

NORTHROP GRUMMAN CORP /DE/
Form 10-K
January 31, 2019
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, 2018

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 80-0640649

(State or other jurisdiction of (I.R.S. Employer
incorporation or organization) Identification Number)

2980 Fairview Park Drive 22042
Falls Church, Virginia
(Address of principal executive offices) (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 Name of each exchange on which registered

Common Stock, \$1 par value 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 if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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, 2018, 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 \$53.4 billion.

As of January 28, 2019, 169,737,507 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 2019 Annual Meeting of Shareholders are incorporated by reference in Part III of this Form 10-K.

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NORTHROP GRUMMAN CORPORATION

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 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 to the consolidated financial statements for further information regarding the acquisition of Orbital ATK.

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 awareness; and 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

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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.

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.

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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; 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 logistic solutions supporting the full life cycle of platforms and systems and delivering innovative, technology-driven solutions and services for DoD, global defense and federal-civil customers. Major products and services include software and system sustainment; modernization of platforms and associated subsystems; advanced training solutions; and integrated logistics support. The sector is reported in three business areas, which reflect our core capabilities: Advanced Defense Services; Global Logistics and Modernization; and System Modernization and Services.

Advanced Defense Services – provides advanced defense and security services including cyber; network operations and security; system and software sustainment and modernization; and training to strengthen the national security of the U.S. and its allies. Key programs include the Marine Corps Cyber Operations Group, which provides network defense services for the U.S. Marine Corps; Ministry of the National Guard (MNG) Training Support, through our interest in a joint venture for which we consolidate the financial results, which provides equipment fielding, training and maintenance, logistics and operations support to the Saudi Arabia MNG; and the Mission Command Training Program, the Army's premier leadership and staff training exercise program at the tactical and operational level.

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.

System Modernization and Services – provides full life cycle information systems modernization and sustainment primarily in support of civilian government agencies. Competencies include analytics; mission information processing; cyber and secure networking; and software development. Capabilities include fraud detection and compliance services, data analysis and decision support tools, software system sustainment and modernization, and application migration to the cloud; services to U.S. government healthcare agencies, including benefits systems administration, fraud prevention, payment modernization, bioinformatics, and precision health; and information sharing and analysis solutions as well as sophisticated enterprise-wide solutions to design, build and manage resilient and secure next generation IT infrastructures. Our capabilities provide proactive network monitoring, patch management and desktop optimization to control and reduce overall operating costs.

Subsequent Realignment – Effective January 1, 2019, Advanced Defense Services and System Modernization and Services merged to create the Global Services business area. This realignment is not reflected in the business descriptions above or in the financial information contained in this report.

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 82 percent, 85 percent and 84 percent of sales during the years ended December 31, 2018, 2017 and 2016, respectively. For further information on sales by customer category, see Note 15 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, Harris, L3 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, 2018, total backlog, which is equivalent to the company’s remaining performance obligations, was \$53.5 billion as compared with \$42.6 billion at December 31, 2017. 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.

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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 85,000 employees. Approximately 4,800 are covered by 16 collective agreements in the U.S., of which we negotiated three renewals in 2018 and expect to negotiate two renewals in 2019. See “Risk Factors” for further discussion regarding risks related to employee relations.

REGULATORY MATTERS

Government Contract Security Restrictions

Certain classified programs with the U.S. government are prohibited by the customer from being publicly discussed and are therefore 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 and benefits 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 Notes 1 and 15 to the consolidated financial statements and “Risk Factors” for further information regarding our contracts.

The following table summarizes sales for the year ended December 31, 2018, recognized by contract type and customer category:

\$ in millions	U.S. Government ⁽¹⁾	International ⁽²⁾	Other Customers	Total	Percentage of Total Sales	
Cost-type contracts	\$ 14,234	\$ 680	\$ 90	\$ 15,004	50	%
Fixed-price contracts	10,562	3,754	775	15,091	50	%
Total sales	\$ 24,796	\$ 4,434	\$ 865	\$ 30,095	100	%

Sales to the U.S. government include sales from contracts for which we are the prime contractor, as well as those

⁽¹⁾ 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 82 percent, 85 percent and 84 percent of our sales during the years ended December 31, 2018, 2017 and 2016, respectively; 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, military strategy and planning and/or changes in social, economic or political priorities.

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 to programs in which we do not participate and/or reductions in funding for or the termination of programs in which we do participate, unless offset by other programs and opportunities, 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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Most recently, on February 9, 2018, Congress passed the Bipartisan Budget Act (BBA) of 2018, which raised the statutory budget caps for defense spending, including for Overseas Contingency Operations (OCO), by \$80 billion for FY 2018 and by \$85 billion for FY 2019. The BBA also raised non-defense spending by \$63 billion for FY 2018 and \$68 billion for FY 2019 and suspended the debt ceiling until March 1, 2019. The original spending caps established by the BCA will return for FY 2020 and FY 2021 without another statutory change. Similarly, the suspension of the debt ceiling is expected to end on March 1, 2019 absent further action.

On March 23, 2018, the President signed the Omnibus Appropriations Act for FY 2018, which provided \$1.3 trillion in discretionary funding for federal agencies. In total for FY 2018, Congress appropriated approximately \$700 billion for national security, including approximately \$630 billion for base discretionary funding and approximately \$70 billion in OCO funding.

On September 28, 2018, full-year appropriations for FY 2019 were enacted representing over half of discretionary federal spending. For FY 2019, Congress appropriated approximately \$716 billion for national security, including approximately \$647 billion for base discretionary funding and approximately \$69 billion in OCO funding. A continuing resolution was approved to provide further funding for other agencies (including NASA and other civil agencies) through December 7, 2018, which was subsequently extended through December 21, 2018. On December 22, 2018, U.S. government agencies that had not yet received full-year appropriations and did not otherwise have funding entered into a temporary shutdown. On January 25, 2019, a third continuing resolution was enacted, which funds these agencies through February 15, 2019.

The 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.

The budget environment, including budget caps mandated by the BCA for fiscal years 2020 and 2021, and uncertainty surrounding the debt ceiling and the appropriations processes, 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, what challenges budget reductions (required by the BCA and otherwise) will present for the defense industry and whether annual appropriations bills for all agencies will be enacted for FY 2020. If annual appropriations bills are not timely enacted for FY 2020 or beyond, 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, the long-term impact of the BCA, 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, litigation and other legal proceedings, particularly those involving governments. 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, mischarging, contract performance, fraud, procurement integrity, products liability, warranty liability, the use of hazardous materials, personal injury

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claims, environmental, shareholder derivative actions, prior acquisitions and divestitures, intellectual property, tax, employees, export/import, anti-corruption, labor, health and safety, accidents, launch failures, 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. 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. 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 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 2018, 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.

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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) 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.

Our international business is subject to both U.S. and foreign laws and regulations, including, without limitation, laws and regulations relating to import-export controls, 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 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, or security risks may dramatically affect our ability to conduct or continue to conduct business in international markets. 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, alter 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-

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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.

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 expand globally. 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 other 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 sensitive information and networks; insider threats; threats to the safety of our directors, officers and employees; threats to the security 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. 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 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), and corruption of data, networks or systems. 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 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

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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, 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 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 or materials 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 economic conditions, including changes in defense budgets or credit availability, or other changes impacting a subcontractor or supplier (including changes in ownership or operations) 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.

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 and regulations applicable to our industry and we could be adversely affected by changes in such laws and regulations 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 contracts, 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, 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

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compliance with applicable laws, regulations 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 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 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. As a result of certain of these initiatives, we have experienced and may continue to experience an increased number of audits and/or a lengthened period of time required to close open audits. 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 are being challenged, debated and, in certain cases, modified, all with potentially significant financial costs to the company. In connection with these cost reduction initiatives, 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 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 laws, regulations 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, 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 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 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 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.

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

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. 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, 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.

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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 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; 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 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. We are, and expect we may further become, a party to various legal proceedings and disputes related to remediation and/or alleged environmental impacts in Bethpage, including with federal and state entities, local municipalities and water districts, insurance carriers and individual and class action plaintiffs. These matters could result in fines, penalties, sanctions, compensatory or other damages (including natural resource damages), determinations on allocation, allowability and coverage, and non-monetary relief and actions.

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 located in regions that may be exposed to hurricanes, earthquakes, other damaging storms, 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 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.

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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, 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 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 amount 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, 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, 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 or launch 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.

Certain of our Innovation Systems products, including products from its Defense Systems business, such as small, medium and large caliber ammunition, and its Flight Systems business, such as 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 detailed pre-construction reviews of process changes and new operations, along with routine safety audits of operations involving explosive materials, 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

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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 and OPB plans, including Pension Benefit Guaranty Corporation premiums for certain of our defined benefit plans, and our health and welfare 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 and changes in assumptions associated with our pension and OPB plans could have a material adverse effect on our financial position, results of operations and/or cash flows.

Anticipated benefits of the Orbital ATK Acquisition may not be realized.

On June 6, 2018, the company completed the acquisition of Orbital ATK, Inc., which is now our new Innovation Systems sector. We believe this acquisition will enable us to broaden our capabilities and offerings, enhance our ability to provide innovative solutions to meet our customers' emerging requirements, create value for shareholders and provide expanded opportunities for our combined employees. However, in the course of integrating our business with the legacy Orbital ATK business, we may discover additional information about the legacy Orbital ATK business (including its financial controls and potential risks, opportunities and liabilities) that alters our assessment of the anticipated benefits, costs and risks of the acquisition. Additionally, our customers may not value our combined businesses and capabilities as much as we anticipate, in which case we may not realize the benefits of our combined business to the extent we currently anticipate or at all.

Our ability to realize the anticipated benefits of the acquisition will depend, to a significant extent, on our ability to integrate the legacy Orbital ATK business with ours. The integration of an independent business with our business is a complex, costly and time-consuming process. Costs may include, among other things, those associated with facilities and systems consolidation, operational impacts, severance and other potential employment-related costs, as well as fees paid to financial, legal and other advisors. We are devoting significant management attention and resources effectively to integrate the legacy Orbital ATK business and operations with our business, including integration of internal controls processes and procedures, and to realize the anticipated benefits. The integration process may disrupt our business and, if implemented ineffectively, may not result in the realization of the expected benefits of the acquisition, including enhanced product offerings. The consummation of the acquisition has triggered change in control and other similar provisions in certain agreements to which legacy Orbital ATK is a party and otherwise affected contractual relationships, which could have an adverse impact on the combined business if we are unable to address such issues successfully. The failure to meet the challenges involved in integrating the legacy Orbital ATK business and to realize the anticipated benefits of the acquisition could cause an interruption of, or a loss of momentum in, our activities.

The foregoing risks could have a material adverse effect on our future 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

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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. Governments have increased certain 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 have also declined 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 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.

If we are unable adequately to exploit our intellectual property rights, to protect our intellectual property rights against infringement or third party claims, 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.

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 50 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

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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 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.

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.

Item 1B. Unresolved Staff Comments

None.

