 and ASU 2016-01	—	21	—
Other comprehensive income (loss), net of tax	(45)	(74)	(46)
End of year	(97)	(52)	1
Total shareholders' equity	\$ 8,819	\$ 8,187	\$ 7,132
Cash dividends declared per share	\$ 5.16	\$ 4.70	\$ 3.90

The accompanying notes are an integral part of these consolidated financial statements.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations

Northrop Grumman Corporation (herein referred to as “Northrop Grumman,” the “company,” “we,” “us,” or “our”) is a leading global security company. We offer a broad portfolio of capabilities and technologies that enable us to deliver innovative platforms, systems and solutions for applications that range from undersea to outer space and into cyberspace. We provide capabilities in autonomous systems; cyber; command, control, communications and computers, intelligence, surveillance and reconnaissance (C4ISR); space; strike; and logistics and modernization. We participate in many high-priority defense and government programs in the United States (U.S.) and abroad. We conduct most of our business with the U.S. government, principally the Department of Defense (DoD) and intelligence community. We also conduct business with foreign, state and local governments, as well as commercial customers.

On June 6, 2018 (the “Merger date”), the company completed its previously announced acquisition of Orbital ATK, Inc. (“Orbital ATK”) (the “Merger”). On the Merger date, Orbital ATK became a wholly-owned subsidiary of the company and its name was changed to Northrop Grumman Innovation Systems, Inc., which we established as a new, fourth business sector (“Innovation Systems”). The operating results of Innovation Systems subsequent to the Merger date have been included in the company’s consolidated results of operations. See Note 2 for further information regarding the Merger.

At December 31, 2019, the company was aligned in four operating sectors: Aerospace Systems, Innovation Systems, Mission Systems and Technology Services. In September 2019, the company announced changes effective January 1, 2020, which are intended to better align the company’s broad portfolio to serve its customers’ needs. The company continues to be aligned in four sectors as follows: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems. This realignment is not reflected in any of the accompanying financial information.

Principles of Consolidation

The consolidated financial statements include the accounts of Northrop Grumman and its subsidiaries and joint ventures or other investments for which we consolidate the financial results. Intercompany accounts, transactions and profits are eliminated in consolidation. Investments in equity securities and joint ventures where the company has significant influence, but not control, are accounted for using the equity method.

Basis of Presentation

Effective January 1, 2019, we adopted Accounting Standards Codification (ASC) Topic 842, *Leases*, using the optional transition method to apply the standard through a cumulative effect adjustment in the period of adoption. The adoption of this standard is reflected in the amounts and disclosures set forth in this Form 10-K.

Accounting Estimates

The company’s consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States of America (“GAAP” or “FAS”). The preparation thereof requires management to make estimates and judgments that affect the reported amounts of assets and liabilities and the disclosure of contingencies at the date of the financial statements, as well as the reported amounts of sales and expenses during the reporting period. Estimates have been prepared using the most current and best available information; however, actual results could differ materially from those estimates.

Revenue Recognition

The majority of our sales are derived from long-term contracts with the U.S. government for the production of goods, the provision of services, or a combination of both. The company classifies sales as product or service based on the predominant attributes of each performance obligation.

The company recognizes revenue for each separately identifiable performance obligation in a contract representing a promise to transfer a distinct good or service to a customer. In most cases, goods and services provided under the company’s contracts are accounted for as single performance obligations due to the complex and integrated nature of our products and services. These contracts generally require significant integration of a group of goods and/or services to deliver a combined output. In some contracts, the company provides multiple distinct goods or services to a customer, most commonly when a contract covers multiple phases of the product life cycle (e.g., development, production, sustainment, etc.). In those cases, the company accounts for the distinct contract deliverables as separate performance obligations and allocates the transaction price to each performance obligation based on its relative standalone selling price, which is generally estimated using cost plus a reasonable margin. Warranties are provided on certain contracts, but do not typically provide for services beyond standard assurances and are therefore not

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considered to be separate performance obligations. Assets recognized from the costs to obtain or fulfill a contract are not material.

Contracts are often modified for changes in contract specifications or requirements, which may result in scope and/or price changes. Most of the company's contract modifications are for goods or services that are not distinct in the context of the contract and are therefore accounted for as part of the original performance obligation through a cumulative estimate-at-completion (EAC) adjustment.

The company recognizes revenue as control is transferred to the customer, either over time or at a point in time. In general, our U.S. government contracts contain termination for convenience and/or other clauses that generally provide the customer rights to goods produced and/or in-process. Similarly, our non-U.S. government contracts generally contain contractual termination clauses or entitle the company to payment for work performed to date for goods and services that do not have an alternative use. As control is effectively transferred while we perform on our contracts, we generally recognize revenue over time using the cost-to-cost method (cost incurred relative to total cost estimated at completion) as the company believes this represents the most appropriate measurement towards satisfaction of its performance obligations. Revenue for contracts in which the control of goods produced does not transfer until delivery to the customer is recognized at a point in time (i.e., typically upon delivery).

Contract Estimates

Use of the cost-to-cost method requires us to make reasonably dependable estimates regarding the revenue and cost associated with the design, manufacture and delivery of our products and services. The company estimates profit on these contracts as the difference between total estimated sales and total estimated cost at completion and recognizes that profit as costs are incurred. Significant judgment is used to estimate total sales and cost at completion.

Contract sales may include estimates of variable consideration, including cost or performance incentives (such as award and incentive fees), contract claims and requests for equitable adjustment (REAs). Variable consideration is included in total estimated sales to the extent it is probable that a significant reversal in the amount of cumulative revenue recognized will not occur when the uncertainty associated with the variable consideration is subsequently resolved. We estimate variable consideration as the most likely amount to which we expect to be entitled.

We recognize changes in estimated contract sales or costs and the resulting changes in contract profit on a cumulative basis. Cumulative EAC adjustments represent the cumulative effect of the changes on current and prior periods; sales and operating margins in future periods are recognized as if the revised estimates had been used since contract inception. If it is determined that a loss is expected to result on an individual performance obligation, the entire amount of the estimable future loss, including an allocation of general and administrative (G&A) costs, is charged against income in the period the loss is identified.

The following table presents the effect of aggregate net EAC adjustments:

<i>\$ in millions, except per share data</i>	Year Ended December 31		
	2019	2018	2017
Revenue	\$ 538	\$ 631	\$ 374
Operating income	480	577	360
Net earnings ⁽¹⁾	379	456	234
Diluted earnings per share ⁽¹⁾	2.23	2.61	1.33

⁽¹⁾ Based on a 21% federal statutory tax rate for the years ended December 31, 2019 and 2018 and a 35% federal statutory tax rate for the year ended December 31, 2017.

EAC adjustments on a single performance obligation can have a material effect on the company's financial statements. When such adjustments occur, we generally disclose the nature, underlying conditions and financial impact of the adjustments. No such adjustments were material to the financial statements during the year ended December 31, 2019. During the second quarter of 2018, the company recognized \$69 million of favorable EAC adjustments on multiple restricted programs at Aerospace Systems. During the third quarter of 2017, the company recorded a \$56 million favorable EAC adjustment on a restricted program at Aerospace Systems.

Backlog

Backlog represents the future sales we expect to recognize on firm orders received by the company and is equivalent to the company's remaining performance obligations at the end of each period. It comprises both funded backlog (firm orders for which funding is authorized and appropriated) and unfunded backlog. Unexercised contract options

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and indefinite delivery indefinite quantity (IDIQ) contracts are not included in backlog until the time an option or IDIQ task order is exercised or awarded.

Company backlog as of December 31, 2019 was \$64.8 billion. We expect to recognize approximately 45 percent and 70 percent of our December 31, 2019 backlog as revenue over the next 12 and 24 months, respectively, with the remainder to be recognized thereafter.

Contract Assets and Liabilities

For each of the company's contracts, the timing of revenue recognition, customer billings, and cash collections results in a net contract asset or liability at the end of each reporting period. Fixed-price contracts are typically billed to the customer either using progress payments, whereby amounts are billed monthly as costs are incurred or work is completed, or performance based payments, which are based upon the achievement of specific, measurable events or accomplishments defined and valued at contract inception. Cost-type contracts are typically billed to the customer on a monthly or semi-monthly basis.

Contract assets are equivalent to and reflected as Unbilled receivables in the consolidated statements of financial position and are primarily related to long-term contracts where revenue recognized under the cost-to-cost method exceeds amounts billed to customers. Unbilled receivables are classified as current assets and, in accordance with industry practice, include amounts that may be billed and collected beyond one year due to the long-cycle nature of many of our contracts. Accumulated contract costs in unbilled receivables include costs such as direct production costs, factory and engineering overhead, production tooling costs, and allowable G&A. Unbilled receivables also include certain estimates of variable consideration described above. These contract assets are not considered a significant financing component of the company's contracts as the payment terms are intended to protect the customer in the event the company does not perform on its obligations under the contract.

Contract liabilities are equivalent to and reflected as Advance payments and billings in excess of costs incurred in the consolidated statements of financial position. Certain customers make advance payments prior to the company's satisfaction of its obligations on the contract. These amounts are recorded as contract liabilities until such obligations are satisfied, either over time as costs are incurred or at a point in time when deliveries are made. Contract liabilities are not a significant financing component as they are generally utilized to pay for contract costs within a one-year period or are used to ensure the customer meets contractual requirements.

Net contract assets are as follows:

<i>\$ in millions</i>	December 31, 2019	December 31, 2018	\$ Change	% Change
Unbilled receivables, net	\$ 5,334	\$ 5,026	\$ 308	6 %
Advance payments and amounts in excess of costs incurred	(2,237)	(1,917)	(320)	17 %
Net contract assets	\$ 3,097	\$ 3,109	\$ (12)	— %

The change in the balances of the company's contract assets and liabilities primarily results from timing differences between revenue recognition and customer billings and/or payments. Net contract assets as of December 31, 2019 are consistent with the prior year and principally reflect an increase in Advance payments and amounts in excess of costs incurred at Mission Systems and Innovation Systems, and an increase in Unbilled receivables, net at Mission Systems and Aerospace Systems.

The amount of revenue recognized for the years ended December 31, 2019, 2018 and 2017 that was included in the contract liability balance at the beginning of each year was \$1.3 billion, \$1.3 billion and \$1.2 billion, respectively.

Disaggregation of Revenue

See Note 16 for information regarding the company's sales by customer type, contract type and geographic region for each of our segments. We believe those categories best depict how the nature, amount, timing and uncertainty of our revenue and cash flows are affected by economic factors.

General and Administrative Expenses

In accordance with the regulations that govern cost accounting requirements for government contracts, most general management and corporate expenses incurred at the segment and corporate locations are considered allowable and allocable costs. Allowable and allocable G&A costs, including independent research and development (IR&D) and bid and proposal (B&P) costs, are allocated on a systematic basis to contracts in progress and are included as a component of total estimated contract costs.

Research and Development

Company-sponsored research and development activities primarily include efforts related to government programs. Company-sponsored IR&D expenses totaled \$953 million, \$764 million and \$639 million in 2019, 2018 and 2017, respectively, which represented 2.8 percent, 2.5 percent and 2.5 percent of total sales, respectively. Customer-funded research and development activities are charged directly to the related contracts.

Income Taxes

Provisions for federal and foreign income taxes are calculated on reported earnings before income taxes based on current tax law and include the cumulative effect of any changes in tax rates from those used previously in determining deferred tax assets and liabilities. Such provisions differ from the amounts currently payable because certain items of income and expense are recognized in different periods for financial reporting purposes than for income tax purposes. The company recognizes federal and foreign interest accrued related to unrecognized tax benefits in income tax expense. Federal tax penalties are recognized as a component of income tax expense.

In accordance with the regulations that govern cost accounting requirements for government contracts, current state and local income and franchise taxes are generally considered allowable and allocable costs and, consistent with industry practice, are recorded in operating costs and expenses. The company generally recognizes changes in deferred state taxes and unrecognized state tax benefits in unallocated corporate expenses.

Uncertain tax positions reflect the company's expected treatment of tax positions taken in a filed tax return, or planned to be taken in a future tax return or claim, which have not been reflected in measuring income tax expense or taxes payable for financial reporting purposes. Until these positions are sustained by the taxing authorities or the statute of limitations concerning such issues lapses, the company does not generally recognize the tax benefits resulting from such positions and reports the tax effects as a liability for uncertain tax positions in its consolidated statements of financial position.

Cash and Cash Equivalents

Cash and cash equivalents are comprised of cash in banks and highly liquid instruments with original maturities of three months or less, primarily consisting of bank time deposits and investments in institutional money market funds. Cash in bank accounts often exceeds federally insured limits.

Fair Value of Financial Instruments

The company measures the fair value of its financial instruments using observable and unobservable inputs. Observable inputs reflect market data obtained from independent sources, while unobservable inputs reflect internal market assumptions.

These two types of inputs create the following fair value hierarchy:

Level 1 - Quoted prices for identical instruments in active markets.

Level 2 - Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations whose inputs are observable or whose significant value drivers are observable.

Level 3 - Significant inputs to the valuation model are unobservable.

The company holds a portfolio of marketable securities consisting of securities to partially fund non-qualified employee benefit plans. A portion of these securities are held in common/collective trust funds and are measured at fair value using net asset value (NAV) per share as a practical expedient. Marketable securities accounted for as trading are recorded at fair value on a recurring basis and are included in Other non-current assets in the consolidated statements of financial position. Changes in unrealized gains and losses on trading securities are included in Other, net in the consolidated statements of earnings and comprehensive income. Investments in held-to-maturity instruments with original maturities greater than three months are recorded at amortized cost.

Derivative financial instruments are recognized as assets or liabilities in the financial statements and measured at fair value on a recurring basis. Changes in the fair value of derivative financial instruments that are designated as fair value hedges are recorded in net earnings, while the changes in the fair value of derivative financial instruments that are designated as cash flow hedges are recorded as a component of other comprehensive income until settlement. For derivative financial instruments not designated as hedging instruments, gains or losses resulting from changes in the fair value are reported in Other, net in the consolidated statements of earnings and comprehensive income.

The company uses derivative financial instruments to manage its exposure to foreign currency exchange risk related to receipts from customers and payments to suppliers denominated in foreign currencies (i.e., foreign currency

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forward contracts). For foreign currency forward contracts, where model-derived valuations are appropriate, the company utilizes the income approach to determine the fair value and uses the applicable London Interbank Offered Rate (LIBOR) swap rates.

The company does not use derivative financial instruments for trading or speculative purposes, nor does it use leveraged financial instruments. Credit risk related to derivative financial instruments is considered minimal and is managed through the use of multiple counterparties with high credit standards and periodic settlements of positions, as well as by entering into master netting agreements with most of our counterparties.

Inventoried Costs

Inventoried costs generally comprise costs associated with unsatisfied performance obligations on contracts accounted for using point in time revenue recognition, costs incurred in excess of existing contract requirements or funding that are probable of recovery and other accrued contract costs that are expected to be recoverable when allocated to specific contracts. Product inventory primarily consists of raw materials and is stated at the lower of cost or net realizable value, generally using the average cost method.

Accumulated contract costs in inventoried costs include costs such as direct production costs, factory and engineering overhead, production tooling costs, and allowable G&A. Inventoried costs are classified as current assets and, in accordance with industry practice, include amounts related to contracts having production cycles longer than one year.

Cash Surrender Value of Life Insurance Policies

The company maintains whole life insurance policies on a group of executives, which are recorded at their cash surrender value as determined by the insurance carrier. The company also has split-dollar life insurance policies on former officers and executives from acquired businesses, which are recorded at the lesser of their cash surrender value or premiums paid. These policies are utilized as a partial funding source for deferred compensation and other non-qualified employee retirement plans. As of December 31, 2019 and 2018, the carrying values associated with these policies were \$380 million and \$316 million, respectively, and are recorded in Other non-current assets in the consolidated statements of financial position.

Property, Plant and Equipment

Property, plant and equipment are depreciated over the estimated useful lives of individual assets. Most assets are depreciated using declining-balance methods, with the remainder using the straight-line method. Depreciation expense is generally recorded in the same segment where the related assets are held. However, the additional depreciation expense related to the step-up in fair value of property, plant and equipment acquired through business combinations is recorded in unallocated corporate expense within operating income as such depreciation is not considered part of management's evaluation of segment operating performance. Major classes of property, plant and equipment and their useful lives are as follows:

<i>Useful life in years, \$ in millions</i>	Useful Life	December 31	
		2019	2018
Land and land improvements	Up to 40 ⁽¹⁾	\$ 619	\$ 636
Buildings and improvements	Up to 45	2,575	2,139
Machinery and other equipment	Up to 20	6,997	6,618
Capitalized software costs	3-5	606	603
Leasehold improvements	Length of Lease ⁽²⁾	1,965	1,745
Property, plant and equipment, at cost		12,762	11,741
Accumulated depreciation		(5,850)	(5,369)
Property, plant and equipment, net		\$ 6,912	\$ 6,372

⁽¹⁾ Land is not a depreciable asset.

⁽²⁾ Leasehold improvements are depreciated over the shorter of the useful life of the asset or the length of the lease.

Goodwill and Other Purchased Intangible Assets

The company tests goodwill for impairment at least annually as of December 31, or when an indicator of potential impairment exists. When performing the goodwill impairment test, the company uses a discounted cash flow approach corroborated by comparative market multiples, where appropriate, to determine the fair value of its reporting units.

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Goodwill and other purchased intangible asset balances are included in the identifiable assets of their assigned business segment. However, the company includes the amortization of other purchased intangible assets in unallocated corporate expense within operating income as such amortization is not considered part of management's evaluation of segment operating performance. The company's customer-related intangible assets are generally amortized over their respective useful lives based on the pattern in which the future economic benefits of the intangible assets are expected to be consumed. Other intangible assets are generally amortized on a straight-line basis over their estimated useful lives.

Leases

The company leases certain buildings, land and equipment. Under ASC 842, at contract inception we determine whether a contract is or contains a lease and whether the lease should be classified as an operating or finance lease. Operating lease balances are included in Operating lease right-of-use assets, Other current liabilities, and Operating lease liabilities in our consolidated statements of financial position.

The company recognizes operating lease right-of-use assets and operating lease liabilities based on the present value of the future minimum lease payments over the lease term at commencement date. We use our incremental borrowing rate based on the information available at commencement date to determine the present value of future payments and the appropriate lease classification. Many of our leases include renewal options aligned with our contract terms. We define the initial lease term to include renewal options determined to be reasonably certain. In our adoption of ASC 842, we elected not to recognize a right-of-use asset and a lease liability for leases with an initial term of 12 months or less; we recognize lease expense for these leases on a straight-line basis over the lease term. We elected the practical expedient to not separate lease components from nonlease components and applied that practical expedient to all material classes of leased assets.

Many of the company's real property lease agreements contain incentives for tenant improvements, rent holidays or rent escalation clauses. For tenant improvement incentives, if the incentive is determined to be a leasehold improvement owned by the lessee, the company generally records a deferred rent liability and amortizes the deferred rent over the term of the lease as a reduction to rent expense. For rent holidays and rent escalation clauses during the lease term, the company records rental expense on a straight-line basis over the term of the lease. For these lease incentives, the company uses the date of initial possession as the commencement date, which is generally when the company is given the right of access to the space and begins to make improvements in preparation for intended use.

Finance leases are not material to our consolidated financial statements and the company is not a lessor in any material arrangements. We do not have any material restrictions or covenants in our lease agreements, sale-leaseback transactions, land easements or residual value guarantees.

Litigation, Commitments and Contingencies

We accrue for litigation, commitments and contingencies when management, after considering the facts and circumstances of each matter as then known to management, has determined it is probable a liability will be found to have been incurred and the amount of the loss can be reasonably estimated. When only a range of amounts is reasonably estimable and no amount within the range is more likely than another, the low end of the range is recorded. Legal fees are expensed as incurred. Due to the inherent uncertainties surrounding gain contingencies, we generally do not recognize potential gains until realized.

Environmental Costs

We accrue for environmental liabilities when management determines that, based on the facts and circumstances known to the company, it is probable the company will incur costs to address environmental impacts and the costs are reasonably estimable. When only a range of amounts is reasonably estimable and no amount within the range is more probable than another, we record the low end of the range. The company typically projects environmental costs for up to 30 years, records environmental liabilities on an undiscounted basis, and excludes asset retirement obligations and certain legal costs. At sites involving multiple parties, we accrue environmental liabilities based upon our expected share of liability, taking into account the financial viability of other liable parties.

Retirement Benefits

The company sponsors various defined benefit pension plans and defined contribution retirement plans covering substantially all of its employees. In most cases, our defined contribution plans provide for a company match of employee contributions. The company also provides postretirement benefits other than pensions to eligible retirees and qualifying dependents, consisting principally of health care and life insurance benefits.

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The liabilities, unamortized prior service credits and annual income or expense of the company's defined benefit pension and other postretirement benefit plans (OPB) are determined using methodologies that involve several actuarial assumptions.

Because U.S. government regulations provide for the costs of pension and OPB plans to be charged to our contracts in accordance with the Federal Acquisition Regulation (FAR) and the related U.S. Government Cost Accounting Standards (CAS) that govern such plans, we calculate retiree benefit plan costs under both FAS and CAS methods. While both FAS and CAS recognize a normal service cost component in measuring periodic pension cost, there are differences in the way the components of annual pension costs are calculated under each method. Measuring plan obligations under FAS and CAS includes different assumptions and models, such as in estimating returns on plan assets, calculating interest expense and the periods over which gains/losses related to pension assets and actuarial changes are recognized. As a result, annual retiree benefit plan expense amounts for FAS are different from the amounts for CAS in any given reporting period even though the ultimate cost of providing benefits over the life of the plans is the same under either method. CAS retiree benefit plan costs are charged to contracts and are included in segment operating income, and the difference between the service cost component of FAS expense and total CAS expense is recorded in operating income at the consolidated company level. Not all net periodic pension expense is recognized in net earnings in the year incurred because it is allocated as production costs and a portion remains in inventory at the end of a reporting period.

Actuarial gains and losses are immediately recognized in net periodic benefit cost for FAS through Mark-to-market pension and OPB ("MTM") (expense) benefit upon annual remeasurement in the fourth quarter, or on an interim basis as triggering events warrant remeasurement. Prior service credits are recognized as a component of Accumulated other comprehensive loss and amortized into earnings in future periods.

Stock Compensation

The company's stock compensation plans are classified as equity plans and compensation expense is generally recognized over the vesting period of stock awards (typically three years), net of estimated forfeitures. The company issues stock awards in the form of restricted performance stock rights and restricted stock rights. The fair value of stock awards is determined based on the closing market price of the company's common stock on the grant date. At each reporting date, the number of shares used to calculate compensation expense and diluted earnings per share is adjusted to reflect the number ultimately expected to vest.

Accumulated Other Comprehensive Loss

The components of accumulated other comprehensive loss are as follows:

<i>\$ in millions</i>	December 31	
	2019	2018
Unamortized prior service credit, net of tax expense of \$17 for 2019 and \$32 for 2018	\$ 51	\$ 98
Cumulative translation adjustment	(147)	(144)
Other, net	(1)	(6)
Total accumulated other comprehensive loss	\$ (97)	\$ (52)

Related Party Transactions

For all periods presented, the company had no material related party transactions.

Accounting Standards Updates

On February 25, 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*. ASC Topic 842 supersedes existing lease guidance, including ASC 840 - *Leases*. Among other things, ASU 2016-02 requires recognition of a right-of-use asset and liability for future lease payments for contracts that meet the definition of a lease and requires disclosure of certain information about leasing arrangements. On July 30, 2018, the FASB issued ASU No. 2018-11, *Leases (Topic 842): Targeted Improvements*, which, among other things, allows companies to elect an optional transition method to apply the new lease standard through a cumulative-effect adjustment in the period of adoption.

We adopted the standard on January 1, 2019 using the optional transition method and, as a result, did not recast prior period consolidated financial statements. All prior period amounts and disclosures are presented under ASC 840. We elected the package of practical expedients, which, among other things, allows us to carry forward our prior lease classifications under ASC 840. We did not elect to adopt the hindsight practical expedient and are therefore maintaining the lease terms we previously determined under ASC 840. Adoption of the new standard resulted in the

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recording of additional lease assets and lease liabilities on the consolidated statements of financial position with no cumulative impact to retained earnings and did not have a material impact on our results of operations or cash flows.

Other accounting standards updates adopted and/or issued, but not effective until after December 31, 2019, are not expected to have a material effect on the company's consolidated financial position, annual results of operations and/or cash flows.

2. ACQUISITION OF ORBITAL ATK

On June 6, 2018, the company completed its previously announced acquisition of Orbital ATK, by acquiring all of the outstanding shares of Orbital ATK for a purchase price of \$7.7 billion in cash. On the Merger date, Orbital ATK became a wholly-owned subsidiary of the company and its name was changed to Northrop Grumman Innovation Systems, Inc. We established Innovation Systems as a new, fourth business sector. Its main products include precision munitions and armaments; tactical missiles and subsystems; ammunition; launch vehicles; space and strategic propulsion systems; aerospace structures; space exploration products; and national security and commercial satellite systems and related components/services. The acquisition was financed with proceeds from the company's debt financing completed in October 2017 and cash on hand. We believe this acquisition has enabled us to broaden our capabilities and offerings, provide additional innovative solutions to meet our customers' emerging requirements, create value for shareholders and provide expanded opportunities for our combined employees.

The operating results of Innovation Systems subsequent to the Merger date are included in the company's consolidated results of operations. Innovation Systems recognized sales of \$3.3 billion, operating income of \$343 million and net earnings of \$273 million for the period from the Merger date to December 31, 2018.

The company recognized \$29 million of acquisition-related costs that were expensed as incurred during the year ended December 31, 2018. These costs are included in Product and Service cost in the consolidated statements of earnings and comprehensive income.

Purchase Price Allocation

The acquisition was accounted for as a purchase business combination. As such, the company recorded the assets acquired and liabilities assumed at fair value, with the excess of the purchase price over the fair value of assets acquired and liabilities assumed recorded as goodwill. Determining the fair value of assets acquired and liabilities assumed requires significant judgment, including the amount and timing of expected future cash flows, long-term growth rates and discount rates. In some cases, the company used discounted cash flow analyses, which were based on our best estimate of future sales, earnings and cash flows after considering such factors as general market conditions, customer budgets, existing firm and future orders, changes in working capital, long term business plans and recent operating performance. Use of different estimates and judgments could yield materially different results.

During the second quarter of 2019, the company finalized its determination of the fair values of the assets acquired and liabilities assumed as of the Merger date. Based on additional information obtained during the measurement period, the company refined its initial assessment of fair value and recognized the following significant adjustments to our preliminary purchase price allocation: Intangible assets increased \$220 million, Other current liabilities increased \$114 million, Pension and OPB plan liabilities increased \$56 million, Other non-current liabilities increased \$53 million, Other current assets increased \$44 million and Goodwill decreased \$36 million. These adjustments did not result in a material impact on the financial results of prior periods.

The Merger date fair value of the consideration transferred totaled \$7.7 billion in cash, which was comprised of the following:

<i>\$ in millions, except per share amounts</i>	Purchase price	
Shares of Orbital ATK common stock outstanding as of the Merger date		57,562,152
Cash consideration per share of Orbital ATK common stock	\$	134.50
Total purchase price	\$	7,742

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The following purchase price allocation table presents the company's final determination of the fair values of assets acquired and liabilities assumed at the Merger date:

<i>\$ in millions</i>	As of June 6, 2018
Cash and cash equivalents	\$ 85
Accounts receivable	596
Unbilled receivables	1,237
Inventoried costs	220
Other current assets	237
Property, plant and equipment	1,509
Goodwill	6,259
Intangible assets	1,525
Other non-current assets	151
Total assets acquired	11,819
Trade accounts payable	(397)
Accrued employee compensation	(158)
Advance payments and billings in excess of costs incurred	(222)
Below market contracts ⁽¹⁾	(151)
Other current liabilities	(412)
Long-term debt	(1,687)
Pension and OPB plan liabilities	(613)
Deferred tax liabilities	(248)
Other non-current liabilities	(189)
Total liabilities assumed	(4,077)
Total purchase price	\$ 7,742

⁽¹⁾ Included in Other current liabilities in the consolidated statements of financial position.

The following table presents a summary of purchased intangible assets and their related estimated useful lives:

	Fair Value (in millions)	Estimated Useful Life in Years
Customer contracts	\$ 1,245	9
Commercial customer relationships	280	13
Total customer-related intangible assets	\$ 1,525	

The purchase price allocation resulted in the recognition of \$6.3 billion of goodwill, a majority of which was allocated to the Innovation Systems sector (refer to Note 8). The goodwill recognized is attributable to expected revenue synergies generated by the integration of Aerospace Systems, Mission Systems and Technology Services products and technologies with those of legacy Orbital ATK, synergies resulting from the consolidation or elimination of certain costs, and intangible assets that do not qualify for separate recognition, such as the assembled workforce of Orbital ATK. None of the goodwill is expected to be deductible for tax purposes.

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Unaudited Supplemental Pro Forma Information

The following table presents unaudited pro forma financial information prepared in accordance with Article 11 of Regulation S-X and computed as if Orbital ATK had been included in our results as of January 1, 2017:

<i>\$ in millions, except per share amounts</i>	Year Ended December 31	
	2018	2017
Sales	\$ 32,319	\$ 30,634
Net earnings	3,417	2,938
Diluted earnings per share	19.57	16.73

The unaudited supplemental pro forma financial data has been calculated after applying our accounting policies and adjusting the historical results of Orbital ATK with pro forma adjustments, net of tax, that assume the acquisition occurred on January 1, 2017. Significant pro forma adjustments include the following:

1. The impact of the adoption of ASC Topic 606 on Orbital ATK's historical sales of \$21 million and cost of sales of \$21 million, for the year ended December 31, 2017.
2. The elimination of intercompany sales and costs of sales between the company and Orbital ATK of \$80 million and \$155 million for the years ended December 31, 2018 and 2017, respectively.
3. The elimination of nonrecurring transaction costs incurred by the company and Orbital ATK in connection with the Merger of \$71 million and \$57 million for the years ended December 31, 2018 and 2017, respectively.
4. The recognition of additional depreciation expense, net of removal of historical depreciation expense, of \$8 million and \$40 million for the years ended December 31, 2018 and 2017, respectively, related to the step-up in fair value of acquired property, plant and equipment.
5. Additional interest expense related to the debt issued to finance the Merger, including amortization of the debt issuance costs associated with the newly issued debt, of \$208 million for the year ended December 31, 2017. Interest expense and amortization of debt issuance costs have been included in the company's historical financial statements since the date of issuance (October 12, 2017).
6. The recognition of additional amortization expense, net of removal of historical amortization expense, of \$90 million and \$290 million for the years ended December 31, 2018 and 2017, respectively, related to the fair value of acquired intangible assets.
7. The elimination of Orbital ATK's historical amortization of net actuarial losses and prior service credits and impact of the revised pension and OPB net periodic benefit cost as determined under the company's plan assumptions of \$51 million and \$110 million for the years ended December 31, 2018 and 2017, respectively.
8. The income tax effect on the pro forma adjustments, which was calculated using the federal statutory tax rate in effect in each respective period, of \$(5) million and \$130 million for the years ended December 31, 2018 and 2017, respectively.

The unaudited pro forma financial information does not reflect the potential realization of revenue synergies or cost savings, nor does it reflect other costs relating to the integration of the two companies. This unaudited pro forma financial information should not be considered indicative of the results that would have actually occurred if the acquisition had been consummated on January 1, 2017, nor are they indicative of future results.

3. EARNINGS PER SHARE, SHARE REPURCHASES AND DIVIDENDS ON COMMON STOCK

Basic Earnings Per Share

We calculate basic earnings per share by dividing net earnings by the weighted-average number of shares of common stock outstanding during each period.

Diluted Earnings Per Share

Diluted earnings per share include the dilutive effect of awards granted to employees under stock-based compensation plans. The dilutive effect of these securities totaled 0.7 million, 0.9 million and 1.2 million shares for the years ended December 31, 2019, 2018 and 2017, respectively.

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Share Repurchases

On September 16, 2015, the company's board of directors authorized a share repurchase program of up to \$4.0 billion of the company's common stock (the "2015 Repurchase Program"). Repurchases under the 2015 Repurchase Program commenced in March 2016.

On December 4, 2018, the company's board of directors authorized a new share repurchase program of up to an additional \$3.0 billion in share repurchases of the company's common stock (the "2018 Repurchase Program"). By its terms, repurchases under the 2018 Repurchase Program will commence upon completion of the 2015 Repurchase Program and will expire when we have used all authorized funds for repurchases.

During the fourth quarter of 2018, the company entered into an accelerated share repurchase (ASR) agreement with Goldman Sachs & Co. LLC (Goldman Sachs) to repurchase \$1.0 billion of the company's common stock under the 2015 Repurchase Program. Under the agreement, we made a payment of \$1.0 billion to Goldman Sachs and received an initial delivery of 3.0 million shares valued at \$800 million that were immediately canceled by the company. The remaining balance was settled on January 4, 2019 with a final delivery of 0.9 million shares from Goldman Sachs. The final average purchase price was \$260.32 per share.

As of December 31, 2019, repurchases under the 2015 Repurchase Program totaled \$3.7 billion; \$0.3 billion remained under this share repurchase authorization. By its terms, the 2015 Repurchase Program is set to expire when we have used all authorized funds for repurchases.

Share repurchases take place from time to time, subject to market conditions and management's discretion, in the open market or in privately negotiated transactions. The company retires its common stock upon repurchase and, in the periods presented, has not made any purchases of common stock other than in connection with these publicly announced repurchase programs.

The table below summarizes the company's share repurchases to date under the authorizations described above:

Repurchase Program Authorization Date	Amount Authorized (in millions)	Total Shares Retired (in millions)	Average Price Per Share ⁽¹⁾	Date Completed	Shares Repurchased (in millions)		
					Year Ended December 31		
					2019	2018	2017
September 16, 2015	\$ 4,000	14.5	\$ 255.04		3.2	3.8	1.6
December 4, 2018	\$ 3,000	—	\$ —		—	—	—
					3.2	3.8	1.6

⁽¹⁾ Includes commissions paid.

Dividends on Common Stock

In May 2019, the company increased the quarterly common stock dividend 10 percent to \$1.32 per share from the previous amount of \$1.20 per share.

In May 2018, the company increased the quarterly common stock dividend 9 percent to \$1.20 per share from the previous amount of \$1.10 per share.

In January 2018, the company increased the quarterly common stock dividend 10 percent to \$1.10 per share from the previous amount of \$1.00 per share.

In May 2017, the company increased the quarterly common stock dividend 11 percent to \$1.00 per share from the previous amount of \$0.90 per share.

4. ACCOUNTS RECEIVABLE, NET

Accounts receivable, net represent amounts billed and due from customers. Substantially all accounts receivable at December 31, 2019 are expected to be collected in 2020. The company does not believe it has significant exposure to credit risk as the majority of our accounts receivable are due from the U.S. government either as the ultimate customer or in connection with foreign military sales.

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Accounts receivable consisted of the following:

<i>\$ in millions</i>	December 31	
	2019	2018
Due from U.S. government ⁽¹⁾	\$ 1,030	\$ 1,164
Due from international and other customers	329	318
Accounts receivable, gross	1,359	1,482
Allowance for doubtful accounts	(33)	(34)
Accounts receivable, net	\$ 1,326	\$ 1,448

⁽¹⁾ Includes receivables due from the U.S. government associated with foreign military sales (FMS). For FMS, we contract with and are paid by the U.S. government.

5. UNBILLED RECEIVABLES, NET

Unbilled receivables, net represent revenue recognized under the cost-to-cost method that exceeds amounts billed to customers. Substantially all unbilled receivables at December 31, 2019 are expected to be billed and collected in 2020. Progress and performance-based payments are reflected as an offset to the related unbilled receivable balances.

Unbilled receivables consisted of the following:

<i>\$ in millions</i>	December 31	
	2019	2018
Due from U.S. government ⁽¹⁾		
Unbilled receivables	\$ 17,347	\$ 16,823
Progress and performance-based payments received	(12,838)	(12,539)
Total due from U.S. government	4,509	4,284
Due from international and other customers		
Unbilled receivables	4,063	3,811
Progress and performance-based payments received	(3,193)	(3,030)
Total due from international and other customers	870	781
Unbilled receivables, net of progress and performance-based payments received	5,379	5,065
Allowance for doubtful accounts	(45)	(39)
Unbilled receivables, net	\$ 5,334	\$ 5,026

⁽¹⁾ Includes unbilled receivables due from the U.S. government associated with FMS sales. For FMS, we contract with and are paid by the U.S. government.

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6. INVENTORIED COSTS, NET

Inventoried costs are primarily associated with contracts where the U.S. government is the primary customer, therefore the company does not believe it has significant exposure to recoverability risk related to these amounts.

Inventoried costs, net consisted of the following:

<i>\$ in millions</i>	December 31	
	2019	2018
Production costs of contracts in process	\$ 476	\$ 402
G&A expenses	31	16
	507	418
Progress and performance-based payments received	(41)	(41)
	466	377
Product inventory and raw material	317	277
Inventoried costs, net	\$ 783	\$ 654

7. INCOME TAXES

The 2017 Tax Act was enacted in December 2017 and included a number of changes to previous U.S. tax laws that impacted the company, most notably a reduction of the U.S. corporate income tax rate from 35 percent to 21 percent for tax years beginning after December 31, 2017. In accordance with Staff Accounting Bulletin No.118, the company recognized provisional tax expense of \$285 million for the year ended December 31, 2017 and additional tax expense of \$5 million for the year ended December 31, 2018 related to the 2017 Tax Act.

Federal and foreign income tax expense consisted of the following:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Federal income tax expense:			
Current	\$ 758	\$ 292	\$ 449
Deferred	(474)	213	907
Total federal income tax expense	284	505	1,356
Foreign income tax expense:			
Current	10	7	8
Deferred	6	1	(4)
Total foreign income tax expense	16	8	4
Total federal and foreign income tax expense	\$ 300	\$ 513	\$ 1,360

Earnings from foreign operations before income taxes are not material for all periods presented.

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Income tax expense differs from the amount computed by multiplying earnings before income taxes by the statutory federal income tax rate due to the following:

<i>\$ in millions</i>	Year Ended December 31					
	2019		2018		2017	
Income tax expense at statutory rate	\$ 535	21.0 %	\$ 786	21.0 %	\$ 1,480	35.0 %
Stock compensation - excess tax benefits	(14)	(0.5)	(27)	(0.7)	(48)	(1.1)
Research credit	(216)	(8.5)	(186)	(5.0)	(130)	(3.1)
Foreign derived intangible income	(28)	(1.1)	(16)	(0.4)	—	—
Manufacturing deduction	—	—	—	—	(97)	(2.3)
Settlements with taxing authorities	—	—	—	—	(42)	(1.0)
Impacts related to the 2017 Tax Act	—	—	(84)	(2.2)	285	6.8
MTM benefit tax rate differential ⁽¹⁾	—	—	—	—	(72)	(1.7)
Other, net	23	0.9	40	1.0	(16)	(0.4)
Total federal and foreign income taxes	\$ 300	11.8 %	\$ 513	13.7 %	\$ 1,360	32.2 %

⁽¹⁾ Impact of applying the 2017 Tax Act enacted statutory tax rate of 21 percent versus 35 percent.

The year to date 2019 effective tax rate decreased to 11.8 percent from 13.7 percent in the same period of 2018. MTM expense reduced the 2019 effective tax rate by 3.7 percentage points and the 2018 effective tax rate by 1.1 percentage points. In addition, the company's effective tax rate for 2019 reflects an increase in benefits for research credits and foreign derived intangible income of \$30 million and \$12 million, respectively, and the absence of an \$84 million benefit associated with the 2017 Tax Act realized in 2018.

The year to date 2018 effective tax rate decreased to 13.7 percent from 32.2 percent in the same period of 2017 principally due to the reduction of the U.S. corporate income tax rate from 35 percent to 21 percent as a result of the 2017 Tax Act and a \$56 million increase in research credits. In addition, the company's effective tax rate for 2017 includes \$285 million of tax expense recorded in connection with the 2017 Tax Act, largely due to the write-down of net deferred tax assets, offset by \$97 million of tax benefits associated with manufacturing deductions and a \$72 million tax benefit from the impact of applying the 2017 Tax Act enacted statutory tax rate of 21 percent versus 35 percent to the 2017 MTM benefit.

Income tax payments, net of refunds received, were \$324 million, \$270 million and \$517 million for the years ended December 31, 2019, 2018 and 2017, respectively.

Uncertain Tax Positions

We file income tax returns in the U.S. federal jurisdiction and in various state and foreign jurisdictions. The Northrop Grumman 2014-2017 federal tax returns and refund claims related to its 2007-2016 federal tax returns are currently under IRS examination. In addition, legacy Orbital ATK federal tax returns for the year ended March 31, 2015, the nine-month transition period ended December 31, 2015 and calendar years 2016-2017 are currently under IRS examination.

Tax returns for open tax years related to state and foreign jurisdictions remain subject to examination. As state income taxes are generally considered allowable and allocable costs, any individual or aggregate state examination impacts are not expected to have a material impact on our financial results. Amounts currently subject to examination related to foreign jurisdictions are not material.

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The change in unrecognized tax benefits during 2019, 2018 and 2017, excluding interest, is as follows:

<i>\$ in millions</i>	December 31		
	2019	2018	2017
Unrecognized tax benefits at beginning of the year	\$ 748	\$ 283	\$ 135
Additions based on tax positions related to the current year	158	293	102
Additions for tax positions of prior years	400	207	110
Reductions for tax positions of prior years	(65)	(23)	(44)
Settlements with taxing authorities	(15)	(7)	(20)
Other, net	(3)	(5)	—
Net change in unrecognized tax benefits	475	465	148
Unrecognized tax benefits at end of the year	\$ 1,223	\$ 748	\$ 283

During 2019, we increased our unrecognized tax benefits by approximately \$319 million related to our methods of accounting associated with the timing of revenue recognition and related costs, and the 2017 Tax Act. It is reasonably possible that within the next twelve months our unrecognized tax benefits may decrease by up to \$60 million. Since enactment of the 2017 Tax Act, the IRS and U.S. Treasury Department have issued and are expected to further issue interpretive guidance that impacts taxpayers. We will continue to evaluate such guidance as it is issued.

These liabilities, along with \$56 million of accrued interest and penalties, are included in other current and non-current liabilities in the consolidated statements of financial position. If the income tax benefits from these tax positions are ultimately realized, \$570 million of federal and foreign tax benefits would reduce the company's effective tax rate.

Net interest expense within the company's federal, foreign and state income tax provisions was not material for all years presented.

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Deferred Income Taxes

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and tax purposes. Net deferred tax assets and liabilities are classified as non-current in the consolidated statements of financial position.

The tax effects of significant temporary differences and carryforwards that gave rise to year-end deferred federal, state and foreign tax balances, as presented in the consolidated statements of financial position, are as follows:

<i>\$ in millions</i>	December 31	
	2019	2018
Deferred Tax Assets		
Retiree benefits	\$ 1,827	\$ 1,541
Accrued employee compensation	336	308
Provisions for accrued liabilities	166	139
Inventory	684	650
Stock-based compensation	38	42
Operating lease liabilities	411	—
Tax credits	166	174
Other	73	59
Gross deferred tax assets	3,701	2,913
Less valuation allowance	(160)	(142)
Net deferred tax assets	3,541	2,771
Deferred Tax Liabilities		
Goodwill	515	511
Purchased intangibles	262	346
Property, plant and equipment, net	584	518
Operating lease right-of-use assets	404	—
Contract accounting differences	1,225	1,381
Other	43	29
Deferred tax liabilities	3,033	2,785
Total net deferred tax assets (liabilities)	\$ 508	\$ (14)

Realization of deferred tax assets is primarily dependent on generating sufficient taxable income in future periods. The company believes it is more-likely-than-not our net deferred tax assets will be realized.

At December 31, 2019, the company has available tax credits and unused net operating losses of \$324 million and \$310 million, respectively, that may be applied against future taxable income. The majority of tax credits and net operating losses expire in 2020 through 2040, however, some may be carried forward indefinitely. Due to the uncertainty of the realization of the tax credits and net operating losses, the company has recorded valuation allowances of \$121 million and \$32 million as of December 31, 2019, respectively.

Undistributed Foreign Earnings

As of December 31, 2019, the company has accumulated undistributed earnings generated by our foreign subsidiaries and most have been taxed in the U.S. as a result of the 2017 Tax Act. The 2017 Tax Act allows for a dividend received deduction for repatriation of earnings. We intend to indefinitely reinvest these earnings, as well as future earnings from our foreign subsidiaries, to fund our international operations and foreign credit facility. In addition, we expect future U.S. cash generation will be sufficient to meet future U.S. cash needs.

8. GOODWILL AND OTHER PURCHASED INTANGIBLE ASSETS

Goodwill

As discussed in Note 2, the Merger resulted in the recognition of \$6.3 billion of goodwill, a majority of which was allocated to the Innovation Systems sector. A portion of this goodwill was allocated to the company's other sectors based on expected revenue synergies generated by the integration of their products and technologies with those of Innovation Systems.

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Changes in the carrying amounts of goodwill for the years ended December 31, 2018 and 2019, were as follows:

<i>\$ in millions</i>	Aerospace Systems	Innovation Systems	Mission Systems	Technology Services	Total
Balance as of December 31, 2017	\$ 3,742	\$ —	\$ 6,696	\$ 2,017	\$ 12,455
Acquisition of Orbital ATK	418	5,256	469	79	6,222
Other ⁽¹⁾	—	—	(2)	(3)	(5)
Balance as of December 31, 2018	\$ 4,160	\$ 5,256	\$ 7,163	\$ 2,093	\$ 18,672
Acquisition of Orbital ATK	—	37	—	—	37
Other ⁽¹⁾	—	—	—	(1)	(1)
Balance as of December 31, 2019	\$ 4,160	\$ 5,293	\$ 7,163	\$ 2,092	\$ 18,708

⁽¹⁾ Other consists primarily of adjustments for foreign currency translation.

Accumulated goodwill impairment losses at December 31, 2019 and 2018, totaled \$570 million at Aerospace Systems.

Other Purchased Intangible Assets

Net customer-related and other intangible assets are as follows:

<i>\$ in millions</i>	December 31	
	2019	2018
Gross customer-related and other intangible assets	\$ 3,356	\$ 3,356
Less accumulated amortization	(2,316)	(1,984)
Net customer-related and other intangible assets	\$ 1,040	\$ 1,372

Amortization expense for 2019, 2018 and 2017, was \$332 million, \$203 million and \$14 million, respectively. As of December 31, 2019, the expected future amortization of purchased intangibles for each of the next five years is as follows:

<i>\$ in millions</i>	
2020	\$ 262
2021	204
2022	197
2023	78
2024	55

9. FAIR VALUE OF FINANCIAL INSTRUMENTS

The following table presents the financial assets and liabilities the company records at fair value on a recurring basis identified by the level of inputs used to determine fair value. See Note 1 for the definitions of these levels and for further information on our financial instruments.

<i>\$ in millions</i>	December 31, 2019			December 31, 2018		
	Level 1	Level 2	Total	Level 1	Level 2	Total
Financial Assets (Liabilities)						
Marketable securities	\$ 364	\$ 1	\$ 365	\$ 319	\$ 1	\$ 320
Marketable securities valued using NAV			17			15
Total marketable securities	364	1	382	319	1	335
Derivatives	—	(3)	(3)	—	(10)	(10)

The notional value of the company's foreign currency forward contracts at December 31, 2019 and 2018 was \$98 million and \$114 million, respectively. The portion of notional value designated as a cash flow hedge at

December 31, 2019 was \$7 million. At December 31, 2018, no portion of the notional value was designated as a cash flow hedge.

The derivative fair values and related unrealized gains/losses at December 31, 2019 and 2018 were not material.

There were no transfers of financial instruments between the three levels of the fair value hierarchy during the years ended December 31, 2019 and 2018.

The carrying value of cash and cash equivalents and commercial paper approximates fair value.

10. DEBT

Commercial Paper

The company maintains a commercial paper program that serves as a source of short-term financing with capacity to issue unsecured commercial paper notes up to \$2.0 billion. At December 31, 2019, there were no commercial paper borrowings outstanding. At December 31, 2018, there were \$198 million of outstanding short-term commercial paper borrowings at a weighted-average interest rate of 2.77 percent that had original maturities of three months or less from the date of issuance. The outstanding balance of commercial paper borrowings is recorded in Other current liabilities in the consolidated statements of financial position.

Credit Facilities

In August 2018, the company entered into a five-year senior unsecured credit facility in an aggregate principal amount of \$2.0 billion (the "2018 Credit Agreement"). The revolving credit facility established under the 2018 Credit Agreement is intended to support the company's commercial paper program and other general corporate purposes. At December 31, 2019, there was no balance outstanding under this facility. Commercial paper borrowings reduce the amount available for borrowing under the 2018 Credit Agreement. In October 2019, the company amended the 2018 Credit Agreement to extend its maturity date by one year from August 2023 to August 2024.

In December 2016, a subsidiary of the company entered into a two-year credit facility, with two additional one-year option periods, in an aggregate principal amount of £120 million (the equivalent of approximately \$155 million as of December 31, 2019) (the "2016 Credit Agreement"). The company exercised the second option to extend the maturity to December 2020. The 2016 Credit Agreement is guaranteed by the company. At December 31, 2019, there was £60 million (the equivalent of approximately \$78 million as of December 31, 2019) outstanding under this facility, which bears interest at a rate of LIBOR plus 1.10 percent. All of the borrowings outstanding under this facility are recorded in Other current liabilities in the consolidated statements of financial position.

Our credit agreements contain generally customary terms and conditions, including covenants restricting the company's ability to sell all or substantially all of its assets, merge or consolidate with another entity or undertake other fundamental changes and incur liens. The company also cannot permit the ratio of its debt to capitalization (as set forth in the credit agreements) to exceed 65 percent. At December 31, 2019, the company was in compliance with all covenants under its credit agreements.

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Unsecured Senior Notes

Long-term debt consists of the following:

<i>\$ in millions</i>		December 31	
		2019	2018
Fixed-rate notes and debentures, maturing in	Interest rate		
2019	5.05%	\$ —	\$ 500
2020	2.08%	1,000	1,000
2021	3.50%	700	700
2022	2.55%	1,500	1,500
2023	3.25%	1,050	1,050
2025	2.93%	1,500	1,500
2026	7.75% - 7.88%	527	527
2027	3.20%	750	750
2028	3.25%	2,000	2,000
2031	7.75%	466	466
2040	5.05%	300	300
2043	4.75%	950	950
2045	3.85%	600	600
2047	4.03%	2,250	2,250
Credit facilities	1.89%	78	108
Other	Various	272	272
Debt issuance costs		(64)	(73)
Total long-term debt		13,879	14,400
Less: current portion ⁽¹⁾		1,109	517
Long-term debt, net of current portion		\$ 12,770	\$ 13,883

⁽¹⁾ The current portion of long-term debt is recorded in Other current liabilities in the consolidated statements of financial position.

The estimated fair value of long-term debt was \$15.1 billion and \$14.3 billion as of December 31, 2019 and 2018, respectively. We calculated the fair value of long-term debt using Level 2 inputs, based on interest rates available for debt with terms and maturities similar to the company's existing debt arrangements.

Indentures underlying long-term debt issued by the company or its subsidiaries contain various restrictions with respect to the issuer, including one or more restrictions relating to limitations on liens, sale-leaseback arrangements and funded debt of subsidiaries. The majority of these fixed rate notes and debentures are subject to redemption at the company's discretion at any time prior to maturity in whole or in part at the principal amount plus any make-whole premium and accrued and unpaid interest. Interest on these fixed rate notes and debentures are payable semi-annually in arrears.

Total interest payments, net of interest received, were \$521 million, \$456 million and \$273 million for the years ended December 31, 2019, 2018 and 2017, respectively.

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Maturities of long-term debt as of December 31, 2019, are as follows:

\$ in millions

Year Ending December 31	
2020	\$ 1,110
2021	742
2022	1,505
2023	1,053
2024	3
Thereafter	9,532
Total principal payments	13,945
Unamortized premium on long-term debt, net of discount	(2)
Debt issuance costs	(64)
Total long-term debt	\$ 13,879

11. INVESTIGATIONS, CLAIMS AND LITIGATION

On May 4, 2012, the company commenced an action, *Northrop Grumman Systems Corp. v. United States*, in the U.S. Court of Federal Claims. This lawsuit relates to an approximately \$875 million firm fixed-price contract awarded to the company in 2007 by the U.S. Postal Service (USPS) for the construction and delivery of flats sequencing systems (FSS) as part of the postal automation program. The FSS have been delivered. The company's lawsuit is based on various theories of liability. The complaint seeks approximately \$63 million for unpaid portions of the contract price, and approximately \$115 million based on the company's assertions that, through various acts and omissions over the life of the contract, the USPS adversely affected the cost and schedule of performance and materially altered the company's obligations under the contract. The United States responded to the company's complaint with an answer, denying most of the company's claims, and counterclaims seeking approximately \$410 million, less certain amounts outstanding under the contract. The principal counterclaim alleges that the company delayed its performance and caused damages to the USPS because USPS did not realize certain costs savings as early as it had expected. On April 2, 2013, the U.S. Department of Justice informed the company of a False Claims Act complaint relating to the FSS contract that was filed under seal by a relator in June 2011 in the U.S. District Court for the Eastern District of Virginia. On June 3, 2013, the United States filed a Notice informing the Court that the United States had decided not to intervene in this case. The relator alleged that the company violated the False Claims Act in a number of ways with respect to the FSS contract, alleged damage to the USPS in an amount of at least approximately \$179 million annually, alleged that he was improperly discharged in retaliation, and sought an unspecified partial refund of the contract purchase price, penalties, attorney's fees and other costs of suit. The relator later voluntarily dismissed his retaliation claim and reasserted it in a separate arbitration, which he also ultimately voluntarily dismissed. On September 5, 2014, the court granted the company's motion for summary judgment and ordered the relator's False Claims Act case be dismissed with prejudice. On February 16, 2018, both the company and the United States filed motions to dismiss many of the claims and counterclaims referenced above, in whole or in part. The United States also filed a motion seeking to amend its answer and counterclaim, including to reduce its counterclaim to approximately \$193 million, which the court granted on June 11, 2018. On October 17, 2018, the court granted in part and denied in part the parties' motions to dismiss. After a mediation that did not resolve the dispute, the court has set trial to commence on February 3, 2020, running through March or early April. Although the ultimate outcome of these matters ("the FSS matters," collectively), including any possible loss, cannot be predicted or reasonably estimated at this time, the company intends vigorously to pursue and defend the FSS matters.

On August 8, 2013, the company received a court-appointed expert's report in litigation pending in the Second Federal Court of the Federal District in Brazil brought by the Brazilian Post and Telegraph Corporation (ECT), a Brazilian state-owned entity, against Solystic SAS (Solystic), a French subsidiary of the company, and two of its consortium partners. In this suit, commenced on December 17, 2004, and relatively inactive for some period of time, ECT alleges the consortium breached its contract with ECT and seeks damages of approximately R\$111 million (the equivalent of approximately \$27 million as of December 31, 2019), plus interest, inflation adjustments and attorneys' fees, as authorized by Brazilian law, which amounts could be significant over time. The original suit sought R\$89 million (the equivalent of approximately \$22 million as of December 31, 2019) in damages. In October 2013, ECT asserted an additional damage claim of R\$22 million (the equivalent of approximately \$5 million as of December 31, 2019). In its counterclaim, Solystic alleges ECT breached the contract by wrongfully refusing to accept the equipment Solystic had designed and built and seeks damages of approximately €31 million (the

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equivalent of approximately \$35 million as of December 31, 2019), plus interest, inflation adjustments and attorneys' fees, as authorized by Brazilian law. The Brazilian court retained an expert to consider certain issues pending before it. On August 8, 2013 and September 10, 2014, the company received reports from the expert, which contain some recommended findings relating to liability and the damages calculations put forth by ECT. Some of the expert's recommended findings were favorable to the company and others were favorable to ECT. In November 2014, the parties submitted comments on the expert's most recent report. On June 16, 2015, the court published a decision denying the parties' request to present oral testimony. In a decision dated November 13, 2018, the trial court ruled in ECT's favor on one of its claims against Solystic, and awarded damages of R\$41 million (the equivalent of approximately \$10 million as of December 31, 2019) against Solystic and its consortium partners, with that amount to be adjusted for inflation and interest from November 2004 through any appeal, in accordance with the Manual of Calculations of the Federal Justice, as well as attorneys' fees. On March 22, 2019, ECT appealed the trial court's decision to the intermediate court of appeals. Solystic filed its appeal on April 11, 2019. The parties are assessing whether there is a possible path for a negotiated resolution of the dispute.