FORWARD-LOOKING STATEMENTS AND PROJECTIONS

This Annual Report on Form 10-K and the information we are incorporating 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," "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 more broadly
- investigations, claims, disputes, enforcement actions and/or litigation
-

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

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our exposure to additional risks as a result of our international business, including risks related to geopolitical and economic factors, 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, our ability to do business, and our financial position, results of operations and/or cash flows

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, chemicals and components

changes in procurement and other laws, regulations and practices applicable to our industry, findings by the U.S. government as to our compliance with such laws and regulations, and changes in our customers' business practices globally

increased competition within our markets and bid protests

the ability to maintain a qualified workforce

our ability to meet performance obligations under our contracts, including obligations that 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

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, postretirement and health and welfare plans

our ability successfully to integrate the Orbital ATK business and realize fully the anticipated benefits of the acquisition, without adverse consequences

our ability to exploit 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

changes in business conditions that could impact business investments and/or recorded goodwill or the value of other long-lived assets

unanticipated changes in our tax provisions or exposure to additional tax liabilities, including qualification of the Alliant Techsystems Inc. spin-off of Vista Outdoor Inc. as a tax-free transaction

You are urged 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, 2018, we had approximately 53 million square feet of floor space at 548 separate locations, primarily in the U.S., for manufacturing, warehousing, research and testing, administration and various other uses. At December 31, 2018, we leased to third parties approximately 317,000 square feet of our owned and leased facilities.

At December 31, 2018, we had major operations at the following locations:

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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 and Tremonton, UT; Dulles, Radford and Sterling, VA; and Rocket Center, 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; Baltimore, MD; and Herndon, VA. Locations outside the U.S. include Australia and France.

Corporate

Falls Church and Lebanon, VA and Irving, TX.

The following is a summary of our floor space at December 31, 2018:

Square feet (in thousands)	Owned	Leased	U.S. Government Owned/Leased	Total
Aerospace Systems	6,780	7,146	3,209	17,135
Innovation Systems	6,161	6,165	5,394	17,720
Mission Systems	8,584	5,735	—	14,319
Technology Services	434	2,576	—	3,010
Corporate	614	485	—	1,099
Total	22,573	22,107	8,603	53,283

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.

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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 170,607,336 shares and 174,085,619 shares were issued and outstanding as of December 31, 2018 and 2017, 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, 2018 and 2017.

MARKET INFORMATION

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

HOLDERS

The approximate number of common stockholders was 22,385 as of January 28, 2019.

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, 2018:

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) ⁽²⁾
September 29, 2018 - October 26, 2018	163,268	\$ 302.39	163,268	\$ 2,084
October 27, 2018 - November 23, 2018 ⁽³⁾	2,964,720	269.84	2,964,720	1,284
November 24, 2018 - December 31, 2018	—	—	—	4,284
Total	3,127,988	\$ 271.54	3,127,988	\$ 4,284

⁽¹⁾ Includes commissions paid.

⁽²⁾ The value remaining on December 31, 2018 includes an additional \$3.0 billion share repurchase authorization approved by the company's board of directors on December 4, 2018.

The company entered into an accelerated share repurchase agreement with Goldman Sachs & Co. LLC to

⁽³⁾ repurchase \$1.0 billion of the company's common stock and received an initial delivery of shares representing approximately 80 percent of the share repurchase agreement.

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, 2013, 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, Harris Corporation, Huntington Ingalls Industries Inc., L3 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

Selected financial data below reflects the retrospective effects from the January 1, 2018 adoption of Accounting Standards Codification (ASC) Topic 606, Revenue from Contracts with Customers, and Accounting Standards Update (ASU) No. 2017-07, Compensation Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost and the fourth quarter 2018 change in accounting method related to the recognition of actuarial gains and losses for our pension and OPB plans (see Notes 1, 13, 16, 17 and 18 to the consolidated financial statements for further information on these changes).

\$ in millions, except per share amounts	Year Ended December 31				
	2018 ⁽⁵⁾	2017	2016	2015 ⁽³⁾	2014 ⁽³⁾
Sales	\$30,095	\$26,004	\$24,706	\$23,526	\$23,979
Operating income	3,780	3,218	3,277	2,984	3,069
Net earnings (loss)	3,229	2,869	2,043	2,119	(233)
Basic earnings per share	\$18.59	\$16.45	\$11.42	\$11.19	\$(1.12)
Diluted earnings per share	18.49	16.34	11.32	11.06	(1.12)
Cash dividends declared per common share	4.70	3.90	3.50	3.10	2.71
Year-End Financial Position					
Total assets	\$37,653	\$35,128	\$25,815	\$24,424	\$26,545
Notes payable to banks and long-term debt	14,400	15,266	7,070	6,496	5,901
Other long-term obligations ⁽¹⁾	7,309	6,505	7,667	7,059	7,520
Financial Metrics					
Net cash provided by operating activities	\$3,827	\$2,613	\$2,813	\$2,162	\$2,593
Free cash flow ⁽²⁾	2,578	1,685	1,893	1,691	2,032
Other Information					
Company-sponsored research and development expenses	\$764	\$639	\$705	\$712	\$569
Total backlog ⁽⁴⁾	53,500	42,629	45,339	35,923	38,199
Square footage at year-end (in thousands)	53,283	35,379	34,112	34,392	34,264
Number of employees at year-end	85,000	70,000	67,000	65,000	64,300

(1) Other long-term obligations include pension and OPB plan liabilities, unrecognized tax benefits, deferred compensation, environmental liabilities, deferred tax liabilities and other long-term obligations.

Free cash flow 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 accounting principles generally accepted in the United States of America (“GAAP” or “FAS”). See “Liquidity and Capital Resources” – “Free Cash Flow” in Management’s Discussion and Analysis of Financial Conditions and Results of Operations (MD&A) for more information on this measure, including a reconciliation of free cash flow to net cash provided by operating activities.

(3) Years prior to 2016 do not reflect the effects from our January 1, 2018 adoption of ASC Topic 606.

(4) 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.

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

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

OVERVIEW

As previously announced, effective January 1, 2018, we adopted ASC Topic 606, Revenue from Contracts with Customers, and ASU No. 2017-07, Compensation Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost, using the full retrospective method.

Additionally, during the fourth quarter of 2018, we changed our GAAP accounting method related to the recognition of actuarial gains and losses for the company's pension and other postretirement benefit (OPB) plans (the "Accounting change"). Prior to the Accounting change, actuarial gains and losses were recognized as a component of Accumulated other comprehensive (loss) income upon annual remeasurement and were amortized into earnings in future periods on a plan-by-plan basis when they exceeded the accounting corridor, a defined range within which amortization of net gains and losses is not required. Under the new method, actuarial gains and losses are immediately recognized in net periodic benefit cost 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.

Our 2017 and 2016 results below have been recast to reflect the impact of the adoption of ASC Topic 606 and ASU 2017-07 and the Accounting change as described in Notes 1, 13, 16, 17 and 18 to the consolidated financial statements.

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"), 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, whose main 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 acquisition was financed with proceeds from the company's debt financing completed in October 2017 and cash on hand. We believe this acquisition will enable 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. See Note 2 to the consolidated financial statements for further information regarding the acquisition of Orbital ATK.

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 2019, 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.

Most recently, on February 9, 2018, Congress passed the Bipartisan Budget Act (BBA) of 2018, which raised the statutory budget caps for defense spending, including for Overseas Contingency Operations (OCO), by \$80 billion for FY 2018 and by \$85 billion for FY 2019. The BBA also raised non-defense spending by \$63 billion for FY 2018 and \$68 billion for FY 2019 and suspended the debt ceiling until March 1, 2019. The original spending caps

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established by the BCA will return for FY 2020 and FY 2021 without another statutory change. Similarly, the suspension of the debt ceiling is expected to end on March 1, 2019 absent further action.

On March 23, 2018, the President signed the Omnibus Appropriations Act for FY 2018, which provided \$1.3 trillion in discretionary funding for federal agencies. In total for FY 2018, Congress appropriated approximately \$700 billion for national security, including approximately \$630 billion for base discretionary funding and approximately \$70 billion in OCO funding.

On September 28, 2018, full-year appropriations for FY 2019 were enacted representing over half of discretionary federal spending. For FY 2019, Congress appropriated approximately \$716 billion for national security, including approximately \$647 billion for base discretionary funding and approximately \$69 billion in OCO funding. A continuing resolution was approved to provide further funding for other agencies (including NASA and other civil agencies) through December 7, 2018, which was subsequently extended through December 21, 2018. On December 22, 2018, U.S. government agencies that had not yet received full-year appropriations and did not otherwise have funding entered into a temporary shutdown. On January 25, 2019, a third continuing resolution was enacted, which funds these agencies through February 15, 2019.

The 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.

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 lifecycle (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 financial and operating performance using certain financial measures that are not calculated in accordance with GAAP. These non-GAAP financial measures exclude 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.

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Selected financial highlights are presented in the table below:

\$ in millions, except per share amounts	Year Ended December 31			% Change in		
	2018	2017	2016	2018	2017	
Sales	\$30,095	\$26,004	\$24,706	16	5	%
Operating costs and expenses	26,315	22,786	21,429	15	6	%
Operating costs and expenses as a % of sales	87.4	% 87.6	% 86.7	%		
Operating income	3,780	3,218	3,277	17	(2)	%
Operating margin rate	12.6	% 12.4	% 13.3	%		
Mark-to-market pension and OPB (expense) benefit	(655)) 536	(950)) NM	NM	
Federal and foreign income tax expense	513	1,360	638	(62)) 113	%
Effective income tax rate	13.7	% 32.2	% 23.8	%		
Net earnings	3,229	2,869	2,043	13	40	%
Diluted earnings per share	18.49	16.34	11.32	13	44	%

Sales

2018 – Sales increased \$4.1 billion, or 16 percent, as compared with 2017, due to the addition of \$3.3 billion of sales from Innovation Systems and higher sales at Aerospace Systems and Mission Systems, partially offset by lower sales at Technology Services.

2017 – Sales increased \$1.3 billion, or 5 percent, as compared with 2016, primarily due to higher sales at Aerospace Systems and Mission Systems.

See “Segment Operating Results” below for further information by segment and “Product and Service Analysis” for product and service detail. See Note 15 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

2018 – Operating income increased \$562 million, or 17 percent, as compared with 2017, primarily due to a \$544 million increase in segment operating income, which includes the addition of \$343 million of operating income from Innovation Systems, and a \$42 million decrease in unallocated corporate expense, partially offset by a \$25 million decrease in our net FAS (service)/CAS pension adjustment, all of which are further discussed in “Segment Operating Results.” Lower operating costs and expenses as a percentage of sales increased our operating margin rate to 12.6 percent from 12.4 percent in the prior year period and was principally driven by a higher segment operating margin rate, as described in “Segment Operating Results,” and the previously noted decrease in unallocated corporate expense, partially offset by the decrease in our net FAS (service)/CAS pension adjustment.

G&A as a percentage of sales decreased to 10.0 percent in 2018 from 10.4 percent in 2017, principally due to higher sales volume.

2017 – Operating income for 2017 decreased \$59 million, or 2 percent, as compared with 2016, primarily due to a \$280 million increase in unallocated corporate expense, partially offset by a \$181 million increase in our net FAS (service)/CAS pension adjustment and a \$39 million increase in segment operating income, all of which are further discussed in “Segment Operating Results.” Higher operating costs and expenses as a percentage of sales reduced our operating margin rate to 12.4 percent from 13.3 percent in the prior year period and principally was driven by the previously noted increase in unallocated corporate expense and a lower segment operating margin rate, as described in “Segment Operating Results,” partially offset by the increase in our net FAS (service)/CAS pension adjustment.

G&A as a percentage of sales decreased to 10.4 percent in 2017 from 10.7 percent in 2016, principally due to higher sales volume.