We are engaged in remediation activities relating to environmental conditions allegedly resulting from historic operations at the former United States Navy and Grumman facilities in Bethpage, New York. For over 20 years, we have worked closely with the United States Navy, the United States Environmental Protection Agency, the New York State Department of Environmental Conservation, the New York State Department of Health and other federal, state and local governmental authorities, to address legacy environmental conditions in Bethpage. We have incurred, and expect to continue to incur, as included in Note 12, substantial remediation costs related to these environmental conditions. The remediation standards or requirements to which we are subject are being reconsidered and may change and costs may increase materially. As discussed in Note 12, the State of New York issued a Feasibility Study and an Amended Record of Decision, seeking to impose additional remedial requirements. The company is engaged in discussions with the State of New York and certain other potentially responsible parties. The State of New York has said that, among other things, it is also evaluating potential natural resource damages. In addition, we are a party to various, and expect to become a party to additional, legal proceedings and disputes related to remediation, costs, allowability and/or alleged environmental impacts in Bethpage, including with federal and state entities, the Navy, local municipalities and water districts, and insurance carriers, as well as class action and individual plaintiffs alleging personal injury and property damage and seeking both monetary and non-monetary relief. These Bethpage matters could result in additional costs, fines, penalties, sanctions, compensatory or other damages (including natural resource damages), determinations on allocation, allowability and coverage, and non-monetary relief. We cannot at this time predict or reasonably estimate the potential cumulative outcomes or ranges of possible liability of these aggregate Bethpage matters.

On August 12, 2016, plaintiffs filed a putative class action complaint in the United States District Court for the Eastern District of Virginia against Orbital ATK and certain individuals, captioned Steven Knurr, et al. v. Orbital ATK, Inc., No. 16-cv-01031 (TSE-MSN). As later amended, the complaint asserted claims on behalf of Orbital ATK shareholders for violations of Sections 10(b) and 20(a) of the Exchange Act and Rule 10b-5, and Section 14(a) of the Exchange Act allegedly arising out of false and misleading statements and the failure to disclose that: (i) Orbital ATK lacked effective control over financial reporting; and (ii) as a result, Orbital ATK failed to record an anticipated loss on a long-term contract with the U.S. Army to manufacture and supply small caliber ammunition at the U.S. Army's Lake City Army Ammunition Plant. The complaint sought damages and other relief. On June 7, 2019, the court approved the parties' proposal to resolve the litigation for \$108 million, subject to certain terms and conditions. The company continues to pursue recovery of allowable costs and coverage litigation against various of its insurance carriers.

The company is a party to various other investigations, lawsuits, arbitration, claims, enforcement actions and other legal proceedings, including government investigations and claims, that arise in the ordinary course of our business. The nature of legal proceedings is such that we cannot assure the outcome of any particular matter. However, based on information available to the company to date, the company does not believe that the outcome of any of these other matters pending against the company is likely to have a material adverse effect on the company's consolidated financial position as of December 31, 2019, or its annual results of operations and/or cash flows.

12. COMMITMENTS AND CONTINGENCIES

U.S. Government Cost Claims

From time to time, the company is advised of claims by the U.S. government concerning certain potential disallowed costs, plus, at times, penalties and interest. When such findings are presented, the company and U.S. government representatives engage in discussions to enable the company to evaluate the merits of these claims, as well as to assess the amounts being claimed. Where appropriate, provisions are made to reflect the company's

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estimated exposure for such potential disallowed costs. Such provisions are reviewed periodically using the most recent information available. The company believes it has adequately reserved for disputed amounts that are probable and reasonably estimable, and that the outcome of any such matters would not have a material adverse effect on its consolidated financial position as of December 31, 2019, or its annual results of operations and/or cash flows.

Environmental Matters

The table below summarizes the amount accrued for environmental remediation costs, management's estimate of the amount of reasonably possible future costs in excess of accrued costs and the deferred costs expected to be recoverable through overhead charges on U.S. government contracts as of December 31, 2019 and 2018:

<i>\$ in millions</i>	Accrued Costs ⁽¹⁾⁽²⁾	Reasonably Possible Future Costs in excess of Accrued Costs ⁽²⁾	Deferred Costs ⁽³⁾
December 31, 2019	\$ 531	\$ 448	\$ 436
December 31, 2018	461	374	343

⁽¹⁾ As of December 31, 2019, \$148 million is recorded in Other current liabilities and \$383 million is recorded in Other non-current liabilities.

⁽²⁾ Estimated remediation costs are not discounted to present value. The range of reasonably possible future costs does not take into consideration amounts expected to be recoverable through overhead charges on U.S. government contracts.

⁽³⁾ As of December 31, 2019, \$119 million is deferred in Prepaid expenses and other current assets and \$317 million is deferred in Other non-current assets. These amounts are evaluated for recoverability on a routine basis.

Although management cannot predict whether new information gained as our environmental remediation projects progress, or as changes in facts and circumstances occur, will materially affect the estimated liability accrued, except with respect to Bethpage, we do not anticipate that future remediation expenditures associated with our currently identified projects will have a material adverse effect on the company's consolidated financial position as of December 31, 2019, or its annual results of operations and/or cash flows. With respect to Bethpage, the State of New York issued a Feasibility Study and an Amended Record of Decision, seeking to impose additional remedial requirements. The company is engaged in discussions with the State of New York and other potentially responsible parties. As discussed in Note 11, the remediation standards or requirements to which we are subject are being reconsidered and may change and costs may increase materially.

Financial Arrangements

In the ordinary course of business, the company uses standby letters of credit and guarantees issued by commercial banks and surety bonds issued principally by insurance companies to guarantee the performance on certain obligations. At December 31, 2019, there were \$498 million of stand-by letters of credit and guarantees and \$182 million of surety bonds outstanding.

Indemnifications

The company has provided indemnifications for certain environmental, income tax and other potential liabilities in connection with certain of its divestitures. The settlement of these liabilities is not expected to have a material adverse effect on the company's consolidated financial position as of December 31, 2019, or its annual results of operations and/or cash flows.

13. RETIREMENT BENEFITS

Plan Descriptions

U.S. Defined Benefit Pension Plans – The company sponsors several defined benefit pension plans in the U.S. Pension benefits for most participants are based on years of service, age and compensation. It is our policy to fund at least the minimum amount required for all qualified plans, using actuarial cost methods and assumptions acceptable under U.S. government regulations, by making payments into benefit trusts separate from the company.

U.S. Defined Contribution Plans – The company also sponsors defined contribution plans covering the majority of its employees, including certain employees covered under collective bargaining agreements. Company contributions vary depending on date of hire, with a majority of employees being eligible for employer matching of employee contributions. Based on date of hire, certain employees are eligible to receive a company non-elective contribution or an enhanced matching contribution in lieu of a defined benefit pension plan benefit. The company's contributions

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to these defined contribution plans for the years ended December 31, 2019, 2018 and 2017, were \$481 million, \$403 million and \$344 million, respectively.

Non-U.S. Benefit Plans – The company sponsors several benefit plans for non-U.S. employees. These plans are designed to provide benefits appropriate to local practice and in accordance with local regulations. Some of these plans are funded using benefit trusts separate from the company.

Medical and Life Benefits – The company funds a portion of the costs for certain health care and life insurance benefits for a substantial number of its active and retired employees. In addition to a company and employee cost-sharing feature, the health plans also have provisions for deductibles, co-payments, coinsurance percentages, out-of-pocket limits, conformance to a schedule of reasonable fees, the use of managed care providers and coordination of benefits with other plans. The plans also provide for a Medicare carve-out. The company reserves the right to amend or terminate the plans at any time.

Certain covered employees and dependents are eligible to participate in plans upon retirement if they meet specified age and years of service requirements. The company provides subsidies to reimburse certain retirees for a portion of the cost of individual Medicare-supplemental coverage purchased directly by the retiree through a private insurance exchange. The company has capped the amount of its contributions to substantially all of its remaining postretirement medical and life benefit plans. In addition, after January 1, 2005 (or earlier at some businesses), newly hired employees are not eligible for subsidized postretirement medical and life benefits.

Summary Plan Results

The cost to the company of its retirement benefit plans is shown in the following table:

<i>\$ in millions</i>	Year Ended December 31					
	Pension Benefits			Medical and Life Benefits		
	2019	2018	2017	2019	2018	2017
Components of net periodic benefit cost (benefit)						
Service cost	\$ 367	\$ 404	\$ 388	\$ 16	\$ 21	\$ 20
Interest cost	1,360	1,226	1,250	80	76	85
Expected return on plan assets	(2,101)	(2,217)	(1,885)	(92)	(101)	(89)
Amortization of prior service credit	(59)	(58)	(57)	(3)	(21)	(22)
Mark-to-market expense (benefit)	1,783	699	(445)	17	(44)	(91)
Other	—	—	(7)	—	—	—
Net periodic benefit cost (benefit)	\$ 1,350	\$ 54	\$ (756)	\$ 18	\$ (69)	\$ (97)

The table below summarizes the components of changes in unamortized prior service credit for the years ended December 31, 2017, 2018 and 2019:

<i>\$ in millions</i>	Pension Benefits	Medical and Life Benefits	Total
Changes in unamortized prior service credit			
Amortization of prior service credit	\$ 57	\$ 22	\$ 79
Tax expense	(26)	(9)	(35)
Change in unamortized prior service credit – 2017	31	13	44
Amortization of prior service credit	58	21	79
Tax expense	(14)	(5)	(19)
Change in unamortized prior service credit – 2018	44	16	60
Amortization of prior service credit	59	3	62
Tax expense	(14)	(1)	(15)
Change in unamortized prior service credit – 2019	\$ 45	\$ 2	\$ 47

We expect to recognize \$60 million and \$(4) million of prior year service credit (cost) related to our pension benefit and medical and life benefit plans, respectively, in net periodic benefit cost in 2020.

The following table sets forth the funded status and amounts recognized in the consolidated statements of financial position for the company's defined benefit retirement plans. Pension benefits data includes the qualified plans, foreign plans and U.S. unfunded non-qualified plans for benefits provided to directors, officers and certain

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employees. The company uses a December 31 measurement date for its plans.

<i>\$ in millions</i>	Pension Benefits		Medical and Life Benefits	
	2019	2018	2019	2018
Plan Assets				
Fair value of plan assets at beginning of year	\$ 27,150	\$ 27,226	\$ 1,247	\$ 1,338
Net gain (loss) on plan assets	5,025	(1,043)	234	(65)
Employer contributions	221	370	42	38
Participant contributions	8	9	24	25
Benefits paid	(1,763)	(1,685)	(156)	(148)
Acquired plan assets	—	2,293	—	58
Other	5	(20)	1	1
Fair value of plan assets at end of year	30,646	27,150	1,392	1,247
Projected Benefit Obligation				
Projected benefit obligation at beginning of year	32,231	31,967	1,930	2,110
Service cost	367	404	16	21
Interest cost	1,360	1,226	80	76
Participant contributions	8	9	24	25
Actuarial loss (gain)	4,708	(2,561)	159	(211)
Benefits paid	(1,763)	(1,685)	(156)	(148)
Acquired benefit obligation	—	2,895	—	50
Other	3	(24)	(5)	7
Projected benefit obligation at end of year	36,914	32,231	2,048	1,930
Funded status	\$ (6,268)	\$ (5,081)	\$ (656)	\$ (683)
Classification of amounts recognized in the consolidated statements of financial position				
Non-current assets	\$ 124	\$ 77	\$ 151	\$ 124
Current liability	(173)	(164)	(47)	(46)
Non-current liability	(6,219)	(4,994)	(760)	(761)

The accumulated benefit obligation for all defined benefit pension plans was \$36.5 billion and \$31.9 billion at December 31, 2019 and 2018, respectively. Amounts for pension plans with accumulated benefit obligations in excess of fair value of plan assets are as follows:

<i>\$ in millions</i>	December 31	
	2019	2018
Projected benefit obligation	\$ 34,715	\$ 30,259
Accumulated benefit obligation	34,305	29,961
Fair value of plan assets	28,324	25,101

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Plan Assumptions

On a weighted-average basis, the following assumptions were used to determine benefit obligations and net periodic benefit cost:

	Pension Benefits		Medical and Life Benefits	
	2019	2018	2019	2018
Assumptions used to determine benefit obligation at December 31				
Discount rate	3.39%	4.31%	3.35%	4.30%
Initial cash balance crediting rate assumed for the next year	2.39%	3.00%		
Rate to which the cash balance crediting rate is assumed to increase (the ultimate rate)	2.64%	3.25%		
Year that the cash balance crediting rate reaches the ultimate rate	2025	2024		
Rate of compensation increase	3.00%	3.00%		
Initial health care cost trend rate assumed for the next year			5.90%	6.20%
Rate to which the health care cost trend rate is assumed to decline (the ultimate trend rate)			5.00%	5.00%
Year that the health care cost trend rate reaches the ultimate trend rate			2023	2023
Assumptions used to determine benefit cost for the year ended December 31				
Discount rate	4.31%	3.68%	4.30%	3.66%
Initial cash balance crediting rate assumed for the next year	3.00%	2.75%		
Rate to which the cash balance crediting rate is assumed to increase (the ultimate rate)	3.25%	3.00%		
Year that the cash balance crediting rate reaches the ultimate rate	2024	2023		
Expected long-term return on plan assets	8.00%	8.00%	7.67%	7.65%
Rate of compensation increase	3.00%	3.00%		
Initial health care cost trend rate assumed for the next year			6.20%	6.50%
Rate to which the health care cost trend rate is assumed to decline (the ultimate trend rate)			5.00%	5.00%
Year that the health care cost trend rate reaches the ultimate trend rate			2023	2023

Plan Assets and Investment Policy

Plan assets are invested in various asset classes that are expected to produce a sufficient level of diversification and investment return over the long term. Through consultation with our investment management team and outside investment advisers, management develops expected long-term returns for each of the plans' strategic asset classes. In doing so, we consider a number of factors, including our historical investment performance, current market data such as yields/price-earnings ratios, historical market returns over long periods and periodic surveys of investment managers' expectations. Liability studies are conducted on a regular basis to provide guidance in setting investment goals with an objective to balance risk. Risk targets are established and monitored against acceptable ranges.

Our investment policies and procedures are designed to ensure the plans' investments are in compliance with the Employee Retirement Income Security Act (ERISA). Guidelines are established defining permitted investments within each asset class. Derivatives are used for transitioning assets, asset class rebalancing, managing currency risk and for management of fixed-income and alternative investments.

For the majority of the plans' assets, the investment policies require that the asset allocation be maintained within the following ranges as of December 31, 2019:

	Asset Allocation Ranges
Cash and cash equivalents	0% - 12%
Global public equities	30% - 50%
Fixed-income securities	20% - 40%
Alternative investments	18% - 38%

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The table below provides the fair values of the company's pension and Voluntary Employee Beneficiary Association (VEBA) trust plan assets at December 31, 2019 and 2018, by asset category. The table also identifies the level of inputs used to determine the fair value of assets in each category. See Note D for the definitions of these levels. Certain investments that are measured at fair value using NAV per share (or its equivalent) as a practical expedient are not required to be categorized in the fair value hierarchy table. The total fair value of these investments is included in the table below to permit reconciliation of the fair value hierarchy to amounts presented in the funded status table above. As of December 31, 2019 and 2018, there were no investments expected to be sold at a value materially different than NAV.

<i>\$ in millions</i>	Level 1		Level 2		Level 3		Total	
	2019	2018	2019	2018	2019	2018	2019	2018
Asset category								
Cash and cash equivalents	\$ 233	\$ 209	\$ 2,572	\$ 2,655			\$ 2,805	\$ 2,864
U.S. equities	3,341	2,859					3,341	2,859
International equities	3,271	2,711			\$ 2	\$ 1	3,273	2,712
Fixed-income securities								
U.S. Treasuries	20	26	2,716	1,501			2,736	1,527
U.S. Government Agency			297	322			297	322
Non-U.S. Government			194	206			194	206
Corporate debt	28	34	4,513	4,141			4,541	4,175
Asset backed			892	297			892	297
High yield debt	30	11	104	153			134	164
Bank loans			33	20			33	20
Other assets	(9)	15	59	51	2	2	52	68
Investments valued using NAV as a practical expedient								
U.S. equities							1,131	1,170
International equities							5,636	4,017
Fixed-income funds							438	1,386
Hedge funds							246	351
Opportunistic investments							1,459	1,367
Private equity funds							2,454	2,510
Real estate funds							2,376	2,382
Fair value of plan assets at the end of the year	\$ 6,914	\$ 5,865	\$ 11,380	\$ 9,346	\$ 4	\$ 3	\$ 32,038	\$ 28,397

There were no transfers of plan assets between the three levels of the fair value hierarchy during the years ended December 31, 2019 and 2018.

Generally, investments are valued based on information in financial publications of general circulation, statistical and valuation services, records of security exchanges, appraisal by qualified persons, transactions and bona fide offers. Cash and cash equivalents are predominantly held in money market or short-term investment funds. U.S. and international equities consist primarily of common stocks and institutional common trust funds. Investments in certain equity securities, which include domestic and international securities and registered investment companies, and exchange-traded funds with fixed income strategies are valued at the last reported sales or quoted price on the last business day of the reporting period. Fair values for certain fixed-income securities, which are not exchange-traded, are valued using third-party pricing services.

Other assets include derivative assets with a fair value of \$49 million and \$76 million, derivative liabilities with a fair value of \$53 million and \$52 million, and net notional amounts of \$3.6 billion and \$3.2 billion, as of December 31, 2019 and 2018, respectively. Derivative instruments may include exchange traded futures contracts, interest rate swaps, options on futures and swaps, currency contracts, total return swaps and credit default swaps. Notional amounts do not quantify risk or represent assets or liabilities of the pension and VEBA trusts, but are used in the calculation of cash settlement under the contracts. The volume of derivative activity is commensurate with the

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amounts disclosed at year-end. Certain derivative financial instruments within the pension trust are subject to master netting agreements with certain counterparties.

Investments in certain equity and fixed-income funds, which include common/collective trust funds, and alternative investments, including hedge funds, opportunistic investments, private equity funds and real estate funds, are valued based on the NAV derived by the investment managers, as a practical expedient, and are described further below.

U.S. and International equities: Generally, redemption periods are daily or monthly with a notice requirement less than 30 days. As of December 31, 2019 and 2018, there were no unfunded commitments.

Fixed-income funds: Redemption periods are daily, monthly or quarterly with various notice requirements but generally are less than 30 days. As of December 31, 2019 and 2018, there were no unfunded commitments.

Hedge funds: Generally, redemption periods are monthly or quarterly with notice requirements from 30 to 95 days. As of December 31, 2019, unfunded commitments were \$8 million. There were no unfunded commitments as of December 31, 2018.

Opportunistic investments: Opportunistic investments are primarily held in partnerships with a 5-10 year life. As of December 31, 2019 and 2018, unfunded commitments were \$1.3 billion and \$1.1 billion, respectively.

Private equity funds: The term of each fund is typically 10 or more years and the fund's investors do not have an option to redeem their interest in the fund. As of December 31, 2019 and 2018, unfunded commitments were \$1.9 billion and \$1.8 billion, respectively.

Real estate funds: Consists of closed-end real estate funds and infrastructure funds with terms that are typically 10 or more years. This class also contains open-end funds that generally allow investors to redeem their interests in the fund. As of December 31, 2019 and 2018, unfunded commitments were \$60 million and \$73 million, respectively.

For the years ended December 31, 2019 and 2018, the defined benefit pension and VEBA trusts did not hold any Northrop Grumman common stock.

Benefit Payments

The following table reflects estimated future benefit payments for the next ten years, based upon the same assumptions used to measure the benefit obligation, and includes expected future employee service, as of December 31, 2019:

<i>\$ in millions</i>	Pension Plans	Medical and Life Plans	Total
Year Ending December 31			
2020	\$ 1,849	\$ 151	\$ 2,000
2021	1,898	150	2,048
2022	1,947	139	2,086
2023	1,991	138	2,129
2024	2,039	136	2,175
2025 through 2029	10,702	630	11,332

In 2020, the company expects to contribute the required minimum funding of approximately \$96 million to its pension plans and approximately \$44 million to its medical and life benefit plans. During the year ended December 31, 2019, the company made voluntary pension contributions of \$120 million.

14. STOCK COMPENSATION PLANS AND OTHER COMPENSATION ARRANGEMENTS

Stock Compensation Plans

At December 31, 2019, the company had stock-based compensation awards outstanding under the following shareholder-approved plans: the 2011 Long-Term Incentive Stock Plan (2011 Plan), applicable to employees and non-employee directors, and the 1993 Stock Plan for Non-Employee Directors (1993 SPND).

Employee Plans – In May 2015, the company's shareholders approved amendments to the 2011 Plan. These amendments provided that shares issued under the plan would be counted against the aggregate share limit on a one-for-one basis. As amended, 5.1 million shares plus 2.4 million of newly authorized shares were available for issuance under the 2011 Plan; as of December 31, 2019, 5.5 million shares remain available for issuance.

The 2011 Plan provides for the following equity awards: stock options, stock appreciation rights (SARs) and stock awards. Under the 2011 Plan, no SARs have been granted and there are no outstanding stock options. Stock awards include restricted performance stock rights (RPSR) and restricted stock rights (RSR). RPSRs generally vest and are

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paid following the completion of a three-year performance period, based primarily on achievement of financial objectives determined by the Board. RSRs generally vest 100% after three years. Each includes dividend equivalents, which are paid concurrently with the RPSR or RSR. The terms of equity awards granted under the 2011 Plan provide for accelerated vesting, and in some instances forfeiture, of all or a portion of an award upon termination of employment.

Non-Employee Director Plans – Awards to non-employee directors are made pursuant to the Northrop Grumman Corporation Equity Grant Program for Non-Employee Directors under the 2011 Plan (the Director Program), which was amended and restated effective January 1, 2016. Under the amended Director Program, each non-employee director is awarded an annual equity grant in the form of Automatic Stock Units, which vest on the one-year anniversary of the grant date. Directors may elect to have all or any portion of their Automatic Stock Units paid on (A) the earlier of (i) the beginning of a specified calendar year after the vesting date or (ii) their separation from service as a member of the Board, or (B) on the vesting date.

Directors also may elect to defer to a later year all or a portion of their remaining cash retainer or committee retainer fees into a stock unit account as Elective Stock Units or in alternative investment options. Elective Stock Units are awarded on a quarterly basis. Directors may elect to have all or a portion of their Elective Stock Units paid on the earlier of (i) the beginning of a specified calendar year or (ii) their separation from service as a member of the Board. Stock units awarded under the Director Program are paid out in an equivalent number of shares of Northrop Grumman common stock. Directors are credited with dividend equivalents in connection with the accumulated stock units until the shares of common stock relating to such stock units are issued.

Compensation Expense

Stock-based compensation expense for the years ended December 31, 2019, 2018 and 2017 was \$127 million, \$86 million and \$94 million, respectively. The related tax benefits for stock-based compensation for the years ended December 31, 2019, 2018 and 2017 were \$14 million, \$27 million and \$48 million, respectively.

At December 31, 2019, there was \$101 million of unrecognized compensation expense related to unvested stock awards granted under the company's stock-based compensation plans. These amounts are expected to be charged to expense over a weighted-average period of 1.3 years.

Stock Awards

Compensation expense for stock awards is measured at the grant date based on the fair value of the award and is recognized over the vesting period (generally three years). The fair value of stock awards and performance stock awards is determined based on the closing market price of the company's common stock on the grant date. The fair value of market-based stock awards is determined at the grant date using a Monte Carlo simulation model. For purposes of measuring compensation expense for performance awards, the number of shares ultimately expected to vest is estimated at each reporting date based on management's expectations regarding the relevant performance criteria.

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Stock award activity for the years ended December 31, 2017, 2018 and 2019, is presented in the table below. Vested awards do not include any adjustments to reflect the final performance measure for issued shares.

	Stock Awards (in thousands)		Weighted-Average Grant Date Fair Value Per Share	Weighted-Average Remaining Contractual Term (in years)
Outstanding at January 1, 2017	1,148	\$	167	1.3
Granted	397		233	
Vested	(521)		152	
Forfeited	(86)		198	
Outstanding at December 31, 2017	938	\$	192	1.0
Granted	376		321	
Vested	(455)		181	
Forfeited	(63)		250	
Outstanding at December 31, 2018	796	\$	244	0.8
Granted	339		274	
Vested	(383)		222	
Forfeited	(51)		280	
Outstanding at December 31, 2019	701	\$	278	0.9

The majority of our stock awards are granted annually during the first quarter.

The grant date fair value of shares issued in settlement of fully vested stock awards was \$119 million, \$93 million and \$96 million during the years ended December 31, 2019, 2018 and 2017, respectively.

Cash Awards

The company grants certain employees cash units (CUs) and cash performance units (CPUs). Depending on actual performance against financial objectives, recipients of CPUs earn between 0 and 200 percent of the original grant. The following table presents the minimum and maximum aggregate payout amounts related to those cash awards granted for the periods presented:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Minimum aggregate payout amount	\$ 36	\$ 36	\$ 38
Maximum aggregate payout amount	203	205	201

The majority of our cash awards are granted annually during the first quarter. CUs typically vest and settle in cash on the third anniversary of the grant date, while CPUs generally vest and pay out in cash based primarily on the achievement of financial metrics over a three-year period. At December 31, 2019, there was \$133 million of unrecognized compensation expense related to cash awards.

15. LEASES

As described in Note 1, effective January 1, 2019, we adopted ASC 842 using the optional transition method. In accordance with the optional transition method, we did not recast the prior period consolidated financial statements and all prior period amounts and disclosures are presented under ASC 840. Finance leases are not material to our consolidated financial statements and are therefore not included in the following disclosures.

NORTHROP GRUMMAN CORPORATION

Total Lease Cost

Total lease cost is included in Product and Service costs and G&A expenses in the consolidated statement of earnings and comprehensive income and is recorded net of immaterial sublease income. Total lease cost is comprised of the following:

<i>\$ in millions</i>	Year Ended December 31, 2019
Operating lease cost	\$ 318
Variable lease cost	11
Short-term lease cost	75
Total lease cost	\$ 404

Supplemental Balance Sheet Information

Supplemental operating lease balance sheet information consists of the following:

<i>\$ in millions</i>	December 31, 2019
Operating lease right-of-use assets	\$ 1,511
Other current liabilities	261
Operating lease liabilities	1,308
Total operating lease liabilities	\$ 1,569

Other Supplemental Information

Other supplemental operating lease information consists of the following:

<i>\$ in millions</i>	Year Ended December 31, 2019
Cash paid for amounts included in the measurement of operating lease liabilities	\$ 307
Right-of-use assets obtained in exchange for new lease liabilities	462
Weighted average remaining lease term	11.6 years
Weighted average discount rate	3.8%

Maturities of Lease Liabilities

Maturities of operating lease liabilities as of December 31, 2019 are as follows:

<i>\$ in millions</i>	
Year Ending December 31	
2020	\$ 300
2021	262
2022	224
2023	185
2024	146
Thereafter	875
Total lease payments	1,992
Less: imputed interest	(423)
Present value of operating lease liabilities	\$ 1,569

As of December 31, 2019, we have approximately \$125 million in rental commitments for real estate leases that have not yet commenced. These leases are expected to commence in 2020 and 2021 with lease terms of 3 to 11 years.

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Rental expense for operating leases classified under ASC 840 for the years ended December 31, 2018 and 2017 were \$375 million and \$300 million, respectively. These amounts are net of immaterial amounts of sublease income. As of December 31, 2018, future minimum lease payments under long-term non-cancelable operating leases as classified under ASC 840 were as follows:

\$ in millions

Year Ending December 31		
2019	\$	312
2020		270
2021		221
2022		186
2023		152
Thereafter		939
Total minimum lease payments	\$	2,080

16. SEGMENT INFORMATION

The company is aligned in four operating sectors, which also comprise our reportable segments: Aerospace Systems, Innovation Systems, Mission Systems and Technology Services.

The following table presents sales and operating income by segment:

<i>\$ in millions</i>	Year Ended December 31		
	2019	2018	2017
Sales			
Aerospace Systems	\$ 13,862	\$ 13,096	\$ 12,131
Innovation Systems	6,119	3,276	—
Mission Systems	12,263	11,709	11,470
Technology Services	4,110	4,297	4,687
Intersegment eliminations	(2,513)	(2,283)	(2,284)
Total sales	33,841	30,095	26,004
Operating income			
Aerospace Systems	1,434	1,411	1,289
Innovation Systems	671	343	—
Mission Systems	1,639	1,520	1,442
Technology Services	457	443	449
Intersegment eliminations	(292)	(270)	(277)
Total segment operating income	3,909	3,447	2,903
Net FAS (service)/CAS pension adjustment	465	613	638
Unallocated corporate expense	(405)	(280)	(323)
Total operating income	\$ 3,969	\$ 3,780	\$ 3,218

Net FAS (Service)/CAS Pension Adjustment

For financial statement purposes, we account for our employee pension plans in accordance with FAS. However, the cost of these plans is charged to our contracts in accordance with the FAR and the related CAS. The net FAS (service)/CAS pension adjustment reflects the difference between CAS pension expense included as cost in segment operating income and the service cost component of FAS expense included in total operating income.

Unallocated Corporate Expense

Unallocated corporate expense includes the portion of corporate costs not considered allowable or allocable under applicable CAS or FAR, and therefore not allocated to the segments, such as a portion of management and administration, legal, environmental, compensation, retiree benefits and other corporate unallowable costs. Unallocated corporate expense also includes costs not considered part of management's evaluation of segment

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operating performance, such as amortization of purchased intangible assets and the additional depreciation expense related to the step-up in fair value of property, plant and equipment acquired through business combinations.

Disaggregation of Revenue

Sales by Customer Type

<i>\$ in millions</i>	Year Ended December 31					
	2019		2018		2017	
	\$	% ⁽³⁾	\$	% ⁽³⁾	\$	% ⁽³⁾
Aerospace Systems						
U.S. government ⁽¹⁾	\$ 12,044	87%	\$ 11,380	87%	\$ 10,521	87%
International ⁽²⁾	1,508	11%	1,371	10%	1,160	10%
Other customers	106	1%	148	1%	155	1%
Intersegment sales	204	1%	197	2%	295	2%
Aerospace Systems sales	13,862	100%	13,096	100%	12,131	100%
Innovation Systems						
U.S. government ⁽¹⁾	4,419	72%	2,241	68%	—	—
International ⁽²⁾	960	16%	615	19%	—	—
Other customers	409	7%	293	9%	—	—
Intersegment sales	331	5%	127	4%	—	—
Innovation Systems sales	6,119	100%	3,276	100%	—	—
Mission Systems						
U.S. government ⁽¹⁾	9,079	74%	8,803	75%	8,876	77%
International ⁽²⁾	1,840	15%	1,647	14%	1,540	14%
Other customers	117	1%	114	1%	100	1%
Intersegment sales	1,227	10%	1,145	10%	954	8%
Mission Systems sales	12,263	100%	11,709	100%	11,470	100%
Technology Services						
U.S. government ⁽¹⁾	2,392	58%	2,372	55%	2,572	55%
International ⁽²⁾	846	21%	801	19%	752	16%
Other customers	121	3%	310	7%	328	7%
Intersegment sales	751	18%	814	19%	1,035	22%
Technology Services sales	4,110	100%	4,297	100%	4,687	100%
Total						
U.S. government ⁽¹⁾	27,934	83%	24,796	82%	21,969	85%
International ⁽²⁾	5,154	15%	4,434	15%	3,452	13%
Other customers	753	2%	865	3%	583	2%
Total Sales	\$ 33,841	100%	\$ 30,095	100%	\$ 26,004	100%

⁽¹⁾ Sales to the U.S. government include sales from contracts for which we are the prime contractor, as well as those for which we are a subcontractor and the ultimate customer is the U.S. government. Each of the company's segments derives substantial revenue from the U.S. government.

⁽²⁾ International sales include sales from contracts for which we are the prime contractor, as well as those for which we are a subcontractor and the ultimate customer is an international customer. These sales include foreign military sales contracted through the U.S. government.

⁽³⁾ Percentages calculated based on total segment sales.

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Sales by Contract Type

<i>\$ in millions</i>	Year Ended December 31					
	2019		2018		2017	
	\$	% ⁽¹⁾	\$	% ⁽¹⁾	\$	% ⁽¹⁾
Aerospace Systems						
Cost-type	\$ 8,049	59%	\$ 7,634	59%	\$ 7,193	61%
Fixed-price	5,609	41%	5,265	41%	4,643	39%
Intersegment sales	204		197		295	
Aerospace Systems sales	13,862		13,096		12,131	
Innovation Systems						
Cost-type	1,699	29%	843	27%	—	—
Fixed-price	4,089	71%	2,306	73%	—	—
Intersegment sales	331		127		—	
Innovation Systems sales	6,119		3,276		—	
Mission Systems						
Cost-type	5,164	47%	4,939	47%	5,311	51%
Fixed-price	5,872	53%	5,625	53%	5,205	49%
Intersegment sales	1,227		1,145		954	
Mission Systems sales	12,263		11,709		11,470	
Technology Services						
Cost-type	1,567	47%	1,588	46%	1,693	46%
Fixed-price	1,792	53%	1,895	54%	1,959	54%
Intersegment sales	751		814		1,035	
Technology Services sales	4,110		4,297		4,687	
Total						
Cost-type	16,479	49%	15,004	50%	14,197	55%
Fixed-price	17,362	51%	15,091	50%	11,807	45%
Total Sales	\$ 33,841		\$ 30,095		\$ 26,004	

⁽¹⁾ Percentages calculated based on external customer sales.

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Sales by Geographic Region

<i>\$ in millions</i>	Year Ended December 31					
	2019		2018		2017	
	\$	% ⁽²⁾	\$	% ⁽²⁾	\$	% ⁽²⁾
Aerospace Systems						
United States	\$ 12,150	89%	\$ 11,528	89%	\$ 10,676	90%
Asia/Pacific	822	6%	705	6%	649	6%
All other ⁽¹⁾	686	5%	666	5%	511	4%
Intersegment sales	204		197		295	
Aerospace Systems sales	13,862		13,096		12,131	
Innovation Systems						
United States	4,828	83%	2,534	80%	—	—
Asia/Pacific	156	3%	151	5%	—	—
All other ⁽¹⁾	804	14%	464	15%	—	—
Intersegment sales	331		127		—	
Innovation Systems sales	6,119		3,276		—	
Mission Systems						
United States	9,196	83%	8,917	85%	8,976	86%
Asia/Pacific	676	6%	659	6%	671	6%
All other ⁽¹⁾	1,164	11%	988	9%	869	8%
Intersegment sales	1,227		1,145		954	
Mission Systems sales	12,263		11,709		11,470	
Technology Services						
United States	2,513	75%	2,682	77%	2,900	79%
Asia/Pacific	182	5%	151	4%	141	4%
All other ⁽¹⁾	664	20%	650	19%	611	17%
Intersegment sales	751		814		1,035	
Technology Services sales	4,110		4,297		4,687	
Total						
United States	28,687	85%	25,661	85%	22,552	87%
Asia/Pacific	1,836	5%	1,666	6%	1,461	5%
All other ⁽¹⁾	3,318	10%	2,768	9%	1,991	8%
Total Sales	\$ 33,841		\$ 30,095		\$ 26,004	

⁽¹⁾ All other is principally comprised of Europe and the Middle East.

⁽²⁾ Percentages calculated based on external customer sales.

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Intersegment Sales and Operating Income

Sales between segments are recorded at values that include intercompany operating income for the performing segment based on that segment's estimated average operating margin rate for external sales. Such intercompany operating income is eliminated in consolidation, so that the company's total sales and total operating income reflect only those transactions with external customers. See Note 1 for additional information.

The following table presents intersegment sales and operating income before eliminations:

<i>\$ in millions</i>	Year Ended December 31					
	2019		2018		2017	
	Sales	Operating Income	Sales	Operating Income	Sales	Operating Income
Intersegment sales and operating income						
Aerospace Systems	\$ 204	\$ 23	\$ 197	\$ 23	\$ 295	\$ 33
Innovation Systems	331	14	127	1	—	—
Mission Systems	1,227	177	1,145	165	954	141
Technology Services	751	78	814	81	1,035	103
Total	\$ 2,513	\$ 292	\$ 2,283	\$ 270	\$ 2,284	\$ 277

Assets

Substantially all of the company's operating assets are located in the U.S. The following table presents assets by segment:

<i>\$ in millions</i>	December 31	
	2019	2018
Assets		
Aerospace Systems	\$ 10,772	\$ 9,750
Innovation Systems	11,551	10,368
Mission Systems	11,641	11,047
Technology Services	3,089	2,957
Corporate assets ⁽¹⁾	4,036	3,531
Total assets	\$ 41,089	\$ 37,653

⁽¹⁾ Corporate assets principally consist of cash and cash equivalents, refundable taxes, deferred tax assets, property, plant and equipment and marketable securities.

Capital Expenditures and Depreciation and Amortization

The following table presents capital expenditures and depreciation and amortization by segment:

<i>\$ in millions</i>	Year Ended December 31					
	2019			2018		
	2019	2018	2017	2019	2018	2017
	Capital Expenditures			Depreciation and Amortization ⁽¹⁾		
Aerospace Systems	\$ 650	\$ 781	\$ 665	\$ 262	\$ 243	\$ 234
Innovation Systems	271	141	—	173	84	—
Mission Systems	244	206	164	146	134	131
Technology Services	15	18	15	9	45	40
Corporate	84	103	84	428	294	70
Total	\$ 1,264	\$ 1,249	\$ 928	\$ 1,018	\$ 800	\$ 475

⁽¹⁾ Beginning in 2018, corporate amounts include the amortization of purchased intangible assets and the additional depreciation expense related to the step-up in fair value of property, plant and equipment acquired through business combinations as they are not considered part of management's evaluation of segment operating performance.

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17. UNAUDITED SELECTED QUARTERLY DATA

Unaudited quarterly financial results are set forth in the following tables and include the operating results of Innovation Systems subsequent to the Merger date. It is the company's long-standing practice to establish actual interim closing dates using a "fiscal" calendar in which we close our books on a Friday near each quarter-end date, in order to normalize the potentially disruptive effects of quarterly closings on business processes. Similarly, Innovation Systems used a "fiscal" calendar by closing its books on a Sunday near these quarter-end dates. Beginning in the second quarter of 2019, Innovation Systems aligned its "fiscal" calendar with legacy Northrop Grumman. This practice is only used at interim periods within a reporting year.

2019

In millions, except per share amounts

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sales	\$ 8,189	\$ 8,456	\$ 8,475	\$ 8,721
Operating income	936	946	951	1,136
Net earnings (loss)	863	861	933	(409)
Basic earnings (loss) per share	5.08	5.07	5.52	(2.43)
Diluted earnings (loss) per share ⁽¹⁾	5.06	5.06	5.49	(2.43)
Weighted-average common shares outstanding	170.0	169.7	169.1	168.4
Weighted-average diluted shares outstanding ⁽¹⁾	170.7	170.3	169.9	168.4

2018

In millions, except per share amounts

	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sales	\$ 6,735	\$ 7,119	\$ 8,085	\$ 8,156
Operating income	848	817	1,172	943
Net earnings	840	789	1,244	356
Basic earnings per share	4.82	4.52	7.15	2.07
Diluted earnings per share	4.79	4.50	7.11	2.06
Weighted-average common shares outstanding	174.3	174.5	174.1	171.8
Weighted-average diluted shares outstanding	175.4	175.4	174.9	172.6

⁽¹⁾ Fourth quarter 2019 excludes the dilutive effect of awards granted to employees under stock-based compensation plans as such awards would be antidilutive.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

DISCLOSURE CONTROLS AND PROCEDURES

Our principal executive officer (Chairman, Chief Executive Officer and President) and principal financial officer (Corporate Vice President and Chief Financial Officer) have evaluated the company's disclosure controls and procedures (as defined in Rule 13a-15(e) and Rule 15d-15(e) of the Securities Exchange Act of 1934 (the Exchange Act)) as of December 31, 2019, and have concluded that these controls and procedures are effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. These disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in the reports that we file or submit is accumulated and communicated to management, including the principal executive officer and the principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

During the three months ended December 31, 2019, no change occurred in our internal controls over financial reporting that materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

MANAGEMENT'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

The management of Northrop Grumman Corporation (the company) prepared and is responsible for the consolidated financial statements and all related financial information contained in this Annual Report. This responsibility includes establishing and maintaining effective internal control over financial reporting. The company's internal control over financial reporting is designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with accounting principles generally accepted in the United States of America.

To comply with the requirements of Section 404 of the Sarbanes–Oxley Act of 2002, the company designed and implemented a structured and comprehensive assessment process to evaluate its internal control over financial reporting across the enterprise. The assessment of the effectiveness of the company's internal control over financial reporting is based on criteria established in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Because of its inherent limitations, a system of internal control over financial reporting can provide only reasonable assurance and may not prevent or detect misstatements. Management regularly monitors its internal control over financial reporting, and actions are taken to correct deficiencies as they are identified. Based on its assessment, management has concluded that the company's internal control over financial reporting was effective as of December 31, 2019.

Deloitte & Touche LLP issued an attestation report dated January 29, 2020, concerning the company's internal control over financial reporting, which is contained in this Annual Report. The company's consolidated financial statements as of and for the year ended December 31, 2019, have been audited by the independent registered public accounting firm of Deloitte & Touche LLP in accordance with the standards of the Public Company Accounting Oversight Board (United States).

/s/ Kathy J. Warden
Chairman, Chief Executive Officer and President

/s/ Kenneth L. Bedingfield
Corporate Vice President and Chief Financial Officer
January 29, 2020

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Shareholders of
Northrop Grumman Corporation
Falls Church, Virginia

Opinion on Internal Control over Financial Reporting

We have audited the internal control over financial reporting of Northrop Grumman Corporation and subsidiaries (the "Company") as of December 31, 2019, based on criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the criteria established in *Internal Control - Integrated Framework (2013)* issued by COSO.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated financial statements as of and for the year ended December 31, 2019 of the Company and our report dated January 29, 2020 expressed an unqualified opinion on those financial statements and included an explanatory paragraph regarding the Company's adoption of ASC 842, *Leases*, during 2019.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Management's Report on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Deloitte & Touche LLP
McLean, Virginia
January 29, 2020

PART III

Item 10. Directors, Executive Officers and Corporate Governance

DIRECTORS

Information about our Directors will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders, to be filed with the Securities and Exchange Commission (SEC) within 120 days after the end of the company's fiscal year.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

Our executive officers as of January 29, 2020, are listed below, along with their ages on that date, positions and offices held with the company, and principal occupations and employment, focused primarily on the past five years.

<u>Name</u>	<u>Age</u>	<u>Office Held</u>	<u>Since</u>	<u>Recent Business Experience</u>
Kathy J. Warden	48	Chairman, Chief Executive Officer and President	2019	Chief Executive Officer and President (2019); President and Chief Operating Officer (2018); Corporate Vice President and President, Mission Systems Sector (2016-2017); Corporate Vice President and President, Former Information Systems Sector (2013-2015)
Ann M. Addison	58	Corporate Vice President and Chief Human Resources Officer	2019	Corporate Vice President (2018); Executive Vice President and Chief Human Resources Officer, Leidos (2016-2018); Vice President, Human Resources, Lockheed Martin (2010-2016)
Kenneth L. Bedingfield	47	Corporate Vice President and Chief Financial Officer	2015	Vice President, Finance (2014-2015)
Mark A. Caylor	55	Corporate Vice President and President, Mission Systems Sector	2018	Corporate Vice President and President, Enterprise Services and Chief Strategy Officer (2014-2017)
Sheila C. Cheston	61	Corporate Vice President and General Counsel	2010	
Michael A. Hardesty	48	Corporate Vice President, Controller, and Chief Accounting Officer	2013	
Lesley A. Kalan	46	Corporate Vice President and Chief Strategy and Development Officer	2020	Corporate Vice President, Government Relations (2018-2019); Vice President, Legislative Affairs (2010-2017)
Blake E. Larson	60	Corporate Vice President and President, Space Systems Sector	2020	Corporate Vice President and President, Former Innovation Systems Sector (2018-2020); Chief Operating Officer, Orbital ATK, Inc. (2015-2018); Senior Vice President and President, Aerospace Group, Alliant Techsystems, Inc. (2010-2015)
Janis G. Pamiljans	59	Corporate Vice President and President, Aeronautics Systems Sector	2020	Corporate Vice President and President, Former Aerospace Systems Sector (2017-2020); Vice President and General Manager, Strategic Systems Division, Former Aerospace Systems Sector (2015-2017)

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Name	Age	Office Held	Since	Recent Business Experience
David T. Perry	55	Corporate Vice President and Chief Global Business Officer	2019	Corporate Vice President and Chief Global Business Development Officer (2012-2019)
Mary D. Petryszyn	58	Corporate Vice President and President, Defense Systems Sector	2020	Vice President and General Manager, Land and Avionics C4ISR Division, Mission Systems Sector (2016-2019), Vice President, Global Strategy and Mission Solutions, Aerospace Systems Sector (2015-2016), Vice President, International, Aerospace Systems Sector (2013-2015)
Shawn N. Purvis	46	Corporate Vice President and President, Enterprise Services	2018	Vice President and Chief Information Officer (2016-2017); Vice President and General Manager, Cyber Division, Former Information Systems Sector (2014-2016)
Lucy C. Ryan	46	Corporate Vice President, Communications	2019	Vice President, Enterprise Communications (2018); Director of Communications, General Dynamics (2010-2018)

AUDIT COMMITTEE FINANCIAL EXPERT

The information as to the Audit Committee and the Audit Committee Financial Expert will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders.

CODE OF ETHICS

We have adopted Standards of Business Conduct for all of our employees, including the principal executive officer, principal financial officer and principal accounting officer. The Standards of Business Conduct can be found on our internet website at www.northropgrumman.com under "Investor Relations – Corporate Governance – Overview." A copy of the Standards of Business Conduct is available to any stockholder who requests it by writing to: Northrop Grumman Corporation, c/o Office of the Secretary, 2980 Fairview Park Drive, Falls Church, VA 22042. We disclose amendments to provisions of our Standards of Business Conduct by posting amendments on our website. Waivers of the provisions of our Standards of Business Conduct that apply to our directors and executive officers are disclosed in a Current Report on Form 8-K.

The website and information contained on it or incorporated in it are not intended to be incorporated in this Annual Report on Form 10-K or other filings with the SEC.

OTHER DISCLOSURES

Other disclosures required by this Item will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders.

Item 11. Executive Compensation

Information concerning Executive Compensation, including information concerning Compensation Committee Interlocks and Insider Participation and the Compensation Committee Report, will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information as to Securities Authorized for Issuance Under Equity Compensation Plans and Security Ownership of Certain Beneficial Owners and Management will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders.

For a description of securities authorized under our equity compensation plans, see Note 14 to the consolidated financial statements.

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Item 13. Certain Relationships and Related Transactions, and Director Independence

The information as to Certain Relationships and Related Transactions and Director Independence will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders.

Item 14. Principal Accounting Fees and Services

The information as to Principal Accounting Fees and Services will be incorporated herein by reference to the Proxy Statement for the 2020 Annual Meeting of Shareholders.

PART IV

Item 15. Exhibits, Financial Statement Schedules

- (a) 1. Report of Independent Registered Public Accounting Firm

Financial Statements

[Consolidated Statements of Earnings and Comprehensive Income](#)
[Consolidated Statements of Financial Position](#)
[Consolidated Statements of Cash Flows](#)
[Consolidated Statements of Changes in Shareholders' Equity](#)
[Notes to Consolidated Financial Statements](#)

2. Financial Statement Schedules

All schedules have been omitted because they are not applicable, not required, or the information has been otherwise supplied in the consolidated financial statements or notes to the consolidated financial statements.

3. Exhibits

- 2(a) [Agreement and Plan of Merger among Titan II, Inc. \(formerly Northrop Grumman Corporation\), Northrop Grumman Corporation \(formerly New P, Inc.\) and Titan Merger Sub Inc., dated March 30, 2011 \(incorporated by reference to Exhibit 10.1 to Form 8-K filed April 4, 2011, File No. 001-16411\)](#)
- 2(b) [Separation and Distribution Agreement dated as of March 29, 2011, among Titan II, Inc. \(formerly Northrop Grumman Corporation\), Northrop Grumman Corporation \(formerly New P, Inc.\), Huntington Ingalls Industries, Inc., Northrop Grumman Shipbuilding, Inc. and Northrop Grumman Systems Corporation \(incorporated by reference to Exhibit 10.2 to Form 8-K filed April 4, 2011, File No. 001-16411\)](#)
- 2(c) [Agreement and Plan of Merger dated as of September 17, 2017, among Northrop Grumman Corporation, Neptune Merger, Inc. and Orbital ATK, Inc. \(incorporated by reference to Exhibit 2.1 to Form 8-K filed September 18, 2017, File No. 001-16411\)](#)
- 2(d) [Transaction Agreement dated as of April 28, 2014, among Alliant Techsystems Inc., Vista Spenco Inc., Vista Merger Sub Inc. and Orbital Sciences Corporation \(incorporated by reference to Exhibit 2.1 to Alliant Techsystems Inc. \(now known as Northrop Grumman Innovation Systems, Inc.\) Form 8-K filed May 2, 2014, File No. 001-16411\)](#)
- 3(a) [Amended and Restated Certificate of Incorporation of Northrop Grumman Corporation dated May 29, 2012 \(incorporated by reference to Exhibit 3.1 to Form 10-Q for the quarter ended June 30, 2012, filed July 25, 2012, File No. 001-16411\)](#)
- 3(b) [Amended and Restated Bylaws of Northrop Grumman Corporation dated December 4, 2018 \(incorporated by reference to Exhibit 3.1 to Form 8-K filed December 10, 2018, File No. 001-16411\)](#)
- 4(a) [Registration Rights Agreement dated as of January 23, 2001, by and among Northrop Grumman Corporation \(now Northrop Grumman Systems Corporation\), NNG, Inc. \(now Northrop Grumman Corporation\) and Unitrin, Inc. \(incorporated by reference to Exhibit\(d\)\(6\) to Amendment No. 4 to Schedule TO filed January 31, 2001, File No. 001-3229\)](#)
- 4(b) [Indenture dated as of October 15, 1994, between Northrop Grumman Corporation \(now Northrop Grumman Systems Corporation\) and The Chase Manhattan Bank \(National Association\), Trustee \(incorporated by reference to Exhibit 4.1 to Form 8-K filed October 25, 1994, File No. 001-3229\)](#)

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- 4(c) [First Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation, The Bank of New York Mellon \(successor trustee to JPMorgan Chase Bank and The Chase Manhattan Bank, N.A.\), Titan II, Inc. \(formerly known as Northrop Grumman Corporation\), and Titan Holdings II, L.P., to Indenture dated as of October 15, 1994, between Northrop Grumman Corporation \(now Northrop Grumman Systems Corporation\) and The Chase Manhattan Bank, N.A., Trustee \(incorporated by reference to Exhibit 4.1 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)
- 4(d) [Second Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation, The Bank of New York Mellon \(successor trustee to JPMorgan Chase Bank and The Chase Manhattan Bank, N.A.\), Titan Holdings II, L.P., and Northrop Grumman Corporation \(formerly known as New P, Inc.\), to Indenture dated as of October 15, 1994, between Northrop Grumman Corporation \(now Northrop Grumman Systems Corporation\) and The Chase Manhattan Bank, N.A., Trustee \(incorporated by reference to Exhibit 4.2 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)
- 4(e) [Form of Officers' Certificate \(without exhibits\) establishing the terms of Northrop Grumman Corporation's \(now Northrop Grumman Systems Corporation's\) 7.875% Debentures due 2026 \(incorporated by reference to Exhibit 4.3 to Form S-4 Registration Statement No. 333-02653 filed April 19, 1996\)](#)
- 4(f) [Form of Northrop Grumman Corporation's \(now Northrop Grumman Systems Corporation's\) 7.875% Debentures due 2026 \(incorporated by reference to Exhibit 4.6 to Form S-4 Registration Statement No. 333-02653 filed April 19, 1996\)](#)
- 4(g) [Form of Officers' Certificate establishing the terms of Northrop Grumman Corporation's \(now Northrop Grumman Systems Corporation's\) 7.75% Debentures due 2031 \(incorporated by reference to Exhibit 10.9 to Form 8-K filed April 17, 2001, File No. 001-16411\)](#)
- 4(h) [Senior Indenture dated as of December 15, 1991, between Litton Industries, Inc. \(predecessor-in-interest to Northrop Grumman Systems Corporation\) and The Bank of New York, as trustee, under which its 7.75% and 6.98% debentures due 2026 and 2036 were issued, and specimens of such debentures \(incorporated by reference to Exhibit 4.1 to the Form 10-Q of Litton Industries, Inc. for the quarter ended April 30, 1996, filed June 11, 1996, File No. 001-3998\)](#)
- 4(i) [Supplemental Indenture with respect to Senior Indenture dated December 15, 1991, dated as of April 3, 2001, among Litton Industries, Inc. \(predecessor-in-interest to Northrop Grumman Systems Corporation\), Northrop Grumman Corporation, Northrop Grumman Systems Corporation and The Bank of New York, as trustee \(incorporated by reference to Exhibit 4.7 to Form 10-Q for the quarter ended March 31, 2001, filed May 10, 2001, File No. 001-16411\)](#)
- 4(j) [Supplemental Indenture with respect to Senior Indenture dated December 15, 1991, dated as of December 20, 2002, among Litton Industries, Inc. \(predecessor-in-interest to Northrop Grumman Systems Corporation\), Northrop Grumman Corporation, Northrop Grumman Systems Corporation and The Bank of New York, as trustee \(incorporated by reference to Exhibit 4\(t\) to Form 10-K for the year ended December 31, 2002, filed March 24, 2003, File No. 001-16411\)](#)
- 4(k) [Third Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation \(successor-in-interest to Litton Industries, Inc.\), The Bank of New York Mellon \(formerly known as The Bank of New York\), as trustee, Titan II, Inc. \(formerly known as Northrop Grumman Corporation\), and Titan Holdings II, L.P., to Senior Indenture dated December 15, 1991, between Litton Industries, Inc. and The Bank of New York, as trustee \(incorporated by reference to Exhibit 4.5 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)
- 4(l) [Fourth Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation \(successor-in-interest to Litton Industries, Inc.\), The Bank of New York Mellon \(formerly known as The Bank of New York\) as trustee, Titan Holdings II, L.P., and Northrop Grumman Corporation \(formerly known as New P, Inc.\), to Senior Indenture dated December 15, 1991, between Litton Industries, Inc. and The Bank of New York, as trustee \(incorporated by reference to Exhibit 4.6 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)