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

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Mark-to-Market Pension and OPB Adjustment

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

\$ in millions	Year Ended December 31		
	2018	2017	2016
Actuarial gains (losses) on projected benefit obligation	\$2,772	\$(1,570)	\$(988)
Actuarial (losses) gains on plan assets	(3,426)	2,119	25
Other	(1)	(13)	13
MTM (expense) benefit	\$(655)	\$536	\$(950)

2018 – MTM expense of \$655 million in 2018 was primarily driven by actual net plan asset losses of approximately 3.5 percent, partially offset by actuarial gains principally resulting from a 63 basis point increase in the discount rate. In 2017, we recognized a MTM benefit of \$536 million as described below.

2017 – MTM benefit of \$536 million in 2017 was primarily driven by actual net plan asset returns of approximately 16.4 percent, partially offset by actuarial losses principally resulting from a 51 basis point decrease in the discount rate. MTM expense of \$950 million in 2016 was primarily driven by actuarial losses largely resulting from a 34 basis point decrease in the discount rate.

Federal and Foreign Income Taxes

2018 – Our effective tax rate for 2018 was lower than 2017 primarily due to the Tax Cuts and Jobs Act (the “2017 Tax Act”), as discussed in Note 7 to the consolidated financial statements.

2017 – Our effective tax rate for 2017 was higher than 2016 primarily due to the 2017 Tax Act, as discussed in Note 7 to the consolidated financial statements.

Net Earnings

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

\$ in millions	Year Ended December 31			% Change in	
	2018	2017	2016	2018	2017
Net earnings	\$3,229	\$2,869	\$2,043	13 %	40 %
MTM expense (benefit)	655	(536)	950	NM	NM
MTM-related deferred state tax (benefit) expense ⁽¹⁾	(29)	24	(43)	NM	NM
Federal tax (benefit) expense of items above ⁽²⁾	(131)	108	(317)	NM	NM
MTM adjustment, net of tax	495	(404)	590	NM	NM
MTM-adjusted net earnings	\$3,724	\$2,465	\$2,633	51 %	(6) %

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

⁽²⁾ Based on a 21% federal statutory tax rate for the years ended December 31, 2018 and 2017 and a 35% federal statutory tax rate for the year ended December 31, 2016.

2018 – Net earnings for 2018 increased \$360 million, or 13 percent, as compared with 2017, and includes an \$899 million reduction related to impacts associated with our MTM adjustment, net of tax. Excluding these impacts, MTM-adjusted net earnings increased by \$1.3 billion, or 51 percent, primarily due to the lower effective tax rate described above, \$544 million of higher segment operating income, and a \$350 million increase in our net FAS (non-service) pension benefit. These increases were partially offset by \$202 million of higher interest expense.

2017 – Net earnings for 2017 increased \$826 million, or 40 percent, as compared with 2016, and includes a \$1 billion increase related to impacts associated with our MTM adjustment, net of tax. Excluding these items, MTM-adjusted net earnings decreased by \$168 million, or 6 percent, primarily due to the higher effective tax rate noted above and \$59 million of higher interest expense resulting from our debt issuance in October 2017, as described in Note 10 to the consolidated financial statements. These decreases were partially offset by a \$92 million increase in Other, net as a result of gains on the sale of two investments and higher interest income on short-term investments as well as an \$88 million increase in our net FAS (non-service) pension benefit.

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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	
	2018	2017	2016	2018	2017
Diluted earnings per share	\$18.49	\$16.34	\$11.32	13 %	44 %
MTM expense (benefit) per share	3.76	(3.06)	5.27	NM	NM
MTM-related deferred state tax (benefit) expense per share ⁽¹⁾	(0.17)	0.14	(0.24)	NM	NM
Federal tax (benefit) expense of items above per share ⁽²⁾	(0.75)	0.62	(1.76)	NM	NM
MTM adjustment per share, net of tax	2.84	(2.30)	3.27	NM	NM
MTM-adjusted diluted earnings per share	\$21.33	\$14.04	\$14.59	52 %	(4)%

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

⁽²⁾ Based on a 21% federal statutory tax rate for the years ended December 31, 2018 and 2017 and a 35% federal statutory tax rate for the year ended December 31, 2016.

2018 – Diluted earnings per share for 2018 increased \$2.15, or 13 percent, as compared with 2017, and includes a \$5.14 reduction related to impacts associated with our MTM adjustment, net of tax. Excluding these impacts, MTM-adjusted diluted earnings per share increased \$7.29, or 52 percent, primarily due to the 51 percent increase in MTM-adjusted net earnings discussed above.

2017 – Diluted earnings per share for 2017 increased \$5.02, or 44 percent, as compared with 2016, and includes a \$5.57 increase related to impacts associated with our MTM adjustment, net of tax. Excluding these items, MTM-adjusted diluted earnings per share decreased \$0.55, or 4 percent, primarily due to the 6 percent decline in MTM-adjusted net earnings discussed above, partially offset by a 3 percent reduction in weighted-average shares outstanding resulting principally from shares repurchased during 2016.

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. As described above, on the effective date of the Merger, we established Innovation Systems as a new, fourth business sector. 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	Advanced Defense Services
Manned Aircraft	Flight Systems	Cyber and ISR	Global Logistics and Modernization
Space	Space Systems	Sensors and Processing	System Modernization and Services

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 Reconciliation of Segment Operating Income to Total Operating Income section below, is a non-GAAP measure that reflects total earnings from our four segments, including allocated pension expense recognized under CAS, and excluding unallocated corporate items and FAS pension expense. This non-GAAP measure may be useful to investors and other users of our financial statements as a supplemental measure in evaluating the financial performance and operational trends of our sectors. This non-GAAP measure 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.

\$ in millions	Year Ended December 31			% Change in	
	2018	2017	2016	2018	2017
Segment operating income	\$3,447	\$2,903	\$2,864	19%	1 %
Segment operating margin rate	11.5 %	11.2 %	11.6 %		

2018 – Segment operating income for 2018 increased \$544 million, or 19 percent, as compared with 2017, and includes the addition of \$343 million of operating income from Innovation Systems and higher operating income at Aerospace Systems and Mission Systems. The higher operating income includes \$69 million of favorable EAC adjustments on multiple restricted programs at Aerospace Systems. Segment operating margin rate increased to 11.5 percent from 11.2 percent in 2017 principally due to higher segment margin rates at each of the legacy Northrop Grumman sectors. 2017 – Segment operating income for 2017 increased \$39 million, or 1 percent, as compared with 2016, primarily due to higher operating income at Aerospace Systems, partially offset by lower operating income at Mission Systems and Technology Services. The higher operating income includes a \$56 million favorable EAC adjustment at Aerospace Systems on a restricted program largely related to performance incentives and \$54 million recognized in connection with a claim related to certain costs incurred in prior years (the “2017 Cost Claim”). Segment operating margin rate decreased to 11.2 percent from 11.6 percent in 2016 principally due to lower segment margin rates at Mission Systems and Aerospace Systems.

Reconciliation of Segment Operating Income to Total Operating Income - The table below reconciles segment operating income to total operating income by including the impact of the net FAS (service)/CAS pension adjustment, as well as unallocated corporate expenses (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). See Note 15 to the consolidated financial statements for further information on the net FAS (service)/CAS pension adjustment and unallocated corporate expense.

\$ in millions	Year Ended December 31			% Change in	
	2018	2017	2016	2018	2017
Segment operating income	\$3,447	\$2,903	\$2,864	19 %	1 %
CAS pension expense	1,017	1,026	847	(1)%	21 %
Less: FAS (service) pension expense	(404)	(388)	(390)	4 %	(1)%
Net FAS (service)/CAS pension adjustment	613	638	457	(4)%	40 %
Intangible asset amortization and PP&E step-up depreciation ⁽¹⁾	(220)	—	—	NM	NM
MTM-related deferred state tax benefit (expense) ⁽²⁾	29	(24)	43	NM	NM
Other unallocated corporate expense ⁽³⁾	(86)	(295)	(82)	(71)%	260 %
Unallocated corporate expense	(277)	(319)	(39)	(13)%	718 %
Other	(3)	(4)	(5)	(25)%	(20)%
Total operating income	\$3,780	\$3,218	\$3,277	17 %	(2)%

⁽¹⁾ Includes amortization of purchased intangible assets and the additional depreciation expense related to the step-up in fair value of property, plant and equipment (PP&E) acquired through business combinations, which are included

in unallocated corporate expense as they are not considered part of management's evaluation of segment operating performance.

- (2) 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.

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NORTHROP GRUMMAN CORPORATION

Includes \$24 million, \$34 million and \$35 million of deferred state tax expense for the years ended December 31, (3) 2018, 2017 and 2016, respectively, resulting from the reversal of previously recognized amortization of net actuarial losses in connection with the Accounting change.

Net FAS (service)/CAS Pension Adjustment

2018 – The decrease in our net FAS (service)/CAS pension adjustment, as compared with 2017, is primarily due to lower CAS expense for legacy Northrop Grumman resulting from higher assets returns in 2017 and a change in the legacy Northrop Grumman mortality assumption as of December 31, 2017, which more than offset the additional net FAS (service)/CAS pension adjustment from the addition of Innovation Systems.

2017 – The increase in our net FAS (service)/CAS pension adjustment, as compared with 2016, is primarily due to higher CAS expense resulting from the continued phase-in of CAS harmonization and the impact of actual demographic experience, partially offset by a change in our mortality assumption as of December 31, 2016.

Unallocated Corporate Expense

2018 – Unallocated corporate expense for 2018 decreased \$42 million, as compared with 2017, primarily due to a \$223 million benefit recognized for the finalization of certain prior year corporate cost claims resulting in a reduction of overhead reserves and an increase in our estimated recovery of certain environmental remediation costs and a \$53 million increase in MTM-related deferred state tax benefit, partially offset by \$220 million of intangible asset amortization and PP&E step-up depreciation.

2017 – Unallocated corporate expense for 2017 increased \$280 million, as compared with 2016, primarily due to a \$67 million increase in MTM-related deferred state tax expense, \$47 million of costs associated with the Orbital ATK acquisition and \$41 million of deferred state tax expense resulting from state tax adjustments associated with the filing of our prior year federal tax return and the company's \$500 million discretionary pension contribution in December 2017. In addition, the prior year period included a \$35 million benefit recognized for state tax refunds claimed on our prior year tax returns and a \$25 million benefit recognized for estimated prior year overhead claim recoveries.

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:

	Year Ended December		
	31		
\$ in millions	2018	2017	2016
Favorable EAC adjustments	\$1,019	\$717	\$771
Unfavorable EAC adjustments	(442)	(357)	(328)
Net EAC adjustments	\$577	\$360	\$443

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

	Year Ended		
	December 31		
\$ in millions	2018	2017	2016
Aerospace Systems	\$309	\$250	\$208
Innovation Systems ⁽¹⁾	34	—	—
Mission Systems	175	104	217
Technology Services	76	19	47
Eliminations	(17)	(13)	(29)
Net EAC adjustments	\$577	\$360	\$443

(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.

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AEROSPACE SYSTEMS

	Year Ended December 31			% Change	
	2018	2017	2016	2018	2017
\$ in millions					
Sales	\$13,096	\$12,131	\$10,853	8%	12%
Operating income	1,411	1,289	1,198	9%	8%
Operating margin rate	10.8%	10.6%	11.0%		

2018 – Aerospace Systems sales for 2018 increased \$965 million, or 8 percent, as compared with 2017, due to higher volume in each of our three business areas, principally on Manned Aircraft programs. Manned Aircraft sales were driven by higher restricted and F-35 volume. Autonomous Systems sales reflect higher volume on several programs, including Triton, partially offset by lower Global Hawk volume. Space sales reflect higher restricted and Ground Based Strategic Deterrent Technology Maturation Risk Reduction volume, partially offset by lower intercompany and James Webb Space Telescope (JWST) volume.