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- 4(m) Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 (incorporated by reference to Exhibit 2 to the Form 8-A Registration Statement of TRW Inc. dated July 3, 1986, File No. 001-02384)
- 4(n) First Supplemental Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and Mellon Bank, N.A., as trustee, dated as of August 24, 1989 (incorporated by reference to Exhibit 4(b) to Form S-3 Registration Statement No. 33-30350 of TRW Inc.)
- 4(o) [Fifth Supplemental Indenture between TRW Inc. \(predecessor-in-interest to Northrop Grumman Systems Corporation\) and The Chase Manhattan Bank, as successor trustee, dated as of June 2, 1999 \(incorporated by reference to Exhibit 4\(f\) to Form S-4 Registration Statement No. 333-83227 of TRW Inc. filed July 20, 1999\)](#)
- 4(p) [Ninth Supplemental Indenture dated as of December 31, 2009 among Northrop Grumman Space & Mission Systems Corp. \(predecessor-in-interest to Northrop Grumman Systems Corporation\); The Bank of New York Mellon, as successor trustee; Northrop Grumman Corporation; and Northrop Grumman Systems Corporation \(incorporated by reference to Exhibit 4\(p\) to Form 10-K for the year ended December 31, 2009, filed February 9, 2010, File No. 001-16411\)](#)
- 4(q) [Tenth Supplemental Indenture dated as of March 30, 2011, by and among Northrop Grumman Systems Corporation \(successor-in-interest to Northrop Grumman Space & Mission Systems Corp. and TRW, Inc.\), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank and to Mellon Bank, N.A., Titan II Inc. \(formerly known as Northrop Grumman Corporation\), and Titan Holdings II, L.P., to Indenture between TRW Inc. and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 \(incorporated by reference to Exhibit 4.7 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)
- 4(r) [Eleventh Supplemental Indenture dated as of March 30, 2011, by and among Northrop Grumman Systems Corporation \(successor-in-interest to Northrop Grumman Space & Mission Systems Corp. and TRW Inc.\), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank and to Mellon Bank, N.A., Titan Holdings II, L.P., and Northrop Grumman Corporation \(formerly known as New P, Inc.\) to Indenture between TRW Inc. and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 \(incorporated by reference to Exhibit 4.8 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)
- 4(s) [Indenture dated as of November 21, 2001, between Northrop Grumman Corporation and JPMorgan Chase Bank, as trustee \(incorporated by reference to Exhibit 4.1 to Form 8-K filed November 21, 2001, File No. 001-16411\)](#)
- 4(t) [Second Supplemental Indenture dated as of November 8, 2010, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor trustee, to Indenture dated as of November 21, 2001 \(incorporated by reference to Exhibit 4\(a\) to Form 8-K filed November 8, 2010, File No. 001-16411\)](#)
- 4(u) [Form of Northrop Grumman Corporation's 3.500% Senior Note due 2021 \(incorporated by reference to Exhibit B to Exhibit 4\(a\) to Form 8-K filed November 8, 2010, File No. 001-16411\)](#)
- 4(v) [Form of Northrop Grumman Corporation's 5.050% Senior Note due 2040 \(incorporated by reference to Exhibit C to Exhibit 4\(a\) to Form 8-K filed November 8, 2010, File No. 001-16411\)](#)
- 4(w) [Third Supplemental Indenture dated as of March 30, 2011, by and among Titan II, Inc. \(formerly known as Northrop Grumman Corporation\), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank, and Titan Holdings II, L.P., to Indenture dated as of November 21, 2001 between Northrop Grumman Corporation and JPMorgan Chase Bank, as trustee \(incorporated by reference to Exhibit 4.9 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)

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- 4(x) [Fourth Supplemental Indenture dated as of March 30, 2011, by and among Titan Holdings II, L.P., The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank, and Northrop Grumman Corporation \(formerly known as New P, Inc.\), to Indenture dated as of November 21, 2001 between Northrop Grumman Corporation and JPMorgan Chase Bank, as trustee \(incorporated by reference to Exhibit 4.10 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411\)](#)
- 4(y) [Fifth Supplemental Indenture, dated as of May 31, 2013, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 \(incorporated by reference to Exhibit 4\(a\) to Form 8-K filed May 31, 2013, File No. 001-16411\)](#)
- 4(z) [Form of 3.250% Senior Note due 2023 \(incorporated by reference to Exhibit B to Exhibit 4\(a\) to Form 8-K filed May 31, 2013, File No. 001-16411\)](#)
- 4(aa) [Form of 4.750% Senior Note due 2043 \(incorporated by reference to Exhibit C to Exhibit 4\(a\) to Form 8-K filed May 31, 2013, File No. 001-16411\)](#)
- 4(bb) [Sixth Supplemental Indenture, dated as of February 6, 2015, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 \(incorporated by reference to Exhibit 4.1 to Form 8-K filed February 6, 2015, File No. 001-16411\)](#)
- 4(cc) [Form of 3.850% Senior Note due 2045 \(incorporated by reference to Exhibit A to Exhibit 4.1 to Form 8-K filed February 6, 2015, File No. 001-16411\)](#)
- 4(dd) [Seventh Supplemental Indenture, dated as of December 1, 2016, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 \(incorporated by reference to Exhibit 4.1 to Form 8-K filed December 1, 2016, File No. 001-16411\)](#)
- 4(ee) [Form of 3.200% Senior Note due 2027 \(incorporated by reference to Exhibit A to Exhibit 4.1 to Form 8-K filed December 1, 2016, File No. 001-16411\)](#)
- 4(ff) [Eighth Supplemental Indenture, dated as of October 13, 2017, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 \(incorporated by reference to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411\)](#)
- 4(gg) [Form of 2.080% Senior Note due 2020 \(incorporated by reference to Exhibit A to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411\)](#)
- 4(hh) [Form of 2.550% Senior Note due 2022 \(incorporated by reference to Exhibit B to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411\)](#)
- 4(ii) [Form of 2.930% Senior Note due 2025 \(incorporated by reference to Exhibit C to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411\)](#)
- 4(jj) [Form of 3.250% Senior Note due 2028 \(incorporated by reference to Exhibit D to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411\)](#)
- 4(kk) [Form of 4.030% Senior Note due 2047 \(incorporated by reference to Exhibit E to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411\)](#)
- *4(ll) [Description of Securities](#)
- 10(a) [Credit Agreement, dated as of August 17, 2018, among Northrop Grumman Corporation, as Borrower; Northrop Grumman Systems Corporation, as Guarantor; the lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent \(incorporated by reference to Exhibit 10.1 to Form 8-K filed August 17, 2018, File No. 001-16411\)](#)

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- (i) [Extension and Amendment Agreement, dated as of October 17, 2019, among Northrop Grumman Corporation, as Borrower, Northrop Grumman Systems Corporation, as Guarantor, the issuing banks party thereto, the lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent \(incorporated by reference to Exhibit 10.1 to Form 8-K filed October 21, 2019, File No. 001-16411\)](#)
- 10(b) [Form of Guarantee dated as of April 3, 2001, by Northrop Grumman Corporation of the indenture indebtedness issued by Litton Industries, Inc. \(predecessor-in-interest to Northrop Grumman Systems Corporation\) \(incorporated by reference to Exhibit 10.10 to Form 8-K filed April 17, 2001, File No. 001-16411\)](#)
- 10(c) [Form of Guarantee dated as of April 3, 2001, by Northrop Grumman Corporation of Northrop Grumman Systems Corporation indenture indebtedness \(incorporated by reference to Exhibit 10.11 to Form 8-K and filed April 17, 2001, File No. 001-16411\)](#)
- 10(d) [Form of Guarantee dated as of March 27, 2003, by Northrop Grumman Corporation, as Guarantor, in favor of JP Morgan Chase Bank, as trustee, of certain debt securities issued by the former Northrop Grumman Space & Mission Systems Corp. \(predecessor-in-interest to Northrop Grumman Systems Corporation\) \(incorporated by reference to Exhibit 4.2 to Form 10-Q for the quarter ended March 31, 2003, filed May 14, 2003, File No. 001-16411\)](#)
- +10(e) [Northrop Grumman Corporation 1993 Stock Plan for Non-Employee Directors \(as Amended and Restated January 1, 2010\) \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2009, filed July 23, 2009, File No. 001-16411\)](#)
- +10(f) [Amended and Restated 2011 Long-Term Incentive Stock Plan \(as amended and restated effective as of May 20, 2015\) \(incorporated by reference to Appendix B to the Company's Proxy Statement on Schedule 14A for the 2015 Annual Meeting of Shareholders filed April 6, 2015, File No. 001-16411\)](#)
- (i) [Northrop Grumman Corporation Equity Grant Program for Non-Employee Directors under the Northrop Grumman 2011 Long-Term Incentive Stock Plan, Amended and Restated Effective as of January 1, 2016 \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended September 30, 2015, filed October 28, 2015, File No. 001-16411\)](#)
- (ii) [Grant Certificate Specifying the Terms and Conditions Applicable to 2016 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2016 filed April 27, 2016\)](#)
- (iii) [Grant Certificate Specifying the Terms and Conditions Applicable to 2016 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2016 filed April 27, 2016\)](#)
- (iv) [Grant Certificate Specifying the Terms and Conditions Applicable to 2016 Restricted Performance Stock Rights Granted to Janis G. Pamiljans Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10\(h\)\(iv\) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018\)](#)
- (v) [Grant Certificate Specifying the Terms and Conditions Applicable to 2016 Restricted Stock Rights Granted to Janis G. Pamiljans Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10\(h\)\(v\) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018\)](#)
- (vi) [Grant Certificate Specifying the Terms and Conditions Applicable to Special 2016 Restricted Stock Rights Granted to Janis G. Pamiljans Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10\(h\)\(vi\) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018\)](#)

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- (vii) [Grant Certificate Specifying the Terms and Conditions Applicable to 2017 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2017, filed April 26, 2017, File No. 001-16411\)](#)
 - (viii) [Grant Certificate Specifying the Terms and Conditions Applicable to 2017 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2017, filed April 26, 2017, File No. 001-16411\)](#)
 - (ix) [Grant Certificate Specifying the Terms and Conditions Applicable to 2017 Restricted Stock Rights Granted to Janis G. Pamiljans Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended June 30, 2017, filed July 26, 2017\)](#)
 - (x) [Grant Certificate Specifying the Terms and Conditions Applicable to 2018 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2018, filed April 25, 2018, File No. 001-16411\)](#)
 - (xi) [Grant Certificate Specifying the Terms and Conditions Applicable to 2018 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2018, filed April 25, 2018, File No. 001-16411\)](#)
 - (xii) [Grant Certificate Specifying the Terms and Conditions Applicable to Special 2018 Restricted Stock Rights Granted to Blake Larson Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended June 30, 2018, filed July 25, 2018, File No. 001-16411\)](#)
 - (xiii) [Modified Terms and Conditions Applicable to 2017 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.3 to Form 8-K filed September 21, 2018, File No. 001-16411\)](#)
 - (xiv) [Modified Terms and Conditions Applicable to 2017 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.4 to Form 8-K filed September 21, 2018, File No. 001-16411\)](#)
 - (xv) [Modified Terms and Conditions Applicable to 2018 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.1 to Form 8-K filed September 21, 2018, File No. 001-16411\)](#)
 - (xvi) [Modified Terms and Conditions Applicable to 2018 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 8-K filed September 21, 2018, File No. 001-16411\)](#)
 - (xvii) [Grant Certificate Specifying the Terms and Conditions Applicable to 2018 Restricted Stock Rights Granted to Mark Caylor Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10\(g\)\(xvii\) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411\)](#)
 - (xviii) [Grant Certificate Specifying the Terms and Conditions Applicable to 2019 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411\)](#)
 - (xix) [Grant Certificate Specifying the Terms and Conditions Applicable to 2019 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan \(incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411\)](#)
- +10(g) [Northrop Grumman 2011 Long-Term Incentive Stock Plan \(As Amended Through December 4, 2014\) \(incorporated by reference to Exhibit 10\(h\) to Form 10-K for the year ended December 31, 2014, filed February 2, 2015, File No. 001-16411\)](#)



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- (i) [Summary of Non-Employee Director Award Terms Under the 2011 Long-Term Incentive Stock Plan effective December 21, 2011 \(incorporated by reference to Exhibit 10\(j\)\(ii\) to Form 10-K for the year ended December 31, 2011, filed February 8, 2012, File No. 001-16411\)](#)
- (ii) [Northrop Grumman Corporation Equity Grant Program for Non-Employee Directors under the Northrop Grumman 2011 Long-Term Incentive Stock Plan, Amended and Restated Effective January 1, 2015 \(incorporated by reference to Exhibit 10\(h\)\(ii\) to Form 10-K for the year ended December 31, 2014, filed February 2, 2015, File No. 001-16411\)](#)
- +10(h) [Northrop Grumman Supplemental Plan 2 \(Amended and Restated Effective as of January 1, 2014\) \(incorporated by reference to Exhibit 10\(l\) to Form 10-K for the year ended December 31, 2013, Filed February 3, 2014, File No. 001-16411\)](#)
- (i) [Appendix B to the Northrop Grumman Supplemental Plan 2: ERISA Supplemental Program 2 \(Amended and Restated Effective as of January 1, 2014\) \(incorporated by reference to Exhibit 10\(l\)\(i\) to Form 10-K for the year ended December 31, 2013, filed February 3, 2014, File No. 001-16411\)](#)
- (ii) [Appendix G to the Northrop Grumman Supplemental Plan 2: Officers Supplemental Executive Retirement Program \(Amended and Restated Effective as of January 1, 2012\) \(incorporated by reference to Exhibit 10\(k\)\(iv\) to Form 10-K for the year ended December 31, 2011, filed February 8, 2012, File No. 001-16411\)](#)
- (iii) [Appendix I to the Northrop Grumman Supplemental Plan 2: Officers Supplemental Executive Retirement Program II \(Amended and Restated January 1, 2014\) \(incorporated by reference to Exhibit 10\(k\)\(iv\) to Form 10-K for the year ended December 31, 2015, filed February 1, 2016, File No. 001-16411\)](#)
- (iv) [First Amendment to the Northrop Grumman Supplemental Plan 2, dated December 20, 2017 \(Effective as of December 31, 2017\) \(incorporated by reference to Exhibit 10\(j\)\(v\) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018, File No. 001-16411\)](#)
- *(v) [First Amendment to Appendix F to the Northrop Grumman Supplemental Plan 2, CPC Supplemental Executive Retirement Program, effective December 30, 2019](#)
- +10(i) [Northrop Grumman Supplementary Retirement Income Plan \(formerly TRW Supplementary Retirement Income Plan\) \(Amended and Restated Effective January 1, 2014\) \(incorporated by reference to Exhibit 10\(m\) to Form 10-K for the year ended December 31, 2013, filed February 3, 2014, File No. 001-16411\)](#)
- +*10(j) [Severance Plan for Elected and Appointed Officers of Northrop Grumman Corporation \(Amended and Restated Effective December 31, 2019\)](#)
- +10(k) [Non-Employee Director Compensation Term Sheet, effective May 16, 2018 \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2018, filed July 25, 2018, File No. 001-16411\)](#)
- +10(l) [Non-Employee Director Compensation Term Sheet, effective May 15, 2019 \(incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2019, filed July 24, 2019, File No. 001-16411\)](#)
- +10(m) [Form of Indemnification Agreement between Northrop Grumman Corporation and its directors and executive officers \(incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2012, filed April 25, 2012, File No. 001-16411\)](#)
- +10(n) [Northrop Grumman Deferred Compensation Plan \(Amended and Restated Effective as of April 1, 2016\) \(incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2016, filed April 27, 2016, File No. 001-16411\)](#)

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- +10(o) [The 2002 Incentive Compensation Plan of Northrop Grumman Corporation, As Amended and Restated effective January 1, 2009 \(incorporated by reference to Exhibit 10.6 to Form 10-Q for the quarter ended March 31, 2009, filed April 22, 2009, File No. 001-16411\)](#)
- +10(p) [Northrop Grumman 2006 Annual Incentive Plan and Incentive Compensation Plan \(for Non-Section 162\(m\) Officers\), as amended and restated effective January 1, 2009 \(incorporated by reference to Exhibit 10.7 to Form 10-Q for the quarter ended March 31, 2009, filed April 22, 2009, File No. 001-16411\)](#)
- +10(q) [Northrop Grumman Innovation Systems Nonqualified Deferred Compensation Plan, as amended and restated January 1, 2019 \(incorporated by reference to Exhibit 10\(r\) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411\)](#)
- +10(r) [Orbital ATK, Inc. Executive Officer Incentive Plan \(as of May 4, 2016\) \(incorporated by reference to Exhibit 10.1 to Orbital ATK, Inc. \(now known as Northrop Grumman Innovation Systems, Inc.\) Form 8-K filed May 5, 2016\)](#)
- +*10(s) [Northrop Grumman Savings Excess Plan \(Amended and Restated Effective as of January 1, 2020\)](#)
- +10(t) [Northrop Grumman Officers Retirement Account Contribution Plan \(Amended and Restated Effective as of January 1, 2019\) \(incorporated by reference to Exhibit 10\(v\) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411\)](#)
- +10(u) [Northrop Grumman Corporation Special Officer Retiree Medical Plan \(Amended and Restated Effective October 1, 2018\) \(incorporated by reference to Exhibit 10\(w\) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411\)](#)
- +10(v) [Northrop Grumman Innovation Systems Defined Benefit Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2019 \(incorporated by reference to Exhibit 10\(x\) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411\)](#)
- *10(i) [First Amendment to Northrop Grumman Innovation Systems Defined Benefit Supplemental Executive Retirement Plan, effective December 31, 2019](#)
- +10(w) [Northrop Grumman Innovation Systems Defined Contribution Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2019 \(incorporated by reference to Exhibit 10\(y\) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411\)](#)
- +10(x) [Executive Basic Life Insurance and Accidental Death and Dismemberment Insurance Policy dated January 1, 2019 \(incorporated by reference to Exhibit 10.4 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411\)](#)
- +10(y) [Executive Long-Term Disability Insurance Policy dated January 1, 2019 \(incorporated by reference to Exhibit 10.5 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411\)](#)
- +10(z) [Executive Supplemental Individual Disability Insurance Plan dated June 30, 2014 \(incorporated by reference to Exhibit 10\(z\) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018, File No. 001-16411\)](#)
- +10(aa) [Group Personal Excess Liability Policy dated February 14, 2019 and effective as of January 1, 2019 \(incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411\)](#)
- +10(bb) [Letter dated December 16, 2009 from Northrop Grumman Corporation to Wesley G. Bush regarding compensation effective January 1, 2010 \(incorporated by reference to Exhibit 10.2 to Form 8-K filed December 21, 2009, File No. 001-16411\)](#)

NORTHROP GRUMMAN CORPORATION

- +10(cc) [Letter dated January 10, 2018 from Northrop Grumman Corporation to Blake Larson regarding compensation effective June 6, 2018 \(incorporated by reference to Exhibit 10.3 to Form 10-O for quarter ended June 30, 2018, filed July 25, 2018, File No. 001-16411\)](#)
- +10(dd) [Consultant Agreement between Northrop Grumman Systems Corporation and Wesley G. Bush, dated July 31, 2019 \(incorporated by reference to Exhibit 10.1 to Form 10-O for the quarter ended September 30, 2019, filed October 24, 2019, File No. 001-16411\)](#)
- *21 [Subsidiaries](#)
- *23 [Consent of Independent Registered Public Accounting Firm](#)
- *24 [Power of Attorney](#)
- *31.1 [Certification of Kathy J. Warden pursuant to Section 302 of the Sarbanes-Oxley Act of 2002](#)
- *31.2 [Certification of Kenneth L. Bedingfield pursuant to Section 302 of the Sarbanes-Oxley Act of 2002](#)
- **32.1 [Certification of Kathy J. Warden pursuant to Section 906 of the Sarbanes-Oxley Act of 2002](#)
- **32.2 [Certification of Kenneth L. Bedingfield pursuant to Section 906 of the Sarbanes-Oxley Act of 2002](#)
- *101 Northrop Grumman Corporation Annual Report on Form 10-K for the fiscal year ended December 31, 2019, formatted in XBRL (Extensible Business Reporting Language); (i) the Cover Page, (ii) the Consolidated Statements of Earnings and Comprehensive Income, (iii) Consolidated Statements of Financial Position, (iv) Consolidated Statements of Cash Flows, (v) Consolidated Statements of Changes in Shareholders' Equity, and (vi) Notes to Consolidated Financial Statements. The instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
- *104 Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)
- + Management contract or compensatory plan or arrangement
- * Filed with this Report
- ** Furnished with this Report

Item 16. Form 10-K Summary

None.

DESCRIPTION OF COMMON STOCK

General

Northrop Grumman Corporation (the “Company,” “us,” “we,” or “our”) is currently authorized to issue up to 800,000,000 shares of common stock, par value \$1.00 per share and up to 10,000,000 shares of preferred stock, par value \$1.00 per share. Our common stock is registered under Section 12(b) of the Exchange Act.

The following summary is not complete. You should refer to the applicable provisions of our charter and bylaws and to the Delaware General Corporation Law (the “DGCL”) for a complete statement of the terms and rights of our common stock.

Dividends

Holders of common stock are entitled to receive dividends when, as and if declared by our board of directors out of funds legally available for their payment, subject to the rights of holders of any preferred stock that may be issued and outstanding and to restrictions contained in agreements to which the Company is a party.

Voting Rights

Each holder of our common stock is entitled to one vote per share on all matters submitted to a vote of stockholders. Generally, a matter submitted for stockholder action shall be approved if the votes cast “for” the matter exceed the votes cast “against” such matter, unless a greater or different vote is required by statute, any applicable law or regulation, the rights of any authorized class of stock, or our charter or bylaws. Other than in a contested election where directors are elected by a plurality vote, a director nominee shall be elected to the board if the votes cast “for” such nominee’s election exceed the votes cast “against” such nominee’s election. Subject to any rights of the holders of any series of preferred stock pursuant to applicable law or the provision of the certificate of designations creating that series, all voting rights are vested in the holders of shares of our common stock. Holders of shares of our common stock have noncumulative voting rights.

Rights Upon Liquidation

In the event of the Company’s voluntary or involuntary liquidation, dissolution or winding up, holders of our common stock will be entitled to share equally in any of the Company’s assets available for distribution after the payment in full of all debts and distributions and after the holders of any series of outstanding preferred stock have received their liquidation preferences in full.

Other Rights

Holders of our common stock are not entitled to preemptive, conversion or redemption rights. There are no sinking fund provisions applicable to shares of our common stock. All outstanding shares of common stock are fully paid and nonassessable.

Preferred Stock

Our board of directors is authorized, without further action by our stockholders, to issue up to 10,000,000 shares of “blank check” preferred stock, par value \$1.00 per share, in one or more series, and to fix the designations, powers, preferences and the relative, participating, optional or other special rights and any qualifications, limitations and restrictions of the shares of each series of preferred stock. The issuance of preferred stock could impede the completion of a merger, tender offer or other takeover attempt.

Other Provisions of Our Charter and Bylaws and DGCL Provisions That May Have Anti-Takeover Effects

Advance Notice Provisions. Our bylaws provide that a stockholder must notify us in writing, within timeframes specified in the bylaws, of any stockholder nomination of a director and of any other business that the stockholder intends to bring at a meeting of stockholders.

Amendments to Bylaws. Our charter and bylaws provide that our bylaws may be amended by our board of directors or by the affirmative vote of the holders of not less than a majority of the voting power of all outstanding shares of capital stock entitled to vote thereon, voting as a single class, and by the holders of any one or more classes or series of preferred stock entitled to vote thereon as a separate class.

Delaware Business Combination Statute. We are subject to the provisions of Section 203 of the DGCL. In general, the statute prohibits a Delaware corporation that has either a class of stock listed on a national stock exchange or at least 2,000 stockholders of record from engaging in a business combination with an interested stockholder (generally, the beneficial owner of 15% or more of the corporation’s outstanding voting stock) for three years following the time the stockholder became an interested stockholder, unless, prior to that time: (1) the corporation’s board of directors approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder, (2) at least two-thirds of the outstanding shares not owned by that interested stockholder approve the business combination, or (3) upon becoming an interested stockholder, that stockholder owned at least 85% of the outstanding shares, excluding those held by officers, directors and some employee stock plans. A “business combination” includes a merger, asset sale, or other transaction resulting in a financial benefit, other than proportionately as a stockholder, to the interested stockholder.

**FIRST AMENDMENT TO APPENDIX F TO THE
NORTHROP GRUMMAN SUPPLEMENTAL PLAN 2
CPC SUPPLEMENTAL EXECUTIVE RETIREMENT PROGRAM**

This amendment to Appendix F to the Northrop Grumman Supplemental Plan 2, CPC Supplemental Executive Retirement Program (the "Program"), amended and restated effective as of January 1, 2012, is intended to merge the Program into the Northrop Grumman Master Inactive Nonqualified Plan.

This amendment is effective as of midnight on December 30, 2019 and adds a second introductory paragraph before Section F.O I to read as follows:

"The Program was merged into the Northrop Grumman Master Inactive Nonqualified Plan as a Component Plan effective as of December 31, 2019. Notwithstanding the foregoing, cross-references within the Program to the Northrop Grumman Supplemental Plan 2 (the "Plan") or other referenced plan continue to apply for purposes of determining the amount and form and timing of benefits that accrued under the Program."

* * *

IN WITNESS WHEREOF, this Amendment is adopted and executed by the undersigned duly authorized officer on the 17th day of December, 2019.

NORTHROP GRUMMAN CORPORATION

By: /s/ Ann Addison

Ann Addison

Corporate Vice President & Chief Human Resources Officer

Exhibit 10(j)

**Severance Plan for
Elected and Appointed Officers of
Northrop Grumman Corporation
As amended and restated effective December 31, 2019**

1. Purpose of Plan. The purpose of the Plan is to provide severance benefits for eligible elected and appointed officers of Northrop Grumman Corporation who reside and work in the United States. The terms of this amended and restated Plan are applicable to Qualifying Terminations that occur on or after December 31, 2019.

2. Definitions. The terms defined in this section shall have the meaning given below:

- (a) **“Committee”** means the Compensation Committee of the Board of Directors of the Company or any successor to the Committee.
 - (b) **“Code”** means the Internal Revenue Code of 1986, as amended.
 - (c) **“Company”** means Northrop Grumman Corporation.
 - (d) **“CPC”** means the Corporate Policy Council.
 - (e) **“Disability”** means any disability of an Officer recognized as a disability for purposes of the Company’s long-term disability plan, or similar plan later adopted by the Company in place of such plan.
 - (f) **“Key Employee”** means an employee treated as a “specified employee” as of his Separation from Service under Code section 409A(a)(2)(B)(i) of the Company or its affiliate (i.e., a key employee (as defined in Code section 416(i) without regard to paragraph (5) thereof) if the Company’s stock is publicly traded on an established securities market or otherwise. The Company shall determine in accordance with a uniform Company policy which Officers are Key Employees as of each December 31 in accordance with IRS regulations or other guidance under Code section 409A, provided that in determining the compensation of individuals for this purpose, the definition of compensation in Treas. Reg. § 1.415(c)-2(d)(3) shall be used. Such determination shall be effective for the twelve (12) month period commencing on April 1 of the following year.
 - (g) **“Officer”** means an elected or appointed officer of Northrop Grumman Corporation who resides and works in the United States.
 - (h) **“Plan”** means this Severance Plan for Elected and Appointed Officers of Northrop Grumman Corporation, as it may be amended from time to time.
 - (i) **“Qualifying Termination”** means any one of the following (i) an Officer’s involuntary termination of employment with the Company, other than Termination for Cause or mandatory retirement, or (ii) an Officer’s election to terminate employment with the Company in lieu of accepting a downgrade to a non-Officer position or status. “Qualifying Termination” does not include any change in the Officer’s employment status due to any transfer within the Company or to an affiliate, or to a purchaser of assets or a portion of the business of the Company or an affiliate in connection with the purchase, Disability, voluntary termination or normal retirement.
 - (j) **“Release”** means the Separation Agreement and General Release prepared by the Company at the time of the Officer’s termination of employment, which may include such terms as the Company deems appropriate, including certain post-employment restrictions as a condition of receiving benefits under the Plan.
-

(k) **“Separation from Service”** or **“Separate from Service”** means a “separation from service” within the meaning of Code section 409A.

(l) **“Termination for Cause”** means an Officer’s termination of employment with the Company because of:

- (i) The continued failure by the Officer to devote reasonable time and effort to the performance of his duties (other than a failure resulting from the Officer’s incapacity due to physical or mental illness) after written demand for improved performance has been delivered to the Officer by the Company which specifically identifies how the Officer has not devoted reasonable time and effort to the performance of his duties;
- (ii) The willful engaging by Officer in misconduct which is substantially injurious to the Company, monetarily or otherwise; or
- (iii) The Officer’s conviction for committing an act of fraud, embezzlement, theft, or other act constituting a felony (other than traffic related offenses or as a result of vicarious liability).

A Termination for Cause shall not include a termination attributable to:

- (i) Bad judgment or negligence on the part of the Officer other than habitual negligence; or
- (ii) An act or omission believed by the Officer in good faith to have been in or not opposed to the best interests of the Company and reasonably believed by the Officer to be lawful.

3. Eligibility Requirements.

(a) Benefits under the Plan are subject to the Company’s sole discretion and approval.

(b) To be considered to receive benefits under the Plan an Officer must meet the following conditions:

- (i) The Officer must experience a Qualifying Termination that results in termination of employment. If, before termination of employment occurs due to the Qualifying Termination event, the Officer voluntarily quits, retires, or experiences a Termination for Cause, the Officer will not receive benefits under this Plan.
- (ii) The Officer must sign the Release.
- (iii) The Officer must not be in a class of employees eligible for another severance plan maintained by the Company or an affiliate, including, without limitation, the Northrop Grumman Innovation Systems Severance Benefit Plan - Grade 21 (formerly named the Orbital ATK Severance Benefit Plan - Grade 21) or the Northrop Grumman Innovation Systems Executive Severance Plan (formerly named the Orbital ATK Executive Severance Plan). This section 3(b)(iii) shall be inapplicable effective July 1, 2019, for Qualifying Terminations that occur on or after that date.

4. Severance Benefits. Upon the Qualifying Termination of any eligible Officer, the terminated Officer shall be entitled to the following benefits under the Plan: (a) a lump-sum severance cash payment, (b) an

extension of the Officer's existing medical and dental coverage, (c) a prorated annual cash bonus payment, and (d) certain other fringe benefits.

- (a) Lump-sum Cash Severance Payment. The designated Appendix describes the lump sum severance benefit available to the Officer.
- (b) Extension of Medical and Dental Benefits. The Company will continue to pay its portion of the Officer's medical and dental benefits for the period of time following the Officer's termination date that is specified in the designated Appendix, provided that for the balance of the month that includes the Officer's termination date and for the immediately following month, the coverage will be at no cost to the Officer. Such continuation coverage shall run concurrently with COBRA continuation coverage (or similar state law). The Officer must continue to pay his portion of the cost of this coverage with after-tax dollars. If rates for active employees increase during this continuation period, the contribution amount will increase proportionately. Also, if medical and dental benefits are modified, terminated or changed in any way for active employees during this continuation period the Officer will also be subject to such modification, termination or change. Following the continuation period specified in the designated Appendix the Officer will be eligible to receive COBRA benefits for any remaining portion of the applicable COBRA period (typically 18 months) at normal COBRA rates. The unreimbursed COBRA period (*e.g.*, the period when the Officer must pay full COBRA rates in order to receive COBRA benefits) starts the first day of the month following the end of the continuation period specified in the designated Appendix.

Example: A Non-CPC Officer receives a layoff notice on June 5, 2017, and his last day of work is June 19, 2017. The Officer's 18-month COBRA period commences June 20, 2017. The Officer will continue to receive medical and dental coverage from June 20, 2017 through July 31, 2017 at no cost to the Officer. The Officer will continue to receive medical and dental coverage from August 1, 2017 through June 19, 2018, as long as the Officer continues to pay the appropriate active employee contribution. Full COBRA rates will apply to the Officer from June 20, 2018 until the end of the remaining COBRA period on December 19, 2018.

If the Officer is not covered by medical and dental benefits at the time of his termination, this section 4(b) will not apply and no continuation coverage will be offered. No health or welfare benefits other than medical and dental will be continued pursuant to the Plan, including but not limited to disability benefits.

The medical and dental benefits to be provided or payments to be made under this section 4(b) shall be reduced to the extent that the Officer is eligible for benefits or payments for the same occurrence under another employer sponsored plan to which the Officer is entitled because of his employment subsequent to the Qualifying Termination.

To the extent the benefits under this section 4(b) are, or ever become, taxable to the Officer and to the extent the benefits continue beyond the period in which the Officer would be entitled (or would, but for the Plan, be entitled) to COBRA continuation coverage if the Officer elected such coverage and paid the applicable premiums, the Company shall administer such continuation of coverage consistent with the following additional requirements as set forth in Treas. Reg. § 1.409A-3(i)(1)(iv):

- (i) Officer's eligibility for benefits in one year will not affect Officer's eligibility for benefits in any other year;

- (ii) Any reimbursement of eligible expenses will be made on or before the last day of the year following the year in which the expense was incurred; and
- (iii) Officer's right to benefits is not subject to liquidation or exchange for another benefit.

In the event the preceding sentence applies and the Officer is a Key Employee, provision of these benefits after the COBRA period shall commence on the first day of the seventh month following the Officer's Separation from Service (or, if earlier, the first day of the month after the Officer's death).

- (c) Company Performance Related Payment. The Officer will be eligible for a severance payment equal to a pro-rata portion of the bonus he or she would have received under the Company annual incentive plan in which he or she was a participant for the year in which the Qualifying Termination occurred, in addition to the lump-sum cash severance payment described in section 4(a). For this purpose, the pro-rated bonus (if any) will be based on the applicable annual incentive plan payout formula, with any applicable individual performance factor set at 1.00, prorated from the beginning of the performance period (January 1st) to the Officer's date of termination. The severance payment contemplated by this Section 4(c) will be paid when the annual bonuses are paid to active employees between February 15 and March 15 of the year following termination. Notwithstanding anything to the contrary in this section 4(c), if the Officer's bonus opportunity for the fiscal year in which his or her termination occurs is covered by the Company's Incentive Compensation Plan (or similar successor bonus program designed to comply with the performance-based compensation exception under Section 162(m) of the Code), then the Officer's severance payment pursuant to this section 4(c) shall not exceed the maximum bonus the Officer would have been entitled to receive under the Company's Incentive Compensation Plan for that fiscal year, assuming the Officer had been employed through the date bonuses are paid under such plan for that year, and otherwise calculated under the terms of such plan based on actual performance for that fiscal year (but without giving effect to any discretion of the plan administrator to reduce the bonus amount from the maximum otherwise determined in accordance with such plan).
- (d) Other Fringe Benefits. All reimbursements will be within the limits established in the Executive Perquisite Program. These perquisites will cease as of the date of termination except for the following:
 - (i) Financial Planning. If an Officer is eligible for financial planning reimbursement at the time of termination, the Officer will be reimbursed for any financial planning fees as specified in the designated Appendix. For these purposes, "financial planning reimbursement" includes any income tax preparation fee reimbursement the Officer may be entitled to under the financial planning reimbursement terms and conditions applicable to the Officer at the time of termination. The financial planning (including income tax preparation fee) reimbursements contemplated by the Appendices are subject to any other applicable limitations that may apply under the financial planning reimbursement terms and conditions applicable to the Officer at the time of termination (for example, and without limitation, annual caps on amounts that may be used in connection with income tax preparation). All such reimbursements pursuant to this section 4(d)(i) shall be administered consistent with the following additional requirements as set forth in Treas. Reg. § 1.409A-3(i)(1)(iv): (1) Officer's eligibility for benefits in one year will not affect Officer's eligibility for benefits in any other year; (2) any reimbursement of eligible expenses will be made on or before the last day of the year following the year in which the

expense was incurred; and (3) Officer's right to benefits is not subject to liquidation or exchange for another benefit. In addition, no reimbursements shall be made to an Officer who is a Key Employee for six months following the Officer's Separation from Service.

(ii) Outplacement Service. The Officer will be reimbursed for the cost of reasonable outplacement services provided by the Company's outplacement service provider for services provided within one year after the Officer's date of termination; provided, however, that the total reimbursement shall be limited to an amount equal to fifteen percent (15%) of the Officer's base salary as of the date of termination. All services will be subject to the current contract with the provider, and all such expenses shall be reimbursed as soon as practicable, but in no event later than the end of the year following the year the Officer Separates from Service.

(e) Time and Form of Payment. The severance benefits under section 4(a) will be paid to the eligible Officer in a lump sum as soon as practicable following the Officer's Separation from Service, but in no event beyond thirty (30) days from such date, provided the Officer signs the Release within twenty one (21) days following the Officer's Separation from Service. Notwithstanding the foregoing, if the Officer is a Key Employee, the lump sum payment shall be made on or within thirty (30) days after the first day of the seventh month following the Officer's Separation from Service (or, if earlier, the first day of the month after the Officer's death), provided the Officer signs the Release within twenty-one (21) days following the Officer's Separation from Service. This amount will be paid after all regular taxes and withholdings have been deducted. No payment made pursuant to the Plan is eligible compensation under any of the Company's benefit plans, including without limitation, pension, savings, or deferred compensation plans.

5. Limitation of Plan Benefits. Notwithstanding anything contained in this Plan to the contrary, if upon or following a change in the "ownership or effective control" of the Company or in the "ownership of a substantial portion of the assets" of the Company (each within the meaning of Section 280G of the Code), the tax imposed by Section 4999 of the Code or any similar or successor tax (the "Excise Tax") applies, solely because of such transaction, to any payments, benefits and/or amounts received by the Officer pursuant to the Plan or otherwise, including, without limitation, any amounts received, or deemed received within the meaning of any provision of the Code, by the Officer as a result of (and not by way of limitation) any automatic vesting, lapse of restrictions and/or accelerated target or performance achievement provisions, or otherwise, applicable to outstanding grants or awards to the Officer under any of the Company's incentive plans, including without limitation, the 2011 Long-Term Incentive Stock Plan (as amended) (collectively, the "Total Payments"), then the Total Payments shall be reduced (but not below zero) so that the maximum amount of the Total Payments (after reduction) shall be one dollar (\$1.00) less than the amount which would cause the Total Payments to be subject to the Excise Tax; provided that such reduction to the Total Payments shall be made only if the total after-tax benefit to the Officer is greater after giving effect to such reduction than if no such reduction had been made. If such a reduction is required, the Company shall reduce or eliminate the Total Payments by first reducing or eliminating any cash severance benefits, then by reducing or eliminating any accelerated vesting of stock options, then by reducing or eliminating any accelerated vesting of other equity awards, then by reducing or eliminating any other remaining Total Payments, in each case in reverse order beginning with the payments which are to be paid the farthest in time from the date of the transaction triggering the Excise Tax. The preceding provisions of this section 5 shall take precedence over the provisions of any other plan, arrangement or agreement governing the Officer's rights and entitlements to any benefits or compensation.

6. Offset for Other Benefits Received. The benefits under the Plan are in lieu of, and not in addition to, any other severance or separation benefits for which the Officer is eligible under any Company plan, policy or arrangements (including but not limited to, severance benefits provided under any employment agreement, retention incentive agreement, or similar benefits under any individual change in control agreements, plans, policies, arrangements and change in control agreements of acquired companies or business units) (collectively, “severance plans”). If an Officer receives any benefit under any severance plan, such benefit shall cause a corresponding reduction in benefits under this Plan. If, despite any release that the Officer signs in connection with the Plan, such Officer is later awarded and receives benefits under any other severance plan(s), any benefits that the Officer receives under the Plan will be treated as having been received under those other severance plans for purposes of calculating total benefits received under those other severance plans (that is, benefits under those other severance plans will be reduced by amounts received under the Plan).

7. Administration. The Plan shall be administered by the Benefit Plans Administrative Committee (the “Plan Administrator”). The Plan Administrator has sole and absolute discretion to interpret the terms of the Plan, eligibility for benefits, and determine questions of fact. The Plan Administrator may delegate any of its duties or authority to any individual or entity.

8. Claims and Appeals Procedures.

Claims Procedure. If an Officer believes that he or she is entitled to benefits under the Plan and has not received them, the Officer or his authorized representative (each, a “claimant”) may file a claim for benefits. The Vice President of Compensation and Benefits decides claims for benefits under the Plan. The claimant must submit the written claim to the following address:

Vice President of Compensation and Benefits
Northrop Grumman Corporation
2980 Fairview Park Drive
Falls Church, VA 22042

The letter must state the reason why the claimant believes the Officer is entitled to benefits, and the letter must be received no later than 90 days after the Officer’s termination of employment, or 90 days after a payment was due, whichever comes first.

If the claim is denied, in whole or in part, the claimant will receive a written response within 90 days. This response will include (i) the reason(s) for the denial, (ii) reference(s) to the specific Plan provisions on which denial is based, (iii) a description of any additional information necessary to perfect the claim, and (iv) a description of the Plan’s claims and appeals procedures. In some cases more than 90 days may be needed to make a decision, in which case the claimant will be notified prior to the expiration of the 90 days that more time is needed to review the claim and the date by which the Plan expects to render the decision. In no event will the extension be for more than an additional 90 days.

Appeal of Denied Claim. The claimant may appeal a denied claim by filing an appeal with the Benefit Plans Administrative Committee within 60 days after the claim is denied. The written appeal should be sent to the Benefit Plans Administrative Committee at the following address:

Benefit Plans Administrative Committee
Northrop Grumman Corporation
2980 Fairview Park Drive
Falls Church, VA 22042

As part of the appeal process the claimant will be given the opportunity to submit written comments and information and be provided, upon request and free or charge, with copies of documents and other information relevant to the claim. The review on appeal will take into account all information submitted on appeal, whether or not it was submitted or considered in the initial benefit determination. A decision will be made on the appeal within 60 days, unless additional time is needed. If more time is needed, the claimant will be notified prior to the expiration of the 60 days that up to an additional 60 days is needed and the date by which the Plan expects to render the decision. If the claim is denied, in whole or in part, on appeal the claimant will receive a written response which will include (i) the reason(s) for the denial, (ii) references to the specific Plan provisions on which the denial is based, (iii) a statement that the claimant is entitled to receive, upon request and free of charge, copies of all documents and other information relevant to the claim on appeal, and (iv) a description of the Plan's claims and appeals procedures.

If the claim is denied on appeal, the Officer has the right to bring an action under Section 502(a) of the Employee Retirement Income Security Act of 1974, as amended. Any claimant must pursue all claims and appeals procedures described in the Plan document before seeking any other legal recourse with respect to Plan benefits. In addition, any lawsuit must be filed within six months from the date of the denied appeal, or two years from the Officer's termination date, whichever occurs first.

In exercising their authority and responsibility for deciding claims and appeals, the Vice President of Compensation and Benefits (claims) and the Benefit Plans Administrative Committee (appeals) each have full discretionary authority, including, without limitation, authority to construe the terms of the Plan and to make factual determinations. Their determinations and actions will be conclusive and binding on all persons, and no determination or action will be modified by a court unless the determination or action is proven to be arbitrary or capricious.

9. Amendment. The Company (acting through the Committee) reserves the right at any time to terminate or amend this Plan in any respect and without the consent of any Officer.

10. Unfunded Obligations. All benefits due an Officer or the Officer's beneficiary under this Plan are unfunded and unsecured and are payable out of the general funds of the Company. The Company, in its sole and absolute discretion, may establish a trust associated with the payment of Plan benefits, provided that the trust does not alter the characterization of the Plan as an "unfunded plan" for purposes of the Employee Retirement Income Security Act, as amended. Any such trust shall make distributions in accordance with the terms of the Plan.

11. Transferability of Benefits. The right to receive payment of any benefits under this Plan shall not be transferred, assigned or pledged except by beneficiary designation or by will or under the laws of descent and distribution.

12. Taxes. The Company may withhold from any payment due under this Plan any taxes required to be withheld under applicable federal, state or local tax laws or regulations.

13. Gender. The use of masculine pronouns in this Plan shall be deemed to include both males and females.

14. Construction, Governing Laws. The Plan is intended as (i) a pension plan within the meaning of Section 3(2) of the Employee Retirement Income Security Act, as amended ("ERISA"), and (ii) an unfunded pension plan maintained by the Company for a select group of management or highly

compensated employees within the meaning of Department of Labor Regulation 2520.104-23 promulgated under ERISA, and Sections 201, 301, and 401 of ERISA. Nothing in this Plan creates a vested right to benefits in any employee or any right to be retained in the employ of the Company. Except to the extent that federal legislation or applicable regulation shall govern, the validity and construction of the Plan and each of its provisions shall be subject to and governed by the laws of the Commonwealth of Virginia.

15. Severability. If any provision of the Plan is found, held or deemed to be void, unlawful or unenforceable under any applicable statute or other controlling law, the remainder of the Plan shall continue in full force and effect.

IN WITNESS WHEREOF, this Amendment and Restatement is hereby executed by a duly authorized officer on this 17th day of December, 2019.

NORTHROP GRUMMAN CORPORATION

By: /s/ Ann Addison
Ann Addison
Corporate Vice President & Chief Human Resources Officer

Appendix for Corporate Policy Council (CPC) Officers

The following benefits shall apply for purposes of eligible Officers who are members of the CPC:

Section 4(a). Lump-sum Cash Severance Payment. The lump sum cash severance payment shall equal one and one half (1.5) times the sum of (A) one year's base salary as in effect on the effective date of the Officer's termination, plus (B) the Officer's target annual bonus established under the Company's annual incentive plan in which he or she was a participant for the fiscal year in which the date of termination occurs. No supplemental bonuses or other bonuses will be combined with the Officer's annual bonus for purposes of this computation.

Section 4(b). Extension of Medical and Dental Benefits. The Company will continue to pay its portion of the Officer's medical and dental benefits for eighteen months following the Officer's termination date.

Section 4(d)(i). Financial Planning. If the Officer is eligible for financial planning reimbursement at the time of termination, the Officer will be reimbursed for any financial planning fees incurred before his termination date. In addition, the Officer will be reimbursed for the following financial planning fees incurred after his termination date: (i) any fees incurred in the year in which the date of termination occurs, provided that the total financial planning reimbursement for such year (including fees incurred before and after the date of termination) shall not exceed \$18,500 (\$30,000 for the Chief Executive Officer) and (ii) any fees incurred in the year following the year in which the date of termination occurs, provided that the total financial planning reimbursement for such year shall not exceed \$18,500 (\$30,000 for the Chief Executive Officer).

Appendix for non-CPC Officers

The following benefits shall apply for purposes of eligible Officers who are not members of the CPC:

Section 4(a). Lump-sum Cash Severance Payment. The lump sum cash severance payment shall equal the sum of (A) one year's base salary as in effect on the effective date of the Officer's termination, plus (B) the Officer's target annual bonus established under the Company's annual incentive plan in which he or she was a participant for the fiscal year in which the date of termination occurs. No supplemental bonuses or other bonuses will be combined with the Officer's annual bonus for purposes of this computation.

Section 4(b). Extension of Medical and Dental Benefits. The Company will continue to pay its portion of the Officer's medical and dental benefits for one year following the Officer's termination date.

Section 4(d)(i). Financial Planning. If the Officer is eligible for financial planning reimbursement at the time of termination, the Officer will be reimbursed for any financial planning fees incurred before his termination date. In addition, the Officer will be reimbursed for the following financial planning fees incurred after his termination date: (i) any fees incurred in the year in which the date of termination occurs, provided that the total financial planning reimbursement for such year (including fees incurred before and after the date of termination) shall not exceed \$7,500 and (ii) any fees incurred in the year following the year in which the date of termination occurs, provided that the total financial planning reimbursement for such year shall not exceed \$7,500.

NORTHROP GRUMMAN
SAVINGS EXCESS PLAN

(Amended and Restated Effective as of January 1, 2020)

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INTRODUCTION

The Northrop Grumman Savings Excess Plan (the "Plan") is hereby amended and restated effective January 1, 2020. This restatement amends the January 1, 2019 restatement of the Plan. Notwithstanding the foregoing or anything to the contrary in the Plan, this amended and restated Plan document does not affect amounts earned and vested under the Plan prior to 2005.

Northrop Grumman Corporation (the "Company") established this Plan for participants in the Northrop Grumman Savings Plan who exceed the limits under sections 401(a)(17) or 415(c) of the Internal Revenue Code. This Plan is intended (1) to comply with section 409A of the Internal Revenue Code, as amended (the "Code") and official guidance issued thereunder (except with respect to amounts covered by Appendix B), and (2) to be "a plan which is unfunded and is maintained by an employer primarily for the purpose of providing deferred compensation for a select group of management or highly compensated employees" within the meaning of sections 201(2), 301(a)(3) and 401(a)(1) of the Employee Retirement Income Security Act of 1974. Notwithstanding any other provision of this Plan, this Plan shall be interpreted, operated and administered in a manner consistent with these intentions.

ARTICLE I

DEFINITIONS

1.1 Definitions

Whenever the following words and phrases are used in this Plan, with the first letter capitalized, they shall have the meanings specified below.

- (a) "Account" shall mean the recordkeeping account set up for each Participant to keep track of amounts to his or her credit.
- (b) "Administrative Committee" means the committee in charge of Plan administration, as described in Article VII and Appendix D.
- (c) "Affiliated Companies" shall mean the Company and any entity affiliated with the Company under Code sections 414(b) or (c).
- (d) "Base Salary" shall mean a Participant's annual base salary, excluding bonuses, commissions, incentive and all other remuneration for services rendered to the Affiliated Companies and prior to reduction for any salary contributions to a plan established pursuant to section 125 of the Code or qualified pursuant to section 401(k) of the Code.
- (e) "Beneficiary" or "Beneficiaries" shall mean the person or persons, including a trustee, personal representative or other fiduciary, last designated in writing by a Participant in accordance with procedures established by the Administrative Committee to receive the benefits specified hereunder in the event of the Participant's death.
 - (1) No Beneficiary designation shall become effective until it is filed with the Administrative Committee.
 - (2) Any designation shall be revocable at any time through a written instrument filed by the Participant with the Administrative Committee with or without the consent of the previous Beneficiary.

No designation of a Beneficiary other than the Participant's spouse shall be valid unless consented to in writing by such spouse. If there is no such designation or if there is no surviving designated Beneficiary, then the Participant's surviving spouse shall be the Beneficiary. If there is no surviving spouse to receive any benefits payable in accordance with the preceding sentence, the duly appointed and currently acting personal representative of the Participant's estate (which shall include either the Participant's probate estate or living trust) shall be the Beneficiary. In any case where there is no such personal representative of the Participant's estate duly appointed and acting in that capacity within 90 days after the Participant's death (or such extended period as the Administrative Committee determines is reasonably necessary to allow such personal representative to be appointed, but not to exceed 180 days after the Participant's death), then Beneficiary shall mean the person or persons who can verify by affidavit or court order to the satisfaction of the Administrative Committee that they are legally entitled to receive the benefits specified hereunder. Any payment made pursuant to such determination shall constitute a full release and discharge of the Plan, the Administrative Committee and the Company. Effective January 1, 2007, a Participant will automatically revoke a designation of a spouse as primary beneficiary upon the dissolution of their marriage.

(3) In the event any amount is payable under the Plan to a minor, payment shall not be made to the minor, but instead be paid (a) to that person's living parent(s) to act as custodian, (b) if that person's parents are then divorced, and one parent is the sole custodial parent, to such custodial parent, or (c) if no parent of that person is then living, to a custodian selected by the Administrative Committee to hold the funds for the minor under the Uniform Transfers or Gifts to Minors Act in effect in the jurisdiction in which the minor resides. If no parent is living and the Administrative Committee decides not to select another custodian to hold the funds for the minor, then payment shall be made to the duly appointed and currently acting guardian of the estate for the minor or, if no guardian of the estate for the minor is duly appointed and currently acting within 60 days after the date the amount becomes payable, payment shall be deposited with the court having jurisdiction over the estate of the minor. Any payment made pursuant to such determination shall constitute a full release and discharge of the Plan, the Administrative Committee and the Company.

(4) Payment by the Affiliated Companies pursuant to any unrevoked Beneficiary designation, or to the Participant's estate if no such designation exists, of all benefits owed hereunder shall terminate any and all liability of the Affiliated Companies.

- (f) "Board" shall mean the Board of Directors of the Company.
- (g) "Bonuses" shall mean the bonuses earned under the Company's formal incentive plans as defined by the Administrative Committee.
- (h) "Code" shall mean the Internal Revenue Code of 1986, as amended.
- (i) "Committees" shall mean the Committees appointed as provided in Article VII.
- (j) "Company" shall mean Northrop Grumman Corporation and any successor.
- (k) "Company Contributions" shall mean contributions by the Company to a Participant's Account.
- (l) "Compensation" shall be Compensation as defined by Section 5.01 of the NGSP.
- (m) "CPSC Contributions" shall mean the Company contributions under Section 3.2(b)(7).
- (n) "CPSC Participant" shall mean an Employee who is eligible to participate in the NGSP, receives Company Profit Sharing Contributions under the NGSP, and is classified by the Affiliated Companies as an Employee and not as an independent contractor.

(o) "CPSC Subaccount" shall mean the portion of a Participant's Account made up of CPSC Contributions and earnings thereon.

(p) "Disability" or "Disabled" shall mean the Participant's inability to perform each and every duty of his or her occupation or position of employment due to illness or injury as determined in the sole and absolute discretion of the Administrative Committee.

(q) "Eligible Compensation" shall mean (1) Compensation prior to January 1, 2009, and (2) after 2008, Base Salary and Bonuses, reduced by the amount of any deferrals made from such amounts under the Northrop Grumman Deferred Compensation Plan. Notwithstanding the foregoing, effective January 1, 2017, Eligible Compensation shall not include any amount paid to an Eligible Employee following the end of the month first following the month in which the Eligible Employee has a Separation from Service. Notwithstanding the foregoing, Eligible Compensation shall not include any amount deferred under the OADCP (as such term is defined in Appendix E) that otherwise would be payable in 2019.

(r) "Eligible Employee" shall mean any Employee who meets the following conditions:

(1) he or she is eligible to participate in the NGSP;

(2) he or she is classified by the Affiliated Companies as an Employee and not as an independent contractor; and

(3) he or she meets any additional eligibility criteria set by the Administrative Committee. Additional eligibility criteria established by the Administrative Committee may include specifying classifications of Employees who are eligible to participate and the date as of which various groups of Employees will be eligible to participate. This includes, for example, Administrative Committee authority to delay eligibility for employees of newly acquired companies who become Employees.

Notwithstanding the foregoing or anything to the contrary in the Plan, and effective as of and contingent upon the Closing, designated employees of Northrop Grumman Innovation Systems, Inc. ("NGIS") who meet the relevant eligibility criteria, shall be eligible to participate in the Plan effective January 1, 2019, and shall be eligible to make an election under Section 3.1 of the Plan during the 2018 Open Enrollment Period to defer Eligible Compensation for the 2019 Plan Year.

(s) "Employee" shall mean any common law employee of the Affiliated Companies who is classified as an employee by the Affiliated Companies.

(t) "ERISA" shall mean the Employee Retirement Income Security Act of 1974, as it may be amended from time to time.

(u) "Investment Committee" means the committee in charge of investment aspects of the Plan, as described in Article VII.

(v) "Key Employee" means an employee who on the date of his Separation from Service is treated as a "specified employee" under Code section 409A in accordance with a uniform Company policy.

(w) "NEC Contributions" means the Company contributions under Section 3.2(b)(3) and Section 3.2(b)(6).

(x) "NEC Participant" means an Employee who is eligible to participate in the NGSP, receives Non-Elective Contributions under the NGSP and is classified by the Affiliated Companies as an Employee and not as an independent contractor. An Employee is a NEC Participant for a Plan Year only if the Employee is an Employee on December 31 of the Plan Year for which the NEC Contribution is being made, provided however, that the Employee will also be considered a NEC Participant for such Plan Year if the Employee (1) dies while employed

or is laid off or involuntarily terminated other than for cause during the Plan Year for which the NEC Contribution is being made or (2) is performing qualifying military service (as defined in the NGSP) and would receive a Non-Elective Contribution under the NGSP.

(y) "NEC Subaccount" shall mean the portion of a Participant's Account made up of NEC Contributions and earnings thereon.

(z) "NGSP" means the Northrop Grumman Savings Plan.

(aa) "Open Enrollment Period" means the period designated by the Administrative Committee for electing deferrals for the following Plan Year.

(bb) "Participant" shall mean any Eligible Employee who participates in this Plan in accordance with Article II or any Employee who is a RAC Participant, a NEC Participant, or a CPSC Participant.

(cc) "Participant Contributions" shall have the same meaning as that term is defined in the NGSP.

(dd) "Payment Date" shall mean:

(1) for distributions upon early termination under Section B.1(a), a date after the end of the month in which termination of employment occurs; and

(2) for distributions after Retirement, Disability or death under Section B.1(b), a date after the end of the month in which occurs Retirement, the determination of Disability by the Administrative Committee, or the notification of the Administrative Committee of the Participant's death (or later qualification of the Beneficiary or Beneficiaries), as applicable.

The exact date in each case will be determined by the Administrative Committee to allow time for administrative processing.

(ee) "Plan" shall be the Northrop Grumman Savings Excess Plan.

(ff) "Plan Year" shall be the calendar year.

(gg) "RAC Contributions" shall mean the Company contributions under Section 3.2(b)(2) and Section 3.2(b)(5).

(hh) "RAC Participant" shall mean an Employee who is eligible to participate in the NGSP, receives Retirement Account Contributions under the NGSP, and is classified by the Affiliated Companies as an Employee and not as an independent contractor. Notwithstanding the foregoing, an Employee who becomes eligible to participate in the Officers Supplemental Executive Retirement Program II ("OSERP II") under the Northrop Grumman Supplemental Plan 2 shall immediately cease to be eligible for RAC Contributions. Effective for Plan Years beginning on or after January 1, 2019, an Employee is a RAC Participant for a Plan Year only if the Employee is an Employee on December 31 of the Plan Year for which the RAC Contribution is being made, provided however, that the Employee will also be considered a RAC Participant for such Plan Year if the Employee (1) dies while employed or is laid off or involuntarily terminated other than for cause during the Plan Year for which the RAC Contribution is being made or (2) is performing qualifying military service (as defined in the NGSP) and would receive a Retirement Account Contribution under the NGSP.