Operating income for 2018 increased \$122 million, or 9 percent, primarily due to higher sales and a higher operating margin rate. Operating margin rate increased to 10.8 percent from 10.6 percent principally due to improved performance, including the previously noted \$69 million of favorable EAC adjustments on multiple restricted programs in 2018, partially offset by the \$56 million favorable EAC adjustment recorded in 2017.

2017 – Aerospace Systems sales for 2017 increased \$1.3 billion, or 12 percent, as compared with 2016, primarily due to higher volume on Manned Aircraft programs. Manned Aircraft sales were driven by higher restricted sales. Autonomous Systems sales increased principally due to higher volume for several programs, including Triton, partially offset by lower NATO Alliance Ground Surveillance (AGS) volume. Space sales increased primarily due to higher restricted sales, partially offset by lower volume on the JWST and Advanced Extremely High Frequency (AEHF) programs.

Operating income for 2017 increased \$91 million, or 8 percent, primarily due to higher sales, partially offset by a lower operating margin rate. Operating margin rate decreased to 10.6 percent from 11.0 percent principally due to changes in contract mix on Manned Aircraft programs and a gain of \$45 million recognized in the prior year associated with the sale of a property, partially offset by the previously discussed \$56 million favorable EAC adjustment largely related to performance incentives.

INNOVATION SYSTEMS

	Year Ended			% Change	
	December 31	2017	2016	2018	2017
\$ in millions	2018	2017	2016	2018	2017
Sales	\$ 3,276	—	—	—	—
Operating income	343	—	—	—	—
Operating margin rate	10.5%	—	—		

The sales and operating income 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.

2018 – Innovation Systems sales for 2018 were \$5.6 billion and for 2017 were \$4.8 billion, each on a pro forma basis. The \$0.8 billion, or 17 percent, increase reflects higher volume in each business area. Defense Systems sales reflect increased international volume on armament systems programs and increased volume on the Anti-Radiation Guided

Missile program and small caliber ammunition programs. Flight Systems sales were primarily driven by higher Ground-based Midcourse Defense, A350 and F-35 volume. Space Systems sales increased primarily due to higher government satellite volume.

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MISSION SYSTEMS

	Year Ended December 31			% Change	
	2018	2017	2016	2018	2017
\$ in millions					
Sales	\$11,709	\$11,470	\$11,161	2%	3%
Operating income	1,520	1,442	1,468	5%	(2)%
Operating margin rate	13.0%	12.6%	13.2%		

2018 – Mission Systems sales for 2018 increased \$239 million, or 2 percent, as compared with 2017, primarily due to higher Sensors and Processing volume, partially offset by lower Cyber and ISR and Advanced Capabilities volume. Sensors and Processing sales increased principally due to higher volume on restricted programs, communications programs, F-35 and electro-optical/infrared (EO/IR) self-protection programs. Cyber and ISR sales decreased primarily due to ramp-down on a restricted ISR program. Advanced Capabilities sales reflect lower volume on the Joint National Integration Center Research and Development (JRDC) program and follow on activity, partially offset by higher volume on several programs, including the Integrated Air and Missile Defense Battle Command System program.

Operating income for 2018 increased \$78 million, or 5 percent, due to a higher operating margin rate and higher sales. Operating margin rate increased to 13.0 percent from 12.6 percent primarily due to improved performance on Cyber and ISR and Sensors and Processing programs, partially offset by a \$32 million benefit recognized in the prior year in connection with the 2017 Cost Claim described above.

2017 – Mission Systems sales for 2017 increased \$309 million, or 3 percent, as compared with 2016 primarily due to higher Sensors and Processing volume, partially offset by lower Cyber and ISR volume. Sensors and Processing sales increased principally due to higher volume on F-35 sensors, EO/IR self-protection programs, communications programs and the SABR program. These increases were partially offset by lower volume on international ground-based radar programs. Cyber and ISR sales decreased primarily due to lower volume on restricted ISR programs.

Operating income for 2017 decreased \$26 million, or 2 percent, primarily due to a lower operating margin rate, partially offset by higher sales and \$32 million recognized in connection with the 2017 Cost Claim described above. Operating margin rate decreased to 12.6 percent from 13.2 percent primarily due to lower margin rates on Sensors and Processing and Cyber and ISR programs principally resulting from lower performance and changes in contract mix. This decrease was partially offset by improved margin rates at Advanced Capabilities primarily due to the prior year including a \$49 million forward loss provision on an Advanced Capabilities program.

TECHNOLOGY SERVICES

	Year Ended December 31			% Change	
	2018	2017	2016	2018	2017
\$ in millions					
Sales	\$4,297	\$4,687	\$4,765	(8)%	(2)%
Operating income	443	449	456	(1)%	(2)%
Operating margin rate	10.3%	9.6%	9.6%		

2018 – Technology Services sales for 2018 decreased \$390 million, or 8 percent, as compared with 2017, due to lower volume on Advanced Defense Services and System Modernization and Services programs, partially offset by higher volume on Global Logistics and Modernization programs. Advanced Defense Services and System Modernization and Services sales decreased primarily due to the completion of several programs, including JRDC, partially offset by higher volume on the Saudi Arabian Ministry of National Guard Training Support program (through our interest in a joint venture for which we consolidate the financial results). Global Logistics and Modernization sales increased

primarily due to higher volume for several programs, including the Special Electronic Mission Aircraft program, partially offset by lower volume from the completion of the KC-10 program.

Operating income for 2018 decreased \$6 million, or 1 percent, primarily due to lower sales, partially offset by a higher operating margin rate. Operating margin rate increased to 10.3 percent from 9.6 percent primarily due to the close-out of a state IT outsourcing program.

2017 – Technology Services sales for 2017 decreased \$78 million, or 2 percent, as compared with 2016, primarily due to lower volume on System Modernization and Services programs, partially offset by higher volume on Global Logistics and Modernization programs. System Modernization and Services sales decreased principally due to the completion of several programs in 2016 and 2017. Global Logistics and Modernization sales increased primarily due

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to higher intercompany volume and increased sales on the UKAWACS and Hunter programs, partially offset by lower volume on the KC-10 program as our contract nears completion.

Operating income for 2017 decreased \$7 million, or 2 percent, primarily due to lower sales as described above.

Operating margin rate was comparable to the prior year.

PRODUCT AND SERVICE ANALYSIS

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

\$ in millions	Year Ended December 31					
	2018		2017		2016	
Segment Information:	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses
Aerospace Systems						
Product	\$11,087	\$ 9,889	\$10,064	\$ 8,988	\$8,947	\$ 7,945
Service	2,009	1,796	2,067	1,854	1,906	1,710
Innovation Systems						
Product	2,894	2,582	—	—	—	—
Service	382	351	—	—	—	—
Mission Systems						
Product	7,329	6,335	7,012	6,088	6,726	5,810
Service	4,380	3,854	4,458	3,940	4,435	3,883
Technology Services						
Product	485	450	391	360	327	299
Service	3,812	3,404	4,296	3,878	4,438	4,010
Segment Totals						
Total Product	\$21,795	\$19,256	\$17,467	\$15,436	\$16,000	\$14,054
Total Service	10,583	9,405	10,821	9,672	10,779	9,603
Intersegment eliminations	(2,283)	(2,013)	(2,284)	(2,007)	(2,073)	(1,815)
Total Segment ⁽¹⁾	\$30,095	\$ 26,648	\$26,004	\$23,101	\$24,706	\$21,842

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

Product Sales and Costs

2018 – Product sales for 2018 increased \$4.3 billion, or 25 percent, as compared with 2017. The increase was primarily due to the addition of \$2.9 billion of product sales from Innovation Systems and higher restricted and F-35 volume at Aerospace Systems.

Product costs for 2018 increased \$3.8 billion, or 25 percent, as compared with 2017, consistent with the higher product sales described above.

2017 – Product sales for 2017 increased \$1.5 billion, or 9 percent, as compared with 2016. The increase was primarily due to higher product sales at Aerospace Systems and Mission Systems. Higher Aerospace Systems product sales were primarily driven by increased restricted volume, partially offset by lower volume on the JWST and NATO AGS programs. The increase at Mission Systems was principally due to higher product volume on F-35 sensors, EO/IR self-protection programs and the SABR program.

Product costs for 2017 increased \$1.4 billion, or 10 percent, as compared with 2016, consistent with the higher product sales described above and reflects lower product margin rates at Aerospace Systems, principally due to changes in contract mix, and Mission Systems.

Service Sales and Costs

2018 – Service sales for 2018 decreased \$238 million, or 2 percent, as compared with 2017. The decrease was primarily driven by lower service sales at Technology Services principally due to the completion of several programs, partially offset by the addition of \$382 million of service sales from Innovation Systems.

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Service costs for 2018 decreased \$267 million, or 3 percent, as compared with 2017, consistent with the lower service sales described above and reflects a higher service margin rate at Technology Services due to the close-out of a state IT outsourcing program.

2017 – Service sales for 2017 were comparable with 2016. Higher service sales at Aerospace Systems on several Autonomous Systems and Manned Aircraft programs were offset by lower service volume principally on the KC-10 program at Technology Services.

Service costs for 2017 increased \$69 million, or 1 percent, as compared with 2016. The increase principally reflects a lower service margin rate at Mission 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 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.

As discussed in Note 1 to the consolidated financial statements, we adopted ASC Topic 606 on January 1, 2018 using the full retrospective method and applied the transition practical expedient related to backlog for reporting periods presented before the date of initial application. However, for comparative purposes, we have recast our backlog as of December 31, 2017 to reflect the impact of adoption of ASC Topic 606.

Backlog consisted of the following at December 31, 2018 and 2017:

\$ in millions	2018		2017		% Change in 2018
	Funded	Unfunded	Total Backlog	Total Backlog	
Aerospace Systems	\$ 11,448	\$ 14,992	\$ 26,440	\$ 25,560	3 %
Innovation Systems	5,928	2,279	8,207	—	—
Mission Systems	9,676	5,732	15,408	13,277	16 %
Technology Services	2,883	562	3,445	3,792	(9)%
Total backlog	\$ 29,935	\$ 23,565	\$ 53,500	\$ 42,629	26 %

Approximately \$26.6 billion of the \$53.5 billion total backlog at December 31, 2018 is expected to be converted into sales in 2019.

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, 2018, we had cash and cash equivalents of \$1.6 billion; approximately \$250 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 \$784 million at December 31, 2018, and are expected to be paid with cash on hand.

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Operating Cash Flow

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

\$ in millions	Year Ended December 31		
	2018	2017	2016
Net earnings	\$3,229	\$2,869	\$2,043
Non-cash items ⁽¹⁾	1,775	1,018	1,439
Changes in assets and liabilities:			
Trade working capital	(65)	(285)	(169)
Retiree benefits, excluding MTM (expense) benefit	(1,083)	(946)	(375)
Other, net	(29)	(43)	(125)
Net cash provided by operating activities	\$3,827	\$2,613	\$2,813

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

2018 – Net cash provided by operating activities for 2018 increased by \$1.2 billion, or 46 percent, as compared with 2017, principally due to higher net earnings, which include the addition of Innovation Systems, and improved trade working capital performance.

2017 – Net cash provided by operating activities for 2017 decreased by \$200 million, or 7 percent, as compared with 2016, principally due to a \$500 million voluntary pre-tax pension contribution (\$325 million after-tax) made in December 2017.

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.