(ii) "RAC Subaccount" shall mean the portion of a Participant's Account made up of RAC Contributions and earnings thereon.

(jj) "Retirement" shall mean termination of employment with the Affiliated Companies after reaching age 55.

(kk) "Separation from Service" or "Separates from Service" or "Separating from Service" means a "separation from service" within the meaning of Code section 409A.

ARTICLE II

PARTICIPATION

2.1 In General

(a) An Eligible Employee may become a Participant by complying with the procedures established by the Administrative Committee for enrolling in the Plan. Anyone who becomes an Eligible Employee will be entitled to become a Participant during an Open Enrollment Period.

(b) A RAC Participant will become a Participant when RAC Contributions are first made to his or her RAC Subaccount.

(c) A NEC Participant will become a Participant when NEC Contributions are first made to his or her NEC Subaccount.

(d) A CPSC Participant will become a Participant when CPSC Contributions are first made to his or her CPSC Subaccount.

(e) An individual will cease to be a Participant when he or she no longer has a positive balance to his or her Account under the Plan.

2.2 Disputes as to Employment Status

(a) Because there may be disputes about an individual's proper status as an Employee or non-Employee, this Section describes how such disputes are to be handled with respect to Plan participation.

(b) The Affiliated Companies will make the initial determination of an individual's employment status.

(1) If an individual is not treated by the Affiliated Companies as a common law employee, then the Plan will not consider the individual to be an "Eligible Employee" and he or she will not be entitled to participate in the Plan.

(2) This will be so even if the individual is told he or she is entitled to participate in the Plan and given a summary of the plan and enrollment forms or other actions are taken indicating that he or she may participate.

(c) Disputes may arise as to an individual's employment status. As part of the resolution of the dispute, an individual's status may be changed by the Affiliated Companies from non-Employee to Employee. Such Employees are not Eligible Employees and will not be entitled to participate in the Plan.

ARTICLE III

DEFERRAL ELECTIONS

3.1 Elections to Defer Eligible Compensation

(a) Timing. An Eligible Employee who meets the requirements of Section 2.1(a) may elect to defer Eligible Compensation earned in a Plan Year by filing an election in the Open Enrollment Period for the Plan Year. For purposes of determining whether an election filed pursuant to this Section 3.1(a) applies, Eligible Compensation that is Base Salary shall be considered earned in the Plan Year in which, absent such election, it would otherwise be paid. The Open Enrollment Period for Compensation that is Base Salary shall end no later than December 31 of the Plan Year prior to the Plan Year in which the Base Salary is earned. The Open Enrollment Period for Compensation that is Bonus compensation shall end no later than June 30 of the Plan Year in which the performance period for the Bonus ends. An election to participate for a Plan Year is irrevocable.

(b) Election Rules. An Eligible Employee's election may be made in writing, electronically, or as otherwise specified by the Administrative Committee. Such election shall specify the Eligible Employee's rate of deferral for contributions to the Plan, which shall be between 1% and 50%, and shall address distribution of the deferred amounts as described in Section 6.1. All elections must be made in accordance with the rules, procedures and forms provided by the Administrative Committee. The Administrative Committee may change the rules, procedures and forms from time to time and without prior notice to Participants.

(c) Cancellation of Election. If a Participant becomes disabled (as defined under Code section 409A) during a Plan Year, his deferral election for such Plan Year shall be cancelled.

3.2 Contribution Amounts

(a) Participant Contributions. An Eligible Employee's contributions under the Plan for a Plan Year will begin once his or her Compensation for the Plan Year exceeds the Code section 401(a)(17) limit for the Plan Year. The Participant's elected deferral percentage will be applied to his or her Eligible Compensation for the balance of the Plan Year.

(b) Company Contributions. The Company will make Company Contributions to a Participant's Account as provided in (1), (2), (3), (4), (5), (6) and (7) below.

(1) Matching Contributions. The Company will make a Company Contribution equal to the matching contribution rate for which the Participant is eligible under the NGSP for the Plan Year multiplied by the amount of the Participant's contributions under subsection (a).

(2) RAC Contributions. Effective July 1, 2008, the Company will make RAC Contributions equal to a percentage of a RAC Participant's Compensation for a Plan Year in excess of the Code section 401(a)(17) limit. The percentage used to calculate a RAC Participant's contribution for the 2016 Plan Year and each subsequent Plan Year shall be based on the RAC Participant's age on December 31, 2016 as follows:

- (i) Three percent if not yet age 35.
- (ii) Four percent if 35 or older, but not yet 50.
- (iii) Five percent if age 50 or older.

(3) NEC Contributions. Effective January 1, 2019, the Company will make NEC Contributions equal to a percentage of a NEC Participant's Compensation in excess of the Code section 401(a)(17) limit for the Plan Year. The percentage used to calculate a NEC Participant's NEC Contribution for the 2019 Plan

Year and each subsequent Plan Year shall be based on the NEC Participant's age and years of service on December 31 of the Plan Year, as described below:

- (i) Two and one half percent if age and years of service are less than 40.
- (ii) Three percent if age and years of service are 40 through 59.
- (iii) Four percent if age and years of service are at least 60.

For this purpose, years of service shall be calculated in the same manner as for purposes of determining Non-Elective Contributions under the NGSP.

(4) Make-Up Matching Contributions for Contribution Limitation If an Eligible Employee's Participant Contributions under the NGSP for a Plan Year are limited by the Code section 415(c) contribution limit before the Eligible Employee's Participant Contributions under the NGSP are limited by the Code section 401(a)(17) compensation limit, the Company will make a Company Contribution equal to the amount of matching contributions for which the Eligible Employee would have been eligible under the NGSP were Code section 415(c) not applied, reduced by the actual amount of matching contributions made for the Plan Year under the NGSP.

(5) Make-Up RAC Contributions for Contribution Limitation If an Eligible Employee is a RAC Participant and his Retirement Account Contributions under the NGSP for a Plan Year are limited by the Code section 415(c) contribution limit before the RAC Participant's Retirement Account Contributions under the NGSP are limited by the Code section 401(a)(17) compensation limit, the Company will make a Company Contribution equal to the amount of Retirement Account Contributions for which the RAC Participant would have been eligible under the NGSP were Code section 415(c) not applied, reduced by the actual amount of Retirement Account Contributions made for the Plan Year under the NGSP.

(6) Make-Up NEC Contributions for Contribution Limitation If an Eligible Employee is a NEC Participant and his Non-Elective Contributions under the NGSP for a Plan Year are limited by the Code section 415(c) contribution limit before the NEC Participant's Non-Elective Contributions under the NGSP are limited by the Code section 401(a)(17) compensation limit, the Company will make a Company Contribution equal to the amount of Non-Elective Contributions for which the NEC Participant would have been eligible under the NGSP were Code section 415(c) not applied, reduced by the actual amount of Non-Elective Contributions made for the Plan Year under the NGSP.

(7) Make-Up CPSC Contributions for Contribution Limitation If an Eligible Employee is a CPSC Participant and his Company Profit Sharing Contributions under the NGSP for a Plan Year are limited by the Code section 415(c) contribution limit before the CPSC Participant's Company Profit Sharing Contributions under the NGSP are limited by the Code section 401(a)(17) compensation limit, the Company will make a Company Contribution equal to the amount of Company Profit Sharing Contributions for which the CPSC Participant would have been eligible under the NGSP were Code section 415(c) not applied, reduced by the actual amount of Company Profit Sharing Contributions made for the Plan Year under the NGSP.

3.3 Crediting of Deferrals

Amounts deferred by a Participant under the Plan shall be credited to the Participant's Account as soon as practicable after the amounts would have otherwise been paid to the Participant. Company contributions under Section 3.2(b)(1) will be credited to Accounts as soon as practicable after each payroll cycle in which they accrue. Company contributions under Section 3.2(b)(2), Section 3.2(b)(3), Section 3.2(b)(4), Section 3.2(b)(5), Section 3.2(b)(6) and Section 3.2(b)(7) will be credited annually for each Plan Year within the time prescribed by law, including extensions of time, for filing the Company's federal income tax return for the Plan Year.

3.4 Investment Elections

- (a) The Investment Committee will establish a number of different investment funds or other investment options for the Plan. The Investment Committee may change the funds or other investment options from time to time, without prior notice to Participants.
- (b) Participants may elect how their future contributions and existing Account balances will be deemed invested in the various investment funds and may change their elections from time to time. If a Participant does not elect how future contributions will be deemed invested, contributions will be deemed invested in the qualified default investment alternative ("QDIA") that applies to the Participant under the NGSP.
- (c) The deemed investments for a RAC Participant's RAC Subaccount, the deemed investments for a NEC Participant's NEC Subaccount, and the deemed investments for a CPSC Participant's CPSC Subaccount, must be the same as the deemed investments for the Participant's Company contributions under Section 3.2(b)(1).
- (d) Selections of investments, changes and transfers must be made according to the rules and procedures of the Administrative Committee.
 - (1) The Administrative Committee may prescribe rules that may include, among other matters, limitations on the amounts that may be transferred and procedures for electing transfers.
 - (2) The Administrative Committee may prescribe valuation rules for purposes of investment elections and transfers. Such rules may, in the Administrative Committee's discretion, use averaging methods to determine values and accrue estimated expenses. The Administrative Committee may change the methods it uses for valuation from time to time.
 - (3) The Administrative Committee may prescribe the periods and frequency with which Participants may change deemed investment elections and make transfers.
 - (4) The Administrative Committee may change its rules and procedures from time to time and without prior notice to Participants.
- (e) Effective January 13, 2011, Participant investment elections involving a Company stock investment fund (e.g., transfers into or out of the fund) may be restricted, including in accordance with Company policies generally applicable to employee transactions in Company stock.

3.5 Investment Return Not Guaranteed

Investment performance under the Plan is not guaranteed at any level. Participants may lose all or a portion of their contributions due to poor investment performance.

ARTICLE IV

ACCOUNTS

4.1 Accounts

The Administrative Committee shall establish and maintain a recordkeeping Account for each Participant under the Plan.

4.2 Valuation of Accounts

The valuation of Participants' recordkeeping Accounts will reflect earnings, losses, expenses and distributions, and will be made in accordance with the rules and procedures of the Administrative Committee.

- (a) The Administrative Committee may set regular valuation dates and times and also use special valuation dates and times and procedures from time to time under unusual circumstances and to protect the financial integrity of the Plan.
- (b) The Administrative Committee may use averaging methods to determine values and accrue estimated expenses.
- (c) The Administrative Committee may change its valuation rules and procedures from time to time and without prior notice to Participants.

4.3 Use of a Trust

The Company may set up a trust to hold any assets or insurance policies that it may use in meeting its obligations under the Plan. Any trust set up will be a rabbi trust and any assets placed in the trust shall continue for all purposes to be part of the general assets of the Company and shall be available to its general creditors in the event of the Company's bankruptcy or insolvency.

ARTICLE V

VESTING AND FORFEITURES

5.1 In General

A Participant's interest in his or her Account will be nonforfeitable, subject to the exceptions in Section 5.2.

5.2 Exceptions

The following exceptions apply to the vesting rule in Section 5.1 above:

(a) A RAC Participant, a NEC Participant and a CPSC Participant shall become fully vested in his or her RAC Subaccount, NEC Subaccount or CPSC Subaccount (as applicable) and earnings thereon upon the earliest of the following dates, provided he or she is an Employee at such time: (i) the date he or she completes three years of service, (ii) the date of his or her 65th birthday, (iii) the date of his or her death, (iv) the date he or she becomes Disabled, or (v) the date Company Contributions are completely discontinued or the Plan is terminated. Notwithstanding anything to the contrary, if a Participant terminates employment with the Affiliated Companies prior to vesting as set forth in this Section 5.2(a), his or her unvested RAC Subaccount, NEC Subaccount or CPSC Subaccount and earnings thereon shall be immediately forfeited upon such termination. For this purpose, years of service shall be calculated in the same manner as for purposes of determining vesting under the NGSP (including the treatment of a break in service).

(b) A Participant whose original date of hire with the Affiliated Companies is after April 30, 2012 shall become fully vested in his or her Company matching contributions under Sections 3.2(b)(1) and (4) and earnings thereon upon the earliest of the following dates, provided he or she is an Employee at such time: (i) the date he or she completes three years of service, (ii) the date of his or her 65th birthday, (iii) the date of his or her death, or (iv) the date he or she becomes Disabled, or (v) the date Company Contributions are completely discontinued or the Plan is terminated. Notwithstanding anything to the contrary, if a Participant terminates employment with the Affiliated Companies prior to vesting as set for in this Section 5.2(b), his or her unvested

Company matching contributions under Sections 3.2(b)(1) and (4) and earnings thereon shall be immediately forfeited upon such termination. For this purpose, years of service shall be calculated in the same manner as for purposes of determining vesting in Retirement Account Contributions under the NGSP (including the treatment of a break in service).

- (c) Forfeitures on account of a lost payee. See Section 6.6.
- (d) Forfeitures under an escheat law.
- (e) Recapture of amounts improperly credited to a Participant's Account or improperly paid to or with respect to a Participant.
- (f) Expenses charged to a Participant's Account.
- (g) Investment losses.

ARTICLE VI

DISTRIBUTIONS

6.1 Distribution Rules for Non-RAC, Non-NEC and Non-CPSC Amounts

The rules in this Section 6.1 apply to distribution of a Participant's Account other than the RAC Subaccount, the NEC Subaccount and the CPSC Subaccount.

Notwithstanding the foregoing, Appendix B governs the distribution of amounts that were earned and vested (within the meaning of Code section 409A and regulations thereunder) under the Plan prior to 2005 (and earnings thereon) and are exempt from the requirements of Code section 409A. Thus, this Section 6.1 does not apply to these pre-2005 deferrals, but does apply to all other amounts deferred under the Plan.

(a) Separate Distribution Election. A Participant must make a separate distribution election for each year's contributions. A Participant generally makes a distribution election at the same time the Participant makes the deferral election, i.e., during the Open Enrollment Period.

(b) Distribution Upon Separation. A Participant may elect on a deferral form to have the vested portion of his Account related to amounts deferred under the deferral form and Company contributions for the same year (and earnings thereon) distributed in a lump sum or in quarterly or annual installments over a period of 1 to 15 years. Lump sum payments under the Plan will be made in the month following the Participant's Separation from Service. Installment payments shall commence in the March, June, September or December next following the month of Separation from Service. If a Participant does not make a distribution election and his vested Account balance (including amounts subject to Appendix B) exceeds \$50,000 and the Participant is age 55 or older at the time the Participant Separates from Service, the Participant will receive quarterly installments over a 10-year period. Otherwise, a Participant not making an election will receive a lump sum payment. Notwithstanding the foregoing, if the Participant's vested Account balance (including amounts subject to Appendix B) is \$50,000 or less or the Participant is under age 55 at the time the Participant Separates from Service, the vested Account balance shall be distributed in a lump sum payment in the month following the Participant's Separation from Service.

Notwithstanding the timing rules in the foregoing paragraph, distributions may not be made to a Key Employee upon a Separation from Service before the date which is six months after the date of the Key Employee's Separation from Service (or, if earlier, the date of death of the Key Employee). All payments to be made upon the Separation from Service shall be delayed six months in accordance with Treas. Reg. section 1.409A-3(i)(2)(ii).

At the discretion of the Administrative Committee, a distribution may commence earlier or later than the date specified above, provided that the timing of any such commencement complies with Treas. Reg. section 1.409A-3(d) or any successor thereto.

(c) Changes in Form of Distribution. A Participant may make up to two subsequent elections to change the form of a distribution for any year's deferrals and Company contributions. Such an election, however, shall be effective only if the following conditions are satisfied:

- (1) The election may not take effect until at least twelve (12) months after the date on which the election is made; and
- (2) The distribution will be made exactly five (5) years from the date the distribution would have otherwise been made.

6.2 Distribution Rules for RAC Subaccount, NEC Subaccount and CPSC Subaccount

The full vested balance in a RAC Subaccount, a NEC Subaccount and a CPSC Subaccount shall be distributed in a lump sum upon a RAC Participant's, NEC Participant's or CPSC Participant's (as applicable) Separation from Service. Notwithstanding the foregoing, distribution will not be made to a Key Employee upon a Separation from Service until the date which is six months after the date of the Key Employee's Separation from Service (or, if earlier, the date of death of the Key Employee).

At the discretion of the Administrative Committee, a distribution may commence earlier or later than the date specified above, provided that the timing of any such commencement complies with Treas. Reg. section 1.409A-3(d) or any successor thereto.

6.3 Effect of Taxation

If a Participant's benefits under the Plan are includible in income pursuant to Code section 409A, the Company shall have the discretion to accelerate the distribution of all or a portion of such includible benefits to the Participant, provided that the Participant shall not be given a direct or indirect election as to whether such discretion is exercised.

6.4 Permitted Delays

Notwithstanding the foregoing, any payment to a Participant under the Plan shall be delayed upon the Committee's reasonable anticipation of one or more of the following events:

- (a) The Company's deduction with respect to such payment would be eliminated by application of Code section 162(m); or
- (b) The making of the payment would violate Federal securities laws or other applicable law;
- (c) provided, that any payment delayed pursuant to this Section 6.4 shall be paid in accordance with Code section 409A.

6.5 Payments Not Received At Death

In the event of the death of a Participant before receiving a payment, payment will be made to his or her estate if death occurs on or after the date of a check that has been issued by the Plan. Otherwise, payment of the amount will be made to the Participant's Beneficiary.

6.6 Inability to Locate Participant

In the event that the Administrative Committee is unable to locate a Participant or Beneficiary within two years following the required payment date, the amount allocated to the Participant's Account shall be forfeited. If, after such forfeiture and prior to termination of the Plan, the Participant or Beneficiary later claims such benefit, such benefit shall be reinstated without interest or earnings for the forfeiture period.

6.7 Committee Rules

All distributions are subject to the rules and procedures of the Administrative Committee. The Administrative Committee may also require the use of particular forms. The Administrative Committee may change its rules, procedures and forms from time to time and without prior notice to Participants.

ARTICLE VII

ADMINISTRATION

7.1 Committees

(a) Effective April 27, 2006, the Administrative Committee shall be comprised of the individuals (in their corporate capacity) who are members of the Administrative Committee for Northrop Grumman Deferred Compensation Plan. If no such Administrative Committee exists, the members of the Administrative Committee for the Plan shall be individuals holding the following positions within the Company (as such titles may be modified from time to time), or their successors in office: the Corporate Vice President and Chief Human Resources and Administration Officer; the Corporate Vice President, Controller and Chief Accounting Officer; the Vice President, Taxation; the Vice President, Compensation, Benefits and HRIS; and the Corporate Director, Benefits Administration and Services. A member of the Administrative Committee may resign by delivering a written notice of resignation to the Corporate Vice President and Chief Human Resources and Administration Officer.

(b) Prior to April 27, 2006, the Administrative Committee shall be comprised of the individuals appointed by the Compensation Committee of the Board (the "Compensation Committee").

(c) An Investment Committee (referred to together with the Administrative Committee as, the "Committees"), comprised of one or more persons, shall be appointed by and serve at the pleasure of the Board (or its delegate). The number of members comprising the Investment Committee shall be determined by the Board, which may from time to time vary the number of members. A member of the Investment Committee may resign by delivering a written notice of resignation to the Board. The Board may remove any member by delivering a certified copy of its resolution of removal to such member. Vacancies in the membership of the Investment Committee shall be filled promptly by the Board.

7.2 Committee
Action

Each Committee shall act at meetings by affirmative vote of a majority of the members of that Committee. Any determination of action of a Committee may be made or taken by a majority of a quorum present at any meeting thereof, or without a meeting, by resolution or written memorandum signed by a majority of the members of the Committee then in office. A member of a Committee shall not vote or act upon any matter which relates solely to himself or herself as a Participant. The Chairman or any other member or members of each Committee designated by the Chairman may execute any certificate or other written direction on behalf of the Committee of which he or she is a member.

The Compensation Committee shall appoint a Chairman from among the members of the Administrative Committee and a Secretary who may or may not be a member of the Administrative Committee. The Administrative Committee shall conduct its business according to the provisions of this Article and the rules contained in the current edition of Robert's Rules of Order or such other rules of order the Administrative Committee

may deem appropriate. The Administrative Committee shall hold meetings from time to time in any convenient location.

7.3 Powers and Duties of the Administrative Committee

The Administrative Committee shall enforce the Plan in accordance with its terms, shall be charged with the general administration of the Plan, and shall have all powers necessary to accomplish its purposes, including, but not by way of limitation, the following:

- (a) To construe and interpret the terms and provisions of this Plan and make all factual determinations;
- (b) To compute and certify to the amount and kind of benefits payable to Participants and their Beneficiaries;
- (c) To maintain all records that may be necessary for the administration of the Plan;
- (d) To provide for the disclosure of all information and the filing or provision of all reports and statements to Participants, Beneficiaries or governmental agencies as shall be required by law;
- (e) To make and publish such rules for the regulation of the Plan and procedures for the administration of the Plan as are not inconsistent with the terms hereof;
- (f) To appoint a Plan administrator or any other agent, and to delegate to them such powers and duties in connection with the administration of the Plan as the Administrative Committee may from time to time prescribe (including the power to subdelegate);
- (g) To exercise powers granted the Administrative Committee under other Sections of the Plan; and
- (h) To take all actions necessary for the administration of the Plan, including determining whether to hold or discontinue insurance policies purchased in connection with the Plan.

7.4 Powers and Duties of the Investment Committee

The Investment Committee shall have all powers necessary to accomplish its purposes, including, but not by way of limitation, the following:

- (a) To select types of investment and the actual investments against which earnings and losses will be measured;
- (b) To oversee any rabbi trust; and
- (c) To appoint agents, and to delegate to them such powers and duties in connection with its duties as the Investment Committee may from time to time prescribe (including the power to subdelegate).

7.5 Construction and Interpretation

The Administrative Committee shall have full discretion to construe and interpret the terms and provisions of this Plan, to make factual determinations and to remedy possible inconsistencies and omissions. The Administrative Committee's interpretations, constructions and remedies shall be final and binding on all parties, including but not limited to the Affiliated Companies and any Participant or Beneficiary. The Administrative Committee shall administer such terms and provisions in a uniform and nondiscriminatory manner and in full accordance with any and all laws applicable to the Plan.

7.6 Information

To enable the Committees to perform their functions, the Affiliated Companies adopting the Plan shall supply full and timely information to the Committees on all matters relating to the compensation of all Participants, their death or other events that cause termination of their participation in this Plan, and such other pertinent facts as the Committees may require.

7.7 Committee Compensation, Expenses and Indemnity

(a) The members of the Committees shall serve without compensation for their services hereunder.

(b) The Committees are authorized to employ such accounting, consultants or legal counsel as they may deem advisable to assist in the performance of their duties hereunder.

(c) To the extent permitted by ERISA and applicable state law, the Company shall indemnify and hold harmless the Committees and each member thereof, the Board and any delegate of the Committees who is an employee of the Affiliated Companies against any and all expenses, liabilities and claims, including legal fees to defend against such liabilities and claims arising out of their discharge in good faith of responsibilities under or incident to the Plan, other than expenses and liabilities arising out of willful misconduct. This indemnity shall not preclude such further indemnities as may be available under insurance purchased by the Company or provided by the Company under any bylaw, agreement or otherwise, as such indemnities are permitted under ERISA and state law.

7.8 Disputes

The Company's standardized "Northrop Grumman Nonqualified Retirement Plans Claims and Appeals Procedures" shall apply in handling claims and appeals under this Plan.

ARTICLE VIII

MISCELLANEOUS

8.1 Unsecured General Creditor

Participants and their Beneficiaries, heirs, successors, and assigns shall have no legal or equitable rights, claims, or interest in any specific property or assets of the Affiliated Companies. No assets of the Affiliated Companies shall be held in any way as collateral security for the fulfilling of the obligations of the Affiliated Companies under this Plan. Any and all of the Affiliated Companies' assets shall be, and remain, the general unpledged, unrestricted assets of the Affiliated Companies. The obligation under the Plan of the Affiliated Companies adopting the Plan shall be merely that of an unfunded and unsecured promise of those Affiliated Companies to pay money in the future, and the rights of the Participants and Beneficiaries shall be no greater than those of unsecured general creditors. It is the intention of the Affiliated Companies that this Plan be unfunded for purposes of the Code and for purposes of Title I of ERISA.

8.2 Restriction Against Assignment

(a) The Company shall pay all amounts payable hereunder only to the person or persons designated by the Plan and not to any other person or corporation. No part of a Participant's Accounts shall be liable for the debts, contracts, or engagements of any Participant, his or her Beneficiary, or successors in interest, nor shall a Participant's Accounts be subject to execution by levy, attachment, or garnishment or by any other legal or equitable proceeding, nor shall any such person have any right to alienate, anticipate, sell, transfer, commute, pledge, encumber, or assign any benefits or payments hereunder in any manner whatsoever. If any Participant,

Beneficiary or successor in interest is adjudicated bankrupt or purports to anticipate, alienate, sell, transfer, commute, assign, pledge, encumber or charge any distribution or payment from the Plan, voluntarily or involuntarily, the Administrative Committee, in its discretion, may cancel such distribution or payment (or any part thereof) to or for the benefit of such Participant, Beneficiary or successor in interest in such manner as the Administrative Committee shall direct.

(b) The actions considered exceptions to the vesting rule under Section 5.2 will not be treated as violations of this Section.

(c) Notwithstanding the foregoing, all or a portion of a Participant's vested Account balance may be paid to another person as specified in a domestic relations order that the Administrative Committee determines is qualified (a "Qualified Domestic Relations Order"). For this purpose, a Qualified Domestic Relations Order means a judgment, decree, or order (including the approval of a settlement agreement) which is:

- (1) issued pursuant to a State's domestic relations law;
- (2) relates to the provision of child support, alimony payments or marital property rights to a spouse, former spouse, child or other dependent of the Participant;
- (3) creates or recognizes the right of a spouse, former spouse, child or other dependent of the Participant to receive all or a portion of the Participant's benefits under the Plan; and
- (4) meets such other requirements established by the Administrative Committee.

The Administrative Committee shall determine whether any document received by it is a Qualified Domestic Relations Order. In making this determination, the Administrative Committee may consider the rules applicable to "domestic relations orders" under Code section 414(p) and ERISA section 206(d), and such other rules and procedures as it deems relevant.

8.3 Restriction Against Double Payment

If a court orders an assignment of benefits despite Section 8.2, the affected Participant's benefits will be reduced accordingly. The Administrative Committee may use any reasonable actuarial assumptions to accomplish the offset under this Section.

8.4 Withholding

There shall be deducted from each payment made under the Plan or any other compensation payable to the Participant (or Beneficiary) all taxes, which are required to be withheld by the Affiliated Companies in respect to such payment or this Plan. The Affiliated Companies shall have the right to reduce any payment (or compensation) by the amount of cash sufficient to provide the amount of said taxes.

8.5 Amendment, Modification, Suspension or Termination

The Company may, in its sole discretion, terminate, suspend or amend this Plan at any time or from time to time, in whole or in part for any reason. Notwithstanding the foregoing, no amendment or termination of the Plan shall reduce the amount of a Participant's Account balance as of the date of such amendment or termination. Upon termination of the Plan, distribution of balances in Accounts shall be made to Participants and Beneficiaries in the manner and at the time described in Article VI, unless the Company determines in its sole discretion that all such amounts shall be distributed upon termination in accordance with the requirements under Code section 409A.

Notwithstanding the foregoing, no amendment of the Plan shall apply to amounts that were earned and vested (within the meaning of Code section 409A and regulations thereunder) under the Plan prior to 2005,

unless the amendment specifically provides that it applies to such amounts. The purpose of this restriction is to prevent a Plan amendment from resulting in an inadvertent "material modification" to amounts that are "grandfathered" and exempt from the requirements of Code section 409A.

8.6 Governing Law

To the extent not preempted by ERISA, this Plan shall be construed, governed and administered in accordance with the laws of Delaware.

8.7 Receipt and Release

Any payment to a payee in accordance with the provisions of the Plan shall, to the extent thereof, be in full satisfaction of all claims against the Plan, the Committees and the Affiliated Companies. The Administrative Committee may require such payee, as a condition precedent to such payment, to execute a receipt and release to such effect.