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

\$ in millions	Year Ended December 31			% Change in	
	2018	2017	2016	2018	2017
Net cash provided by operating activities	\$3,827	\$2,613	\$2,813	46%	(7)%
Less: capital expenditures	(1,249)	(928)	(920)	35%	1 %
Free cash flow	\$2,578	\$1,685	\$1,893	53%	(11)%

2018 – Free cash flow for 2018 increased \$893 million, or 53 percent, as compared with 2017. The increase was principally driven by the increase in net cash provided by operating activities described above, partially offset by the inclusion of Innovation Systems' capital expenditures and higher capital expenditures at Aerospace Systems.

2017 – Free cash flow for 2017 decreased \$208 million, or 11 percent, as compared with 2016. The decrease was principally driven by the \$500 million voluntary pre-tax pension contribution discussed above.

Investing Cash Flow

2018 – Net cash used in investing activities for 2018 increased to \$8.9 billion from \$889 million in 2017. The increase was principally due to \$7.7 billion paid for the acquisition of Orbital ATK, net of cash acquired.

2017 – Net cash used in investing activities for 2017 increased \$84 million, or 10 percent, as compared with 2016. The increase was primarily due to proceeds from the 2016 sales of a property at Aerospace Systems and a commercial cyber security business at Mission Systems, partially offset by proceeds from the sale of two investments in 2017.

Financing Cash Flow

2018 – Net cash used in financing activities during 2018 was \$4.6 billion, compared to net cash provided by financing activities of \$7.0 billion in 2017. The change is principally due to \$2.3 billion in debt repayments, \$870

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million higher share repurchases and \$320 million in payments to credit facilities in 2018, compared with \$8.2 billion net proceeds from the issuance of long-term debt in 2017.

2017 – Net cash provided by financing activities during 2017 was \$7.0 billion compared to net cash used in financing activities of \$1.8 billion in 2016. The change is principally due to \$7.5 billion higher net proceeds from the issuance of long-term debt and \$1.2 billion lower share repurchases in 2017.

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, 2018, 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:

\$ in millions	Total	2019	2020- 2021	2022- 2023	2024 and beyond
Long-term debt	\$14,475	\$517	\$1,868	\$2,558	\$9,532
Interest payments on long-term debt	7,181	550	1,008	903	4,720
Operating leases	2,080	312	491	338	939
Purchase obligations ⁽¹⁾	12,962	7,167	3,862	917	1,016
Other long-term liabilities ⁽²⁾	1,418	499	376	146	397
Total contractual obligations	\$38,116	\$9,045	\$7,605	\$4,862	\$16,604

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;

⁽¹⁾ 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.

Other long-term liabilities, including their current portions, primarily consist of total accrued environmental reserves, deferred compensation and other miscellaneous liabilities, of which \$159 million is related to ⁽²⁾ environmental reserves recorded in Other current liabilities. It excludes obligations for uncertain tax positions of \$772 million, as the timing of such payments, if any, cannot be reasonably estimated.

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 12, 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.

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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. Changes in estimates of contract sales and cost are frequent. 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. 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 risks affecting contract costs, performance issues with our 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 for our pension and OPB plans and pension and OPB expense 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 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 that is 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 4.31 percent at December 31, 2018, and 3.68 percent at December 31, 2017.

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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, 2018 discount rate assumption would have the following estimated effects on 2018 pension and OPB obligations, which would be reflected in the 2018 MTM expense (benefit), and 2019 expected pension and OPB expense:

\$ in millions	25 Basis	25 Basis
	Point	Point
	Decrease	Increase
	in Rate	in Rate
2019 pension and OPB (benefit) expense	\$ (22)	\$ 20
2018 pension and OPB obligation and MTM expense (benefit)	1,069	(1,016)

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 (benefit) expense. The cash balance crediting rate assumption has therefore been set to its current level of 3.0 percent as of December 31, 2018, growing to 3.25 percent by 2024. Holding all other assumptions constant, an increase or decrease of 25 basis points in the December 31, 2018 cash balance crediting rate assumption would have the following estimated effects on the 2018 pension benefit obligation, which would be reflected in the 2018 MTM (benefit) expense, and 2019 expected pension expense:

\$ in millions	25 Basis	25 Basis
	Point	Point
	Decrease	Increase
	in Rate	in Rate
2019 pension (benefit) expense	\$ (11)	\$ 12
2018 pension obligation and MTM (benefit) expense	(125)	130

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 2018, the Investment Committee of the company’s benefit plans reviewed and approved the plans’ major asset class allocations. The current asset allocation is approximately 45% equities, 30% fixed-income and 25% alternatives, which reflects a shift of approximately 5% from fixed-income 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.

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 2018 was approximately 10.9 percent and our 20-year rolling average rate of return was approximately 7.1 percent, each determined on an arithmetic basis and net of expenses. Our 2018 actual net plan asset losses were approximately 3.5 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.

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For determining 2018 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 7.65 percent. For 2019 FAS expense, we have assumed an expected long-term rate of return on pension plan assets of 8.0 percent and 7.67 percent on OPB plans. Holding all other assumptions constant, an increase or decrease of 25 basis points in our December 31, 2018 EROA assumption would have the following estimated effects on 2019 expected pension and OPB expense:

\$ in millions	25 Basis	25 Basis
	Point	Point
	Decrease	Increase
2019 pension and OPB expense (benefit)	\$ 69	\$ (69)

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 2019 MTM expense (benefit):

\$ in millions	100 Basis	100
	Point	Basis
	Decrease	Point
		Increase
2019 MTM expense (benefit)	275	(275)

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, estimates of fair value are determined 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. The SOA has issued annual updates to their mortality improvement scale each year since then as additional data has become available. These updates generally contained lower mortality improvement projections than the original projections from 2014. After considering the additional information released by the SOA in October 2018, and after reviewing our own historical mortality experience, we continued our practice of adopting the latest SOA 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, 2018, and the amounts estimated for our 2019 pension and OPB expense. For further information regarding our pension and OPB plans, see “Risk Factors” and Note 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.

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

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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, 2018 and 2017, 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, 2018, 2017 and 2016.

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.

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, 2018, 2017 and 2016.

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, 2018, we had no significant off-balance sheet arrangements other than operating leases, which largely will be recorded on our balance sheet effective January 1, 2019 in connection with our adoption of the new lease standard. For additional information on our operating leases, see Notes 1 and 12 to the consolidated financial statements.

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NORTHROP GRUMMAN CORPORATION

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 \$335 million at December 31, 2018. 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 £85 million (the equivalent of approximately \$108 million as of December 31, 2018) outstanding at December 31, 2018 and on our outstanding short-term commercial paper borrowings, for which there was \$198 million outstanding at December 31, 2018. At December 31, 2018, we have \$14.4 billion of long-term debt, primarily consisting of fixed-rate debt, with a fair value of approximately \$14.3 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, 2018, foreign currency forward contracts with a notional amount of \$114 million were outstanding. At December 31, 2018, 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.

COMMODITY PRICE RISK

In certain circumstances, we are exposed to commodity price risk on purchases of inventory such as copper and zinc. We enter into forward contracts and purchase orders for the current expected production requirements for small-caliber ammunition supply contracts. We do not hold or issue derivative financial instruments for trading purposes. At December 31, 2018, we had commodity forward contracts outstanding that hedge forecasted commodity purchases of 10 million pounds of copper and 4 million pounds of zinc. At December 31, 2018, a 10 percent unfavorable change in commodity prices would not have a material impact on our consolidated financial position, annual results of operations and/or cash flows.

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, 2018 and 2017, 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, 2018, and the related notes (collectively referred to as the “financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, 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, 2018, 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 30, 2019 expressed an unqualified opinion on the Company’s internal control over financial reporting, which excludes Northrop Grumman Innovation Systems.

Change in Accounting Principles

As discussed in Note 1 to the consolidated financial statements, the Company elected during 2018 to change its method of accounting for recognizing pension and other postretirement benefit plans actuarial gains and losses. Also discussed in Note 1 to the consolidated financial statements, the Company changed the manner in which it accounts for revenue from contracts with customers due to the adoption of the new revenue standard during 2018. The Company adopted both changes using the full retrospective approach.

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.

/s/Deloitte & Touche LLP

McLean, Virginia

January 30, 2019

We have served as the Company’s auditor since 1975.

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF EARNINGS AND COMPREHENSIVE INCOME

\$ in millions, except per share amounts	Year Ended December 31		
	2018	2017	2016
Sales			
Product	\$20,469	\$16,364	\$15,080
Service	9,626	9,640	9,626
Total sales	30,095	26,004	24,706
Operating costs and expenses			
Product	15,785	12,527	11,197
Service	7,519	7,547	7,600
General and administrative expenses	3,011	2,712	2,632
Operating income	3,780	3,218	3,277
Other (expense) income			
Interest expense	(562)	(360)	(301)
Net FAS (non-service) pension benefit	1,049	699	611
Mark-to-market pension and OPB (expense) benefit	(655)	536	(950)
Other, net	130	136	44
Earnings before income taxes	3,742	4,229	2,681
Federal and foreign income tax expense	513	1,360	638
Net earnings	\$3,229	\$2,869	\$2,043
Basic earnings per share	\$18.59	\$16.45	\$11.42
Weighted-average common shares outstanding, in millions	173.7	174.4	178.9
Diluted earnings per share	\$18.49	\$16.34	\$11.32
Weighted-average diluted shares outstanding, in millions	174.6	175.6	180.5
Net earnings (from above)	\$3,229	\$2,869	\$2,043
Other comprehensive loss			
Change in unamortized prior service credit, net of tax expense of \$19 in 2018, \$35 in 2017 and \$20 in 2016	(60)	(44)	(62)
Change in cumulative translation adjustment	(8)	(4)	(50)
Other, net	(6)	2	(1)
Other comprehensive loss, net of tax	(74)	(46)	(113)
Comprehensive income	\$3,155	\$2,823	\$1,930

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

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

\$ in millions, except par value	December 31	
	2018	2017
Assets		
Cash and cash equivalents	\$1,579	\$11,225
Accounts receivable, net	1,448	1,054
Unbilled receivables, net	5,026	3,465
Inventoried costs, net	654	398
Prepaid expenses and other current assets	973	445
Total current assets	9,680	16,587
Property, plant and equipment, net of accumulated depreciation of \$5,369 for 2018 and \$5,066 for 2017	6,372	4,225
Goodwill	18,672	12,455
Intangible assets, net	1,372	52
Deferred tax assets	94	447
Other non-current assets	1,463	1,362
Total assets	\$37,653	\$35,128
Liabilities		
Trade accounts payable	\$2,182	\$1,661
Accrued employee compensation	1,676	1,382
Advance payments and amounts in excess of costs incurred	1,917	1,761
Other current liabilities	2,499	2,288
Total current liabilities	8,274	7,092
Long-term debt, net of current portion of \$517 for 2018 and \$867 for 2017	13,883	14,399
Pension and OPB plan liabilities	5,755	5,511
Deferred tax liabilities	108	—
Other non-current liabilities	1,446	994
Total liabilities	29,466	27,996
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: 2018—170,607,336 and 2017—174,085,619	171	174
Paid-in capital	—	44
Retained earnings	8,068	6,913
Accumulated other comprehensive (loss) income	(52)) 1
Total shareholders' equity	8,187	7,132
Total liabilities and shareholders' equity	\$37,653	\$35,128
The accompanying notes are an integral part of these consolidated financial statements.		

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF CASH FLOWS

\$ in millions	Year Ended December 31		
	2018	2017	2016
Operating activities			
Net earnings	\$3,229	\$2,869	\$2,043
Adjustments to reconcile to net cash provided by operating activities:			
Depreciation and amortization	800	475	456
Mark-to-market pension and OPB expense (benefit)	655	(536)	950
Stock-based compensation	86	94	93
Deferred income taxes	234	985	(60)
Changes in assets and liabilities:			
Accounts receivable, net	202	(209)	46
Unbilled receivables, net	(297)	(422)	(211)
Inventoried costs, net	(37)	25	(53)
Prepaid expenses and other assets	(56)	(92)	(117)
Accounts payable and other liabilities	381	570	18
Income taxes payable, net	(258)	(157)	148
Retiree benefits	(1,083)	(946)	(375)
Other, net	(29)	(43)	(125)
Net cash provided by operating activities	3,827	2,613	2,813
Investing activities			
Acquisition of Orbital ATK, net of cash acquired	(7,657)	—	—
Capital expenditures	(1,249)	(928)	(920)
Other, net	28	39	115
Net cash used in investing activities	(8,878)	(889)	(805)
Financing activities			
Payments of long-term debt	(2,276)	—	(321)
Net proceeds from issuance of long-term debt	—	8,245	749
Net (payments to) proceeds from credit facilities	(320)	(13)	135
Net borrowings on commercial paper	198	—	—
Common stock repurchases	(1,263)	(393)	(1,547)
Cash dividends paid	(821)	(689)	(640)
Payments of employee taxes withheld from share-based awards	(85)	(92)	(153)
Other, net	(28)	(98)	(9)
Net cash (used in) provided by financing activities	(4,595)	6,960	(1,786)
(Decrease) increase in cash and cash equivalents	(9,646)	8,684	222
Cash and cash equivalents, beginning of year	11,225	2,541	2,319
Cash and cash equivalents, end of year	\$1,579	\$11,225	\$2,541

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

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

\$ in millions, except per share amounts	Year Ended December 31		
	2018	2017	2016
Common stock			
Beginning of year	\$174	\$175	\$181
Common stock repurchased	(4)	(2)	(7)
Shares issued for employee stock awards and options	1	1	1
End of year	171	174	175
Paid-in capital			
Beginning of year	44	—	—
Common stock repurchased	(34)	—	—
Stock compensation	(10)	44	—
End of year	—	44	—
Retained earnings			
Beginning of year	6,913	5,141	5,329
Impact from adoption of ASU 2018-02 and ASU 2016-01 (See Note 1)	(21)	—	—
Common stock repurchased	(1,225)	(371)	(1,548)
Net earnings	3,229	2,869	2,043
Dividends declared	(822)	(687)	(633)
Stock compensation	(6)	(39)	(50)
End of year	8,068	6,913	5,141
Accumulated other comprehensive (loss) income			
Beginning of year	1	47	160
Impact from adoption of ASU 2018-02 and ASU 2016-01 (See Note 1)	21	—	—
Other comprehensive income (loss), net of tax	(74)	(46)	(113)
End of year	(52)	1	47
Total shareholders' equity	\$8,187	\$7,132	\$5,363
Cash dividends declared per share	\$4.70	\$3.90	\$3.50

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

NORTHROP GRUMMAN CORPORATION

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.

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. Material 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

The prior period financial information in the company’s consolidated financial statements reflects the retrospective effects from the company’s January 1, 2018 adoption of Accounting Standards Codification (ASC) Topic 606, Revenue from Contracts with Customers, and Accounting Standards Update (ASU) No. 2017-07, Compensation Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost, and our fourth quarter 2018 change in accounting method related to the recognition of actuarial gains and losses for pension and other postretirement benefit (OPB) plans as discussed below.

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 contract.

Under Accounting Standards Codification (ASC) Topic 606, Revenue from Contracts with Customers, 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 lifecycle (development, production, maintenance and/or support). 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 the cost plus a reasonable margin approach of ASC Topic 606. Warranties are provided on certain contracts, but do not typically provide for services beyond standard assurances and are therefore not within the scope of ASC Topic 606. Likewise, our accounting for costs to

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obtain or fulfill a contract was not significantly impacted by the adoption of ASC Topic 606 as these costs are not material.

A contract modification exists when the parties to a contract approve a change in the scope or price of a contract. Contracts are often modified for changes in contract specifications or requirements. 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 entitle the customer 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 and we are typically entitled to cost plus a reasonable margin for work in process if the contract is terminated for convenience, 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 revenue 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. Each loss provision is first offset against costs included in Unbilled accounts receivable or Inventoried costs; remaining amounts are reflected in Other current liabilities.

Significant EAC adjustments on a single contract could have a material effect on the company's consolidated financial statements. When such adjustments occur, we generally disclose the nature, underlying conditions and financial impact of the adjustments. 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.

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

	Year Ended		
	December 31		
\$ in millions, except per share data	2018	2017	2016
Operating income	\$577	\$360	\$443
Net earnings ⁽¹⁾	456	234	288
Diluted earnings per share ⁽¹⁾	2.61	1.33	1.60

(1) Based on statutory tax rates in effect for each year presented.

Revenue recognized from performance obligations satisfied in previous reporting periods was \$631 million, \$374 million and \$463 million for the years ended December 31, 2018, 2017 and 2016, respectively.

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, 2018 was \$53.5 billion. We expect to recognize approximately 50 percent and 75 percent of our December 31, 2018 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 consist of unbilled receivables, 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 include advance payments and billings in excess of revenue recognized. 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 (liabilities) are as follows:

\$ in millions	December 31, 2018	December 31, 2017	\$ Change	%Change
Unbilled receivables, net	\$ 5,026	\$ 3,465	\$ 1,561	45 %
Advance payments and amounts in excess of costs incurred	(1,917)	(1,761)	(156)	9 %
Net contract assets (liabilities)	\$ 3,109	\$ 1,704	\$ 1,405	82 %

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. The increase in net contract assets during the year ended December 31, 2018 is principally due to the addition of \$1.0 billion of net contract assets from Innovation Systems and a reduction of amounts in excess of costs incurred at Mission Systems.

The amount of revenue recognized for the years ended December 31, 2018, 2017 and 2016 that was included in the contract liability balance at the beginning of each year was \$1.3 billion, \$1.2 billion and \$1.3 billion, respectively.

Disaggregation of Revenue

See Note 15 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 \$764 million, \$639 million and \$705 million in 2018, 2017 and 2016,

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respectively, which represented 2.5 percent, 2.5 percent and 2.9 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 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 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.

Marketable securities accounted for as trading are recorded at fair value on a recurring basis. 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 may use derivative financial instruments to manage its exposure to interest rate risk for its long-term fixed-rate debt portfolio, foreign currency exchange risk related to receipts from customers and payments to suppliers denominated in foreign currencies and commodity price risk on purchases of inventory such as copper and zinc. 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.

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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 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, 2018 and 2017, the carrying values associated with these policies were \$316 million and \$340 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:

Useful life in years, \$ in millions	Useful Life	December 31	
		2018	2017
Land and land improvements	Up to 40 ⁽¹⁾	\$ 636	\$ 420
Buildings and improvements	Up to 40	2,139	1,834
Machinery and other equipment	Up to 20	6,618	5,105
Capitalized software costs	3-5	603	537
Leasehold improvements	Length of Lease ⁽²⁾	1,745	1,395
Property, plant and equipment, at cost		11,741	9,291
Accumulated depreciation		(5,369)	(5,066)
Property, plant and equipment, net		\$ 6,372	\$ 4,225

(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.

Goodwill and other purchased intangible asset balances are included in the identifiable assets of their assigned business segment. Beginning in 2018, the company includes the amortization of other purchased intangible assets in unallocated corporate expense within operating income as such amortization is no longer 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.

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Leases

The company uses its incremental borrowing rate in the assessment of lease classification as capital or operating and defines the initial lease term to include renewal options determined to be reasonably assured. The majority of our leases are operating leases.

Many of the company's real property lease agreements contain incentives for tenant improvements, rent holidays, or rent escalation clauses. For tenant improvement incentives, the company 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 purposes of recognizing 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.

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. As a portion of environmental remediation liabilities are expected to be recoverable 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. The portion of environmental costs not expected to be recoverable is expensed.

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.

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

Because U.S. government regulations require that the costs of pension and OPB plans 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 CAS and FAS 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.

Change in Accounting Method

During the fourth quarter of 2018, we changed our GAAP accounting method related to the recognition of actuarial gains and losses for the company's pension and OPB plans (the "Accounting change"). Prior to the Accounting

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change, actuarial gains and losses were recognized as a component of Accumulated other comprehensive (loss) income upon annual remeasurement and were amortized into earnings in future periods on a plan-by-plan basis when they exceeded the accounting corridor, a defined range within which amortization of net gains and losses is not required.

Under the new method, actuarial gains and losses are immediately recognized in net periodic benefit cost 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 will continue to be recognized as a component of Accumulated other comprehensive (loss) income and amortized into earnings in future periods. While the historical accounting principle was acceptable, we believe the Accounting change is preferable as it better aligns with fair value principles by recognizing the effects of economic and interest rate changes in our pension and OPB assets and liabilities in the year in which the gains and losses are incurred rather than amortizing them over time. The Accounting change has been applied retrospectively to all prior years presented. As of January 1, 2016, the cumulative effect of this change resulted in a \$5.5 billion decrease to retained earnings and a corresponding \$5.5 billion increase to accumulated other comprehensive (loss) income, both net of tax of \$3.5 billion.

See Notes 13, 16, 17 and 18 for further information regarding the impact of the Accounting change on our current and prior period consolidated financial statements.

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) Income

The components of accumulated other comprehensive (loss) income are as follows:

\$ in millions	December 31	
	2018	2017
Unamortized prior service credit, net of tax expense of \$32 for 2018 and \$76 for 2017	\$98	\$133
Cumulative translation adjustment	(144)	(136)
Other, net	(6)	4
Total accumulated other comprehensive (loss) income	\$(52)	\$1

Unamortized prior service credit as of December 31, 2018 reflects a reclassification from accumulated other comprehensive (loss) income to retained earnings of \$25 million of stranded tax effects resulting from the 2017 Tax Act. This reclassification, which was calculated after consideration of the Accounting change, resulted from the company’s early adoption of ASU 2018-02 on January 1, 2018. See “Accounting Standards Updates” below for more information.

Reclassifications from accumulated other comprehensive (loss) income to net earnings related to the amortization of prior service credit were \$60 million, \$44 million and \$62 million, net of taxes, for the years ended December 31, 2018, 2017 and 2016, respectively. The reclassifications are included in the computation of net periodic benefit cost. See Note 13 for further information.

Reclassifications from accumulated other comprehensive (loss) income to net earnings, relating to cumulative translation adjustments, marketable securities (prior to the January 1, 2018 adoption of ASU 2016-01) and cash flow hedges were not material for the years ended December 31, 2018, 2017 and 2016.

Related Party Transactions

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

Accounting Standards Updates

On February 14, 2018, the Financial Accounting Standards Board (FASB) issued ASU No. 2018-02, Income Statement - Reporting Comprehensive Income (Topic 220): Reclassification of Certain Tax Effects from Accumulated Other Comprehensive Income. ASU 2018-02 allows companies to reclassify stranded tax effects resulting from the 2017 Tax Act from accumulated other comprehensive (loss) income to retained earnings. As described above, the company elected to early adopt ASU 2018-02 on January 1, 2018, which resulted in a reclassification of \$25 million

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of stranded tax effects, related to our unamortized prior service credits, from accumulated other comprehensive (loss) income to retained earnings. Adoption of ASU 2018-02 did not have a material impact on the company's results of operations and/or cash flows.