8.8 Payments on Behalf of Persons Under Incapacity

In the event that any amount becomes payable under the Plan to a person who, in the sole judgment of the Administrative Committee, is considered by reason of physical or mental condition to be unable to give a valid receipt therefore, the Administrative Committee may direct that such payment be made to any person found by the Committee, in its sole judgment, to have assumed the care of such person. Any payment made pursuant to such determination shall constitute a full release and discharge of the Administrative Committee and the Company.

8.9 Limitation of Rights and Employment Relationship

Neither the establishment of the Plan, any trust nor any modification thereof, nor the creating of any fund or account, nor the payment of any benefits shall be construed as giving to any Participant, or Beneficiary or other person any legal or equitable right against the Affiliated Companies or any trustee except as provided in the Plan and any trust agreement; and in no event shall the terms of employment of any Employee or Participant be modified or in any way be affected by the provisions of the Plan and any trust agreement.

8.10 Headings

Headings and subheadings in this Plan are inserted for convenience of reference only and are not to be considered in the construction of the provisions hereof.

8.11 Liabilities Transferred to HII

Northrop Grumman Corporation distributed its interest in Huntington Ingalls Industries, Inc. ("HII") to its shareholders on March 31, 2011 (the "HII Distribution Date"). Pursuant to an agreement between Northrop Grumman Corporation and HII, on the HII Distribution Date certain employees and former employees of HII ceased to participate in the Plan and the liabilities for these participants' benefits under the Plan were transferred to HII. On and after the HII Distribution Date, the Company and the Plan, and any successors thereto, shall have no further obligation or liability to any such participant with respect to any benefit, amount, or right due under the Plan.

* * *

IN WITNESS WHEREOF, this Amendment and Restatement is hereby executed by a duly authorized officer on this 17th day of December, 2019.

NORTHROP GRUMMAN CORPORATION

By: /s/ Ann Addison
Ann Addison
Corporate Vice President &
Chief Human Resources Officer

APPENDIX A – 2005 TRANSITION RELIEF

The following provisions apply only during 2005, pursuant to transition relief granted in IRS Notice 2005-1:

A.1 Cash-Out

Participants Separating from Service during 2005 for any reason before age 55 will receive an immediate lump sum distribution of their Account balances. Other Participants Separating from Service in 2005 will receive payments in accordance with their prior elections.

A.2 Elections

During the Plan's open enrollment period in June 2005 Participants may fully or partially cancel 2005 deferral elections and receive in 2005 a refund of amounts previously deferred in 2005.

In addition, individuals working in Company facilities impacted by Hurricane Katrina may stop or reduce 2005 elective contributions to the Plan at any time during 2005. All payments under this Section A.2 will be made before the end of calendar year 2005.

A.3 Key Employees

Key Employees Separating from Service on or after July 1, 2005, with distributions subject to Code section 409A and scheduled for payment in 2006 within six months of Separation from Service, may choose I or II below, subject to III:

- I. Delay the distributions described above for six months from the date of Separation from Service. The delayed payments will be paid as a single sum with interest at the end of the six-month period, with the remaining payments resuming as scheduled.
- II. Accelerate the distributions described above into a payment in 2005 without interest adjustments.
- III. Key Employees must elect I or II during 2005.

APPENDIX B – DISTRIBUTION RULES FOR PRE-2005 AMOUNTS

Distribution of amounts earned and vested (within the meaning of Code section 409A and regulations thereunder) under the Plan or a Merged Plan prior to 2005 (and earnings thereon) are exempt from the requirements of Code section 409A and shall be made in accordance with the Plan or the applicable Merged Plan terms as in effect on December 31, 2004 and as summarized in the following provisions, except as otherwise provided in Appendix C.

B.1 Distribution of Contributions

(a) Distributions Upon Early Termination

(1) **Voluntary Termination**. If a Participant voluntarily terminates employment with the Affiliated Companies before age 55 or Disability, distribution of his or her Account will be made in a lump sum on the Participant's Payment Date.

(2) **Involuntary Termination**. If a Participant involuntarily terminates employment with the Affiliated Companies before age 55, distribution of his or her Account will generally be made in quarterly or annual installments over a fixed number of whole years not to exceed 15 years, commencing on the Participant's Payment Date, in accordance with the Participant's original election on his or her deferral election form. Payment will be made in a lump sum if the Participant had originally elected a lump sum, if the Account balance is \$50,000 or less, or if the Administrative Committee so specifies.

(b) **Distribution After Retirement, Disability or Death**. In the case of a Participant who separates from service with the Affiliated Companies on account of Retirement, Disability or death and has an Account balance of more than \$50,000, the Account shall be paid to the Participant (and after his or her death to his or her Beneficiary) in substantially equal quarterly installments over 10 years commencing on the Participant's Payment Date unless an optional form of benefit has been specified pursuant to Section B.1(b)(1).

(1) An optional form of benefit may be elected by the Participant, on the form provided by Administrative Committee, during his or her initial election period from among those listed below:

- (i) A lump sum distribution on the Participant's Payment Date.
- (ii) Quarterly installments over a period of at least 1 and no more than 15 years beginning on the Participant's Payment Date.
- (iii) Annual installments over a period of at least 2 and no more than 15 years beginning on the Participant's Payment Date.

(2) A Participant from time to time may modify the form of benefit that he or she has previously elected. Upon his or her separation from service, the most recently elected form of distribution submitted at least 12 months prior to separation will govern. If no such election exists, distributions will be paid under the 10-year installment method.

(3) In the case of a Participant who terminates employment with the Affiliated Companies on account of Retirement, Disability or death with an Account balance of \$50,000 or less, the Account shall be paid to the Participant in a lump sum distribution on the Participant's Payment Date.

(4) In general, upon the Participant's death, payment of any remaining Account balance will be made to the Beneficiary in a lump sum on the Payment Date. But the Beneficiary will receive any remaining installments (starting on the Payment Date) if the Participant was receiving installments, or if the Participant died on or after age 55 with an Account balance over \$50,000 and with an effective installment payout

election in place. In such cases, the Beneficiary may still elect a lump sum payment of the remaining Account balance, but only with the Administrative Committee's consent.

(5) In the event that this Plan is terminated, the amounts allocated to a Participant's Account shall be distributed to the Participant or, in the event of his or her death, to his or her Beneficiary in a lump sum.

APPENDIX C – MERGED PLANS

C.1 Plan Mergers

(a) Merged Plans. As of their respective effective dates, the plans listed in (c) (the "Merged Plans") are merged into this Plan. All amounts from those plans that were merged into this Plan are held in their corresponding Accounts.

(b) Accounts. Effective as of the dates below, Accounts are established for individuals who, before the merger, had account balances under the merged plans. These individuals will not accrue benefits under this Plan unless they become Participants by virtue of being hired into a covered position with an Affiliated Company, but they will be considered Participants for purposes of the merged accounts. The balance credited to the Participant's merged plan account will, effective as of the date provided in the table below, be invested in accordance with the terms of this Plan. Except as provided in section C.2 below, amounts merged into this Plan from the merged plans are governed by the terms of this Plan.

(c) Table.

Name of Merged Plans	Merger Effective Dates	Merged Account Names
Northrop Grumman Benefits Equalization Plan	December 10, 2004	NG BEP Account
Northrop Grumman Space & Mission Systems Corp. Deferred Compensation Plan	December 10, 2004	S & MS Deferred Compensation Account
BDM International, Inc. 1997 Executive Deferred Compensation Plan ("BDM Plan")	April 29, 2005	BDM Account
PRC Inc. Executive Deferred Compensation Plan ("PRC Plan")	November 9, 2012	PRC EDCP Account (or Sub-Account, as applicable)

C.2 Merged Plans – General Rule

(a) NG BEP Account and S & MS Deferred Compensation Account Distributions from Participants' NG BEP and S & MS Deferred Compensation Accounts are made under the provisions of Appendix B, except as provided in this Section.

(1) Amounts in the Participant's NG BEP Account and the S & MS Deferred Compensation Account shall be paid out in accordance with elections made under the Merged Plans.

(2) The Participant's "Payment Date" for amounts in the NG BEP Account and the S & MS Deferred Compensation Account shall be deemed to be the end of January following the Participant's termination of employment.

(3) The reference to \$50,000 in the provisions of Appendix B shall be deemed to be \$5,000 with respect to amounts in the NG BEP Account and the S & MS Deferred Compensation Account.

(4) The Administrative Committee shall assume the rights and responsibilities of the Directors/Committee with respect to determining whether a Participant's NG BEP Account may be paid out in a form other than the automatic form of payment.

(5) The Administrative Committee shall assume the rights and responsibilities of the Committee or Special Committee with respect to determining whether a Participant's S & MS Deferred Compensation Account may be paid out in a form other than the automatic form of payment.

(6) For purposes of determining the time of payment of a Participant's NG BEP Account, a Participant's employment will not be deemed to have terminated following the Participant's layoff until the earlier of the end of the twelve-month period following layoff (without a return to employment with the Affiliated Companies) or the date on which the Participant retires under any pension plan maintained by the Affiliated Companies.

(7) A Participant's S & MS Deferred Compensation Account shall be paid to the Participant no later than the January 5 next preceding the Participant's 80th birthday.

(8) In no event will payments of amounts in the Participant's NG BEP Account and the S & MS Deferred Compensation Account be accelerated or deferred beyond the payment schedule provided under the Merged Plans. However, any election to change the time or form of payment for such an amount may be made based on the terms of the relevant Merged Plan as in effect on October 3, 2004.

(b) BDM Account. Distributions of a Participant's vested BDM Account balance shall be made in accordance with this Section C.2(b), and Article VI shall not apply to such distributions. A Participant shall be vested in his BDM Account balance in accordance with the vesting provisions of the BDM Plan.

(1) Timing of Payment: A Participant's vested BDM Account balance shall be distributed in accordance with elections made under the BDM Plan. For those Participants who have not commenced distributions as of April 29, 2005, payments from the BDM Account will commence at the time designated on his or her BDM enrollment and election form, unless extended prior to such date. However, if such a Participant did not elect a fixed date (or elect the earlier of a fixed date or termination of employment), his or her vested BDM Account balance will be paid as soon as administratively practicable following termination of employment in the form designated under Section C.2(b)(2) below.

(2) Form of Payment: A Participant's vested BDM Account balance shall be paid in cash. The vested BDM Account balance will be paid in (i) a lump sum, (ii) five (5) or ten (10) substantially equal annual installments (adjusted for gains and losses), or (iii) a combination thereof, as selected by the Participant (or Beneficiary) prior to the date on which amounts are first payable to the Participant (or Beneficiary) under Section C.2(b)(1) above. If the Participant fails to designate properly the manner of payment, such payment will be made in a lump sum.

(3) Death Benefits: If a Participant dies before commencement of payment of his BDM Account balance, the entire Account balance will be paid at the times provided in Section C.2(b)(2) above to his or her Beneficiary. If a Participant dies after commencement but before he or she has received all payments from his vested BDM Account balance, the remaining installments shall be paid annually to the Beneficiary. For purposes of this Section C.2(b), a Participant's Beneficiary, unless subsequently changed, will be the designated beneficiary(ies) under the BDM Plan or if none, the Participant's spouse, if then living, but otherwise the Participant's then living descendants, if any, per stirpes, but, if none, the Participant's estate.

(4) Lost Participant: In the event that the Administrative Committee is unable to locate a Participant or Beneficiary within three years following the payment date under Section C.2(b)(1) above, the amount allocated to the Participant's BDM Account shall be forfeited. If, after such forfeiture and prior to termination of the Plan, the Participant or Beneficiary later claims such benefit, such benefit shall be reinstated without interest or earnings for the forfeiture period. In lieu of such a forfeiture, the Administrative Committee has

the discretion to direct distribution of the vested BDM Account balance to any one or more or all of the Participant's next of kin, and in the proportions as the Administrative Committee determines.

(5) Committee Rules: All distributions are subject to the rules and procedures of the Administrative Committee. The Administrative Committee may also require the use of particular forms. The Administrative Committee may change its rules, procedures and forms from time to time and without prior notice to Participants.

(6) Payment Schedule: In no event will payments of amounts in the Participant's BDM Account be accelerated or deferred beyond the payment schedule provided under the BDM Plan.

(7) Application to Trustee: BDM International, Inc. set aside amounts in a grantor trust to assist it in meeting its obligations under the BDM Plan. Notwithstanding Section C.2(b)(5) above and the claims procedures provided in Section 7.8, a Participant may make application for payment of benefits under this Section C.2(b) directly to the trustee of such trust.

(c) PRC EDCP Account. Notwithstanding anything to the contrary, the following provisions in this Section C.2(c) summarize the distribution rules in effect under the PRC Plan with respect to the PRC EDCP Account balances, and those PRC Plan distribution terms shall continue to govern the distributions of the PRC EDCP Account balances. Article VI and Appendix B shall not apply to the PRC EDCP Account balances. Nothing in this Section C.2(c) shall change or alter the distribution terms of the PRC Plan in effect as of any date. All capitalized terms in this Section C.2(c) not otherwise defined in the Plan shall be defined in accordance with the terms of the PRC Plan as in effect immediately prior to the PRC Plan's merger with the Plan on November 9, 2012.

(1) Vesting. All Participants are vested in their PRC EDCP Account balances in accordance with the vesting provisions of the PRC Plan.

(2) Fixed Payment Dates; Termination of Employment. A Participant's vested PRC EDCP Account balance shall be distributed in accordance with his elections made under the PRC Plan. However, if such a Participant did not elect a fixed date or termination of employment with all Employers (or elect the earlier of a fixed date or termination of employment) for any particular portion of his or her vested PRC EDCP Account, such portion of his or her PRC EDCP Account balance will be valued and payable at or commence at such Participant's termination of employment according to the provisions of Sections C.2(c)(4) and (5).

(3) Hardship Distributions. In the event of financial hardship of the Participant, as hereinafter defined, the Participant may apply to the Administrative Committee for the distribution of all or any part of his or her vested PRC EDCP Account. The Administrative Committee shall consider the circumstances of each such case, and the best interests of the Participant and his or her family, and shall have the right, in its sole and absolute discretion, if applicable, to allow such distribution, or, if applicable, to direct a distribution of part of the amount requested, or to refuse to allow any distribution. Upon a finding of financial hardship, the Administrative Committee shall make or cause the appropriate distribution to be made to the Participant from amounts held by the Company or the Trustee in respect of the Participant's vested PRC EDCP Account. In no event shall the aggregate amount of the distribution exceed either the full value of the Participant's vested PRC EDCP Account or the amount determined by the Administrative Committee, in its sole and absolute discretion, to be necessary to alleviate the Participant's financial hardship (which financial hardship may be considered to include any taxes due because of the distribution occurring because of this Section), and which is not reasonably available from other resources of the Participant. For purposes of this Section, the value of the Participant's vested PRC EDCP Account shall be determined as of the date of the distribution. "Financial hardship" means (i) a severe financial hardship to the Participant resulting from a sudden and unexpected illness or accident of the Participant or of a dependent (as defined in Code section 152(a)) of the Participant, (ii) loss of the Participant's property due to casualty, or (iii) other similar extraordinary and unforeseeable circumstances arising as a result of events beyond the control of the Participant, each as determined to exist by the Administrative Committee. A distribution may be made under this Section only with the consent of the Administrative Committee.

(4) Amount and Time of Payment. Subject to Section C.2(c)(3), a Participant (or his or her Beneficiary) shall become entitled to receive a vested PRC EDCP Sub-Account balance commencing on the Payment Date for such sub-account. For this purpose, the "Payment Date" will be the relevant date or event triggering payment as provided under Section C.2(c)(2). Notwithstanding the foregoing, a Participant may elect to postpone a Payment Date to a later date, provided the election is made at least 12 months prior to the scheduled Payment Date. For example, a Participant could elect (i) to postpone a fixed payment date to a later fixed payment date, or (ii) elect to postpone the payment date for an amount payable upon termination of employment to a date that necessarily occurs after termination of employment (e.g., two years after termination of employment). There is no limit on the number of such elections a Participant may make. Any payment due hereunder from the Trust which is not paid by the Trust for any reason will be paid by the Employer from its general assets.

(5) Method of Payment

(i) Form of Payment. Unless otherwise elected by the Participant and permitted by the Trustee in its sole and absolute discretion, a Participant's vested PRC EDCP Account balance shall be paid in cash. In the case of distributions to a Participant or his or her Beneficiary by virtue of an entitlement pursuant to Section C.2(c)(2), an aggregate amount equal to the Participant's vested PRC EDCP Sub-Account will be paid by the Trust or the Employer, as provided by Section C.2(c)(4), in a lump sum or in five (5) or ten (10) substantially equal annual installments (adjusted for gains and losses, and reduced by any required withholding or other deductions from such payments), as selected by the Participant on his or her Participant Enrollment and Election Form for such sub-account. If the Participant fails to designate properly the manner of payment, such payment will be made in a lump sum.

If a Participant receiving installment distributions pursuant to Section C.2(c)(7) is re-employed by the Employer, the remaining distributions due to the Participant shall be suspended until such time as the Participant (or his or her Beneficiary) once again becomes eligible for benefit payments, at which time such distribution shall commence, subject to the limitations and conditions contained in the PRC Plan.

(ii) Subsequent Deferral Elections. Such form of payment may be changed by the Participant provided (A) the election is made at least 12 months prior to the payment date for the PRC EDCP Sub-Account provided under Section C.2(c)(4) and (B) the form of payment is not accelerated (i.e., an election of installments may not be changed to a lump sum and an election of 10 annual installments may not be changed to 5 annual installments). There is no limit on the number of such elections a Participant may make.

(6) Death Benefits. If a Participant dies before terminating his or her employment with the Employer and before the commencement of payments to the Participant hereunder, the entire value of the Participant's PRC EDCP Account (which may include credits for insurance contract death benefits deemed to be received by the PRC EDCP Account) shall be paid, as provided in Section C.2(c)(5), to the Beneficiary designated under the Plan, unless the Employer elects a more rapid form or schedule of distribution.

Upon the death of a Participant after payments hereunder have begun but before he or she has received all payments to which he or she is entitled under the Plan, the remaining benefit payments shall be paid to the Beneficiary designated under the Plan, in the manner in which such benefits were payable to the Participant, unless the Employer elects a more rapid form or schedule of distribution.

(7) Application to Trustee. Notwithstanding Section 6.7 above and the claims procedures provided in Section 7.8, on the date or dates on which a Participant or Beneficiary is entitled to payment under Section C.2(c)(2), the Participant or Beneficiary need not make application for payment to the Administrative Committee, but instead may make application for payment directly to the Trustee who shall, subject to any restrictions or limitations contained in the Trust, pay the Participant or Beneficiary the appropriate amount directly from the Trust without the consent of PRC or the Employer. The Trustee shall report the amount of each such payment, and any withholding thereon, to the Company.

APPENDIX D – COMMITTEES AND APPOINTMENTS

Notwithstanding anything to the contrary in this Plan, effective October 25, 2011, the Chief Executive Officer of Northrop Grumman Corporation shall appoint, and shall have the power to remove, the members of (1) an Administrative Committee that shall have responsibility for administering the Plan (including as such responsibilities are described in Article VII of the Plan) and (2) an Investment Committee that shall have responsibility for overseeing any rabbi trusts or other informal funding for the Plan.

APPENDIX E – Eligible OADCP Participants

E.1 The following words and phrases used in this Appendix E, with the first letter capitalized, shall have the meanings specified below:

(a) "Eligible OADCP Participant" means an employee of NGIS who is employed as of December 31, 2018 and has elected to defer Performance Cash under the OADCP that otherwise would be payable in 2019.

(b) "OADCP" means the Northrop Grumman Innovation Systems Nonqualified Deferred Compensation Plan (formerly the Orbital ATK, Inc. Nonqualified Deferred Compensation Plan).

(c) "Performance Cash" shall have the meaning assigned to such term under the OADCP.

E.2 Notwithstanding anything to the contrary in this Plan, effective June 29, 2018 an Eligible OADCP Participant shall become a Participant in the Plan.

E.3 An Eligible OADCP Participant shall receive:

(a) A Company Contribution equal to the matching contribution rate for which the Eligible OADCP Participant is eligible under the NGSP for 2019 multiplied by the amount of Performance Cash deferred by the Eligible OADCP Participant under the OADCP for Performance Cash otherwise payable in 2019; and

(b) A Company Contribution equal to the nonelective company contribution amount that the Eligible OADCP Participant would have received under the NGSP had the Performance Cash otherwise payable in 2019 not been deferred under the OADCP.

E.4 An Eligible OADCP Participant shall be vested in his or her Company Contributions under Section E.3 pursuant to the rules set forth in Section 5.2(b) of the Plan.

**FIRST AMENDMENT TO THE
NORTHROP GRUMMAN INNOVATION SYSTEMS
DEFINED BENEFIT
SUPPLEMENTAL EXECUTIVE RETIREMENT PLAN**

This amendment to the January 1, 2019 restatement of the Northrop Grumman Innovation Systems Defined Benefit Supplemental Executive Retirement Plan (the “NGIS DB SERP”) is intended to reference the merger of the Northrop Grumman Innovation Systems Pension and Retirement Plan into and with the Northrop Grumman Pension Plan and the Thiokol Propulsion Pension Plan into and with the Northrop Grumman Space & Mission Systems Corp. Salaried Pension Plan.

1. Effective December 31, 2019, the first paragraph of Section 1.2 is amended to read as follows:

1.2 **History.** The Company previously sponsored tax-qualified defined benefit Pension Plans called: the “NORTHROP GRUMMAN INNOVATION SYSTEMS PENSION AND RETIREMENT PLAN,” (formerly known as the “Orbital ATK, Inc. Pension and Retirement Plan”) and the “THIOKOL PROPULSION PENSION PLAN” for the purpose of providing retirement benefits to certain employees of Northrop Grumman Innovation Systems, Inc. (“NGIS”) and its affiliates. Effective as of midnight December 31, 2019, the Northrop Grumman Innovation Systems Pension and Retirement Plan merged into the Northrop Grumman Pension Plan (the “NGPP”) such that it became a sub-plan of the NGPP and the Thiokol Propulsion Pension Plan merged into the Northrop Grumman Space & Mission Systems Corp. Salaried Pension Plan (S&MS Plan) such that it became a sub-plan of S&MS Plan, both commencing January 1, 2020. The NGPP and the S&MS Plan are subject to the Employee Retirement Income Security Act of 1974, as amended, (“ERISA”), and are intended to qualify under section 401(a) of the Code. By operation of section 401(a) of the Code, benefits under these plans are restricted so that they do not exceed maximum benefits allowed under section 415 of the Code. In addition, the maximum amount of annual compensation which may be taken into account for any plan participant may not exceed a fixed dollar amount which is established under section 401(a)(17) of the Code.

2. Effective December 31, 2019, Section 3.2 is amended to read as follows:

3.2 **Applicable Pension Plans.** For purposes of this Plan, the “Pension Plans” are:

- (a) Northrop Grumman Innovation Systems Pension and Retirement Plan, a sub-plan of the Northrop Grumman Pension Plan and including the benefit structures under such sub-plan known as the Alliant Techsystems Inc. Retirement Formula, the Alliant Techsystems Inc. Aerospace Pension Formula, the ATK SEG Retirement Formula, the Federal Cartridge Company Pension Formula, the ATK Pension Equity Formula, the Alliant Lake City Retirement Formula, the Alliant Techsystems Inc. Retirement Income Formula (GOCO), and the ATK Cash Balance Formula; and
- (b) Thiokol Propulsion Pension Plan, a sub-plan of the Northrop Grumman Space & Mission Systems Corp. Salaried Pension Plan and including the benefit structures known as the Former Thiokol Propulsion Pension Plan Formula, the Thiokol Pension Equity Formula, and the Thiokol Cash Balance Formula.

* * *

IN WITNESS WHEREOF, Northrop Grumman Corporation has caused this Amendment to be executed by its duly authorized representative on this 17th of December, 2019.

NORTHROP GRUMMAN CORPORATION

By: /s/ Ann Addison
Ann Addison
Corporate Vice President & Chief Human Resources Officer

NORTHROP GRUMMAN CORPORATION SUBSIDIARIES

**Address for all subsidiaries is:
c/o NORTHROP GRUMMAN CORPORATION
Office of the Secretary
2980 Fairview Park Drive
Falls Church, Virginia 22042**

Name of Subsidiary	Jurisdiction of Incorporation	Ownership Percentage
Northrop Grumman Systems Corporation	Delaware	100%
Northrop Grumman Overseas Holdings, Inc.	Delaware	100%
Northrop Grumman Innovation Systems, Inc.	Delaware	100%

The company has additional subsidiaries, which do not constitute significant subsidiaries.

All the above listed subsidiaries have been consolidated in the company's consolidated financial statements.

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Northrop Grumman Corporation
2980 Fairview Park Drive
Falls Church, Virginia 22042

We consent to the incorporation by reference in Registration Statement Nos. 033-59815, 033-59853, 333-67266, 333-100179, 333-107734, 333-121104, 333-125120, 333-127317, and 333-175798 on Form S-8; and Registration Statement No. 333-217087 on Form S-3; of our reports dated January 29, 2020, relating to the financial statements of Northrop Grumman Corporation and subsidiaries, and the effectiveness of Northrop Grumman Corporation and subsidiaries' internal control over financial reporting, appearing in this Annual Report on Form 10-K for the year ended December 31, 2019.

/s/ Deloitte & Touche LLP
McLean, Virginia
January 29, 2020

**POWER OF ATTORNEY IN CONNECTION WITH THE
2019 ANNUAL REPORT ON FORM 10-K**

KNOW ALL MEN BY THESE PRESENTS, that each of the undersigned directors and officers of NORTHROP GRUMMAN CORPORATION, a Delaware corporation, does hereby appoint SHEILA C. CHESTON and JENNIFER C. MCGAREY, and each of them as his or her agents and attorneys-in-fact (the "Agents"), in his or her respective name and in the capacity or capacities indicated below, to execute and/or file the Annual Report on Form 10-K for the fiscal year ended December 31, 2019 (the "Report") under the Securities Exchange Act of 1934, as amended (the "Act"), and any one or more amendments to any part of the Report that may be required to be filed under the Act (including the financial statements, schedules and all exhibits and other documents filed therewith or constituting a part thereof) and to any part or all of any amendment(s) to the Report, whether executed and filed by the undersigned or by any of the Agents. Further, each of the undersigned does hereby authorize and direct the Agents to take any and all actions and execute and file any and all documents with the Securities and Exchange Commission (the "Commission"), which they deem necessary or advisable to comply with the Act and the rules and regulations or orders of the Commission adopted or issued pursuant thereto, to the end that the Report shall be properly filed under the Act. Finally, each of the undersigned does hereby ratify each and every act and documents which the Agents may take, execute or file pursuant thereto with the same force and effect as though such action had been taken or such document had been executed or filed by the undersigned, respectively.

This Power of Attorney shall remain in full force and effect until revoked or superseded by written notice filed with the Commission.

**CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Kathy J. Warden, certify that:

1. I have reviewed this report on Form 10-K of Northrop Grumman Corporation ("company");
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the company's most recent fiscal quarter (the company's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: January 29, 2020

/s/ Kathy J. Warden

Kathy J. Warden

Chairman, Chief Executive Officer and President

**CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Kenneth L. Bedingfield, certify that:

1. I have reviewed this report on Form 10-K of Northrop Grumman Corporation ("company");
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the company's most recent fiscal quarter (the company's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: January 29, 2020

/s/ **Kenneth L. Bedingfield**

Kenneth L. Bedingfield

Corporate Vice President and Chief Financial Officer

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Northrop Grumman Corporation (the “company”) on Form 10-K for the period ended December 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Kathy J. Warden, Chairman, Chief Executive Officer and President of the company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended;
and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the company.

Date: January 29, 2020

/s/ Kathy J. Warden

Kathy J. Warden
Chairman, Chief Executive Officer and President

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Northrop Grumman Corporation (the “company”) on Form 10-K for the period ended December 31, 2019, as filed with the Securities and Exchange Commission on the date hereof (the “Report”), I, Kenneth L. Bedingfield, Corporate Vice President and Chief Financial Officer of the company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended;
and
- (2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the company.

Date: January 29, 2020

/s/ **Kenneth L. Bedingfield**

Kenneth L. Bedingfield
Corporate Vice President and Chief Financial Officer