On March 10, 2017, the FASB issued ASU No. 2017-07, Compensation Retirement Benefits (Topic 715): Improving the Presentation of Net Periodic Pension Cost and Net Periodic Postretirement Benefit Cost. ASU 2017-07 requires employers that sponsor defined benefit pension and/or OPB plans to report the service cost component of net benefit cost in the same line item as other compensation costs arising from services rendered by the pertinent employees during the period. Employers are required to present the other components of net benefit costs in the income statement separately from the service cost component and outside a subtotal of income from operations. Additionally, only the service cost component of net periodic pension cost is eligible for asset capitalization. We adopted ASU 2017-07 on January 1, 2018 using the retrospective method. Adoption of ASU 2017-07 did not have a material impact on our consolidated statements of financial position and/or cash flows. See Note 18 for further information regarding the impact of adopting ASU 2017-17 on our consolidated statements of earnings and comprehensive income.

On February 25, 2016, the FASB issued ASU No. 2016-02, Leases (Topic 842). ASU 2016-02 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. ASU 2016-02 will be effective January 1, 2019, although early adoption is permitted. 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. The company has made substantial progress in executing our implementation plan. We have revised our controls and processes to address the lease standard and have completed the implementation and data input for our lease accounting software tool. We are electing the package of practical expedients, which, among other things, allows us to carry forward our prior lease classifications under ASC 840. However, we are not electing to adopt the hindsight practical expedient and are therefore maintaining the lease terms we previously determined under ASC 840. Adoption of the standard is expected to have an impact of approximately \$1.4 billion on our consolidated statement of financial position for the addition of lease assets and liabilities related to operating leases. ASU 2016-02 also requires expanded disclosure regarding the amounts, timing and uncertainties of cash flows related to a company's lease portfolio. We are evaluating these disclosure requirements and are incorporating the collection of relevant data into our processes in preparation for disclosure in 2019. We do not expect ASU 2016-02 to have a material impact on our annual results of operations and/or cash flows.

On January 5, 2016, the FASB issued ASU No. 2016-01, Financial Instruments (Topic 825): Recognition and Measurement of Financial Assets and Financial Liabilities. ASU 2016-01 requires equity investments that are not accounted for under the equity method of accounting or that do not result in consolidation of the investee to be measured at fair value with changes recognized in net earnings. ASU 2016-01 also eliminates the available-for-sale classification for equity investments that recognized changes in fair value as a component of other comprehensive income. We adopted ASU 2016-01 on January 1, 2018 using the modified retrospective method, which resulted in a \$4 million (net of tax) cumulative-effect adjustment from accumulated other comprehensive (loss) income to retained earnings. Adoption of ASU 2016-01 did not have a material impact on our results of operations and/or cash flows.

On May 28, 2014, the FASB issued ASU No. 2014-09, Revenue from Contracts with Customers (Topic 606). Topic 606 supersedes previous revenue recognition guidance, including ASC 605-35, Revenue Recognition - Construction-Type and Production-Type Contracts, and outlines a single set of comprehensive principles for recognizing revenue under U.S. GAAP. Among other things, it requires companies to identify contractual performance obligations and determine whether revenue should be recognized at a point in time or over time. The primary impact of the adoption of ASC Topic 606 was that, in most cases, the accounting for those contracts where

we previously recognized revenue as units were delivered changed under ASC Topic 606 such that we now recognize revenue as over time as costs are incurred. In addition, for certain of our contracts, there is a change in the number of performance obligations under ASC Topic 606, which has altered the timing of revenue and margin recognition. We adopted ASC Topic 606 on January 1, 2018 using the full retrospective method. We applied the transition practical expedient related to remaining performance obligations for reporting periods presented before the date of initial application. No other practical expedients were applied. The cumulative effect of adopting ASC Topic 606

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was a \$148 million increase to retained earnings at January 1, 2016. See Note 18 for further information regarding the impact of adopting ASC Topic 606 on our consolidated financial statements.

Other accounting standards updates adopted and/or issued, but not effective until after December 31, 2018, 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, whose main 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 acquisition was financed with proceeds from the company's debt financing completed in October 2017 and cash on hand. We believe this acquisition will enable 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.

Preliminary 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 2018, the company completed a preliminary analysis to determine the fair values of the assets acquired and liabilities assumed and the amounts recorded reflected management's initial assessment of fair value as of the Merger date. Based on additional information obtained to date, 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 and Goodwill decreased \$73 million. These adjustments did not result in a material impact on the financial results of prior periods.

The company expects to finalize its purchase price allocation within one year of the Merger date. We are continuing to analyze and assess relevant information in the following areas to determine the fair value of assets acquired and liabilities assumed as of the Merger Date: income tax and certain legal and contract-related matters. The final fair value determination could result in material adjustments to the values presented in the preliminary purchase price allocation table below.

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

\$ in millions, except per share amounts	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 preliminary purchase price allocation table presents the company's refined estimate of the fair values of assets acquired and liabilities assumed at the Merger date:

\$ in millions	As of June 6, 2018
Cash and cash equivalents	\$85
Accounts receivable	596
Unbilled receivables	1,264
Inventoried costs	220
Other current assets	214
Property, plant and equipment	1,509
Goodwill	6,222
Intangible assets	1,525
Other non-current assets	151
Total assets acquired	11,786
Trade accounts payable	(397)
Accrued employee compensation	(158)
Advance payments and amounts 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	(156)
Total liabilities assumed	(4,044)
Total purchase price	\$7,742

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

Below market contracts represent liabilities on certain acquired programs where the expected costs at completion exceed the expected sales under contract. We measured these liabilities based on the estimated price to transfer the obligations to a market participant at the Merger date plus a reasonable profit margin. These liabilities will be reduced as the company incurs costs to complete its performance obligations on the underlying programs. This reduction will be included in sales and is estimated as follows: \$64 million in 2019, \$45 million in 2020, and \$2 million in 2021.

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 preliminary purchase price allocation resulted in the recognition of \$6.2 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:

\$ in millions, except per share amounts	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:

- 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.
- 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.
- 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.
- 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.
- 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).
- 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.
- 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.
- 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 0.9 million, 1.2 million and 1.6 million shares for the years ended December 31, 2018, 2017 and 2016, respectively.

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Share Repurchases

On December 4, 2014, the company's board of directors authorized a share repurchase program of up to \$3.0 billion of the company's common stock (the "2014 Repurchase Program"). Repurchases under the 2014 Repurchase Program commenced in March 2015 and were completed in March 2016.

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 as part of 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 of \$200 million, included as a reduction to Retained earnings on the consolidated statement of financial position, 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, 2018, repurchases under the 2015 Repurchase Program totaled \$2.7 billion; \$1.3 billion remained under this share repurchase authorization. \$200 million of this share repurchase authorization was used to settle the ASR on January 4, 2019. 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		
					2018	2017	2016
December 4, 2014	\$ 3,000	18.0	\$ 166.70	March 2016	—	—	1.4
September 16, 2015	\$ 4,000	11.3	\$ 241.66		3.8	1.6	5.9
December 4, 2018	\$ 3,000	—	\$—		—	—	—
					3.8	1.6	7.3

⁽¹⁾ Includes commissions paid.

Dividends on Common Stock

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.

In May 2016, the company increased the quarterly common stock dividend 13 percent to \$0.90 per share from the previous amount of \$0.80 per share.

4. ACCOUNTS RECEIVABLE, NET

Accounts receivable, net represent amounts billed and due from customers. Substantially all accounts receivable at December 31, 2018 are expected to be collected in 2019. The company does not believe it has significant exposure

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to credit risk as accounts receivable are primarily due from the U.S. government either as the ultimate customer or in connection with foreign military sales.

Accounts receivable consisted of the following:

\$ in millions	December 31	
	2018	2017
Due from U.S. government ⁽¹⁾	\$1,164	\$825
Due from international and other customers	318	268
Accounts receivable, gross	1,482	1,093
Allowance for doubtful accounts	(34)	(39)
Accounts receivable, net	\$1,448	\$1,054

⁽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, 2018 are expected to be billed and collected in 2019. Progress and performance-based payments are reflected as an offset to the related unbilled receivable balances.

Unbilled receivables consisted of the following:

\$ in millions	December 31	
	2018	2017
Due from U.S. government ⁽¹⁾		
Unbilled receivables	\$16,823	\$12,513
Progress and performance-based payments received	(12,539)	(9,447)
Total due from U.S. government	4,284	3,066
Due from international and other customers		
Unbilled receivables	3,811	3,424
Progress and performance-based payments received	(3,030)	(2,986)
Total due from international and other customers	781	438
Unbilled receivables, net of progress and performance-based payments received	5,065	3,504
Allowance for doubtful accounts	(39)	(39)
Unbilled receivables, net	\$5,026	\$3,465

⁽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 from 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:

\$ in millions	December 31	
	2018	2017
Production costs of contracts in process	\$402	\$312
G&A expenses	16	30
	418	342
Progress and performance-based payments received	(41)	(41)
	377	301
Product inventory and raw material	277	97
Inventoried costs, net	\$654	\$398

7. INCOME TAXES

In December 2017, the 2017 Tax Act was enacted. The 2017 Tax Act includes a number of changes to previous U.S. tax laws that impact 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. The 2017 Tax Act also provides for a one-time transition tax on certain foreign earnings and the acceleration of depreciation for certain assets placed into service after September 27, 2017 as well as prospective changes which began in 2018, including repeal of the domestic manufacturing deduction, capitalization of research and development expenditures, additional limitations on executive compensation and limitations on the deductibility of interest.

The company recognized the income tax effects of the 2017 Tax Act in its financial statements in accordance with Staff Accounting Bulletin (SAB) No. 118, which provides SEC staff guidance for the application of ASC Topic 740, Income Taxes. The company finalized its accounting for the income tax effects of the 2017 Tax Act in the third quarter of 2018.

The following tables present the impact of the 2017 Tax Act relating to SAB 118 amounts as an increase (decrease) reflected in the noted line items in the Consolidated Statements of Earnings and Comprehensive Income and Consolidated Statements of Financial Position:

\$ in millions	Year Ended			
	December 31		December 31	
	2018	2017	2018	2017
	Income Tax Expense		Income Tax Rate	
Reduction of U.S. Corporate Income Tax Rate	\$—	\$265	— %	6.3 %
Transition Tax on Foreign Earnings	5	13	0.1	0.3
Acceleration of Depreciation	—	5	—	0.1
Other	—	2	—	0.1
Total	\$5	\$285	0.1 %	6.8 %
	Year Ended December 31			
\$ in millions	2018	2017	2018	2017
	Deferred Tax Assets		Other Current Liabilities	

Reduction of U.S. Corporate Income Tax Rate	\$—	\$(265)	\$—	\$—
Transition Tax on Foreign Earnings	(5)	(13)	—	—
Acceleration of Depreciation	17	(80)	17	(75)
Other	—	—	—	2
Total	\$12	\$(358)	\$17	\$(73)

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Income Tax Expense

Federal and foreign income tax expense consisted of the following:

\$ in millions	Year Ended December 31		
	2018	2017	2016
Federal income tax expense:			
Current	\$ 292	\$ 449	\$ 661
Deferred	213	907	(36)
Total federal income tax expense	505	1,356	625
Foreign income tax expense:			
Current	7	8	14
Deferred	1	(4)	(1)
Total foreign income tax expense	8	4	13
Total federal and foreign income tax expense	\$ 513	\$ 1,360	\$ 638

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

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:

\$ in millions	Year Ended December 31					
	2018		2017		2016	
Income tax expense at statutory rate	\$786	21.0 %	\$1,480	35.0 %	\$938	35.0 %
Stock compensation - excess tax benefits	(27)	(0.7)	(48)	(1.1)	(85)	(3.2)
Research credit	(186)	(5.0)	(130)	(3.1)	(61)	(2.2)
Manufacturing deduction	—	—	(97)	(2.3)	(58)	(2.2)
Settlements with taxing authorities	—	—	(42)	(1.0)	(40)	(1.5)
Repatriation of non-U.S. earnings	—	—	—	—	(33)	(1.2)
Impacts related to the 2017 Tax Act	(84)	(2.2)	285	6.8	—	—
MTM benefit tax rate differential ⁽¹⁾	—	—	(72)	(1.7)	—	—
Other, net	24	0.6	(16)	(0.4)	(23)	(0.9)
Total federal and foreign income taxes	\$513	13.7 %	\$1,360	32.2 %	\$638	23.8 %

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

2018 – The effective tax rate for 2018 was 13.7 percent, as compared with 32.2 percent in 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.

2017 – The effective tax rate for 2017 was 32.2 percent, as compared with 23.8 percent in 2016. The higher rate is principally due to \$285 million of tax expense recorded in connection with the 2017 Tax Act, largely due to the write-down of net deferred tax assets, partially offset by a \$69 million increase in research credits and a \$39 million benefit recognized for additional manufacturing deductions principally related to prior years. The effective tax rates for the years ended December 31, 2017 and 2016 each include separate approximately \$40 million benefits recognized in connection with the resolution of Internal Revenue Service (IRS) examinations of the company's prior year tax returns.

Income tax payments, net of refunds received, were \$270 million, \$517 million and \$691 million for the years ended December 31, 2018, 2017 and 2016, respectively.

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Uncertain Tax Positions

In connection with the Merger, the company has initially recognized an increase in unrecognized tax benefits of approximately \$160 million for matters associated with legacy Orbital ATK, principally related to federal and state research credits. In addition, during 2018, we increased our unrecognized tax benefits related to our methods of accounting associated with the 2017 Tax Act by approximately \$100 million and it is reasonably possible that within the next twelve months those unrecognized tax benefits may increase by up to an additional \$70 million.

We file income tax returns in the U.S. federal jurisdiction and in various state and foreign jurisdictions. The Northrop Grumman 2014-2015 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 and nine-month transition period ended December 31, 2015 are currently under IRS examination.

Tax returns for open tax years related to state and foreign jurisdictions remain subject to examination, but the amounts currently subject to examination are not material.

The change in unrecognized tax benefits during 2018, 2017 and 2016, excluding interest, is as follows:

\$ in millions	December 31		
	2018	2017	2016
Unrecognized tax benefits at beginning of the year	\$283	\$135	\$223
Additions based on tax positions related to the current year	293	102	35
Additions for tax positions of prior years	207	110	2
Reductions for tax positions of prior years	(23)	(44)	(40)
Settlements with taxing authorities	(7)	(20)	(84)
Other, net	(5)	—	(1)
Net change in unrecognized tax benefits	465	148	(88)
Unrecognized tax benefits at end of the year	\$748	\$283	\$135

These liabilities, along with \$24 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, \$430 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:

\$ in millions	December 31	
	2018	2017
Deferred Tax Assets		
Retiree benefits	\$1,541	\$1,477
Accrued employee compensation	308	263
Provisions for accrued liabilities	139	193
Inventory	650	447
Stock-based compensation	42	46
Tax credits	174	9
Other	59	30
Gross deferred tax assets	2,913	2,465
Less valuation allowance	(142)	(26)
Net deferred tax assets	2,771	2,439
Deferred Tax Liabilities		
Goodwill	511	508
Purchased intangibles	346	9
Property, plant and equipment, net	518	256
Contract accounting differences	1,381	1,182
Other	29	37
Deferred tax liabilities	2,785	1,992
Total net deferred tax (liabilities) assets	\$(14)	\$447

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, 2018, the company has available tax credits and unused net operating losses of \$255 million and \$330 million, respectively, that may be applied against future taxable income. The majority of tax credits and net operating losses expire in 2019 through 2039, 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 \$110 million and \$27 million as of December 31, 2018, respectively.

Undistributed Foreign Earnings

As of December 31, 2018, 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, Innovation Systems was established as a new, fourth business sector of the company. The Merger resulted in the recognition of \$6.2 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. The amount of goodwill recognized is subject to change, pending the final determination of the fair value of assets acquired and liabilities assumed in connection with the Merger (see Note 2).

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Changes in the carrying amounts of goodwill for the years ended December 31, 2017 and 2018, were as follows:

\$ in millions	Aerospace Innovation		Mission	Technology	Total
	Systems	Systems	Systems	Services	
Balance as of December 31, 2016	\$ 3,742	\$ —	\$ 6,694	\$ 2,014	\$ 12,450
Other ⁽¹⁾	—	—	2	3	5
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

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

Accumulated goodwill impairment losses at December 31, 2018 and 2017, totaled \$570 million at Aerospace Systems.

Other Purchased Intangible Assets

Net customer-related and other intangible assets, including the fair value of purchased intangible assets acquired in the Merger, are as follows:

\$ in millions	December 31	
	2018	2017
Gross customer-related and other intangible assets	\$3,356	\$1,833
Less accumulated amortization	(1,984)	(1,781)
Net customer-related and other intangible assets	\$1,372	\$52

Amortization expense for 2018, 2017 and 2016, was \$203 million, \$14 million and \$16 million, respectively. The company's other purchased intangible assets are being amortized over an aggregate weighted-average period of 12 years. As of December 31, 2018, the expected future amortization of purchased intangibles for each of the next five years is as follows:

\$ in millions	
2019	\$331
2020	262
2021	204
2022	197
2023	78

9. FAIR VALUE OF FINANCIAL INSTRUMENTS

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; and therefore are not required to be categorized in the fair value hierarchy table below. Marketable securities are included in Other non-current assets in the consolidated statements of financial position.

The company's derivative portfolio consists primarily of commodity forward contracts and foreign currency forward contracts. As a result of the Merger, the company assumed commodity forward contracts, which Innovation Systems periodically uses to hedge forecasted purchases of certain commodities. The contracts generally establish a fixed price for the underlying commodity and are designated and qualify as effective cash flow hedges of such commodity purchases. Commodity derivatives are valued based on prices of future exchanges and recently reported transactions in the marketplace. 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.

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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.

\$ in millions	December 31, 2018			December 31, 2017		
	Level	Level	Total	Level	Level	Total
	1	2		1	2	
Financial Assets (Liabilities)						
Marketable securities	\$ 319	\$ 1	\$ 320	\$ 352	\$ 1	\$ 353
Marketable securities valued using NAV	—	—	15	—	—	—
Total marketable securities	319	1	335	352	1	353
Derivatives	—	(10)	(10)	—	—	—

At December 31, 2018, the company had commodity forward contracts outstanding that hedge forecasted commodity purchases of 10 million pounds of copper and 4 million pounds of zinc. Gains or losses on the commodity forward contracts are recognized in product and service cost as the performance obligations on related contracts are satisfied. The notional value of the company's foreign currency forward contracts at December 31, 2018 and 2017 was \$114 million and \$89 million, respectively. At December 31, 2018, no portion of the notional value was designated as a cash flow hedge. The portion of the notional value designated as a cash flow hedge at December 31, 2017 was \$8 million.

The derivative fair values and related unrealized gains/losses at December 31, 2018 and 2017 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, 2018 and 2017.

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

10. DEBT

Unsecured Senior Notes

In October 2017, the company issued \$8.25 billion of unsecured senior notes to finance the Orbital ATK Acquisition and to pay related fees and expenses as follows:

- \$1.0 billion of 2.08 percent Senior Notes due 2020 (the "2020 Notes"),
- \$1.5 billion of 2.55 percent Senior Notes due 2022 (the "2022 Notes"),
- \$1.5 billion of 2.93 percent Senior Notes due 2025 (the "2025 Notes"),
- \$2.0 billion of 3.25 percent Senior Notes due 2028 (the "2028 Notes") and
- \$2.25 billion of 4.03 percent Senior Notes due 2047 (the "2047 Notes").

In December 2016, the company issued \$750 million of unsecured senior notes due February 1, 2027, with a fixed interest rate of 3.20 percent. We used the net proceeds from this offering for a debt repayment of \$200 million in the fourth quarter of 2016 and for general corporate purposes.

Commercial Paper

In May 2018, the company commenced a commercial paper program that serves as a source of short-term financing. In September 2018, the company amended its commercial paper program to increase its capacity to issue unsecured commercial paper notes from \$750 million up to \$2.0 billion. The commercial paper notes outstanding have original maturities of three months or less from the date of issuance. 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. 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 new five-year senior unsecured credit facility in an aggregate principal amount of \$2.0 billion (the "2018 Credit Agreement"). The 2018 Credit Agreement replaced the company's prior

five-year revolving credit facility in an aggregate amount of \$1.6 billion entered into on July 8, 2015. 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, 2018, there was no balance outstanding under this facility; however, the outstanding balance of commercial paper borrowings reduces the amount available for borrowing under the 2018 Credit Agreement.

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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 \$152 million as of December 31, 2018) (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, 2018, there was £85 million (the equivalent of approximately \$108 million as of December 31, 2018) outstanding under this facility, which bears interest at a rate of LIBOR plus 1.10 percent. All of the borrowings outstanding under this facility mature less than one year from the date of issuance, but may be renewed under the terms of the facility. Based on our intent and ability to refinance the obligations on a long-term basis, substantially all of the borrowings are classified as non-current.

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, 2018, the company was in compliance with all covenants under its credit agreements.

Long-term debt consists of the following:

\$ in millions		December 31	
		2018	2017
Fixed-rate notes and debentures, maturing in	Interest rate		
2018	1.75%	\$—	\$850
2019	5.05%	500	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%	108	134
Other	Various	272	271
Debt issuance costs		(73)	(82)
Total long-term debt		14,400	15,266
Less: current portion ⁽¹⁾		517	867
Long-term debt, net of current portion		\$13,883	\$14,399

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

In connection with the Merger, the company assumed \$1.7 billion of long-term debt, all of which was repaid as of December 31, 2018.

The estimated fair value of long-term debt was \$14.3 billion and \$16.0 billion as of December 31, 2018 and 2017, 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 \$456 million, \$273 million, and \$299 million for the years ended December 31, 2018, 2017 and 2016, respectively.

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Maturities of long-term debt as of December 31, 2018, are as follows:

\$ in millions

Year Ending December 31

2019	\$517
2020	1,127
2021	741
2022	1,505
2023	1,053
Thereafter	9,532
Total principal payments	14,475
Unamortized premium on long-term debt, net of discount	(2)
Debt issuance costs	(73)
Total long-term debt	\$14,400

11. INVESTIGATIONS, CLAIMS AND LITIGATION

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 December 19, 2014, the company filed a motion for partial summary judgment asking the court to dismiss the principal counterclaim referenced above. On June 29, 2015, the Court heard argument and denied that motion without prejudice to filing a later motion to dismiss. On February 16, 2018, both the company and the United States filed motions to dismiss many of the claims and counterclaims 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. On December 17, 2018, the court issued a Scheduling Order, proposed by the parties, providing for the parties to engage in mediation through March 1, 2019, and for pretrial activities then to resume, if and as necessary, with trial to commence on or about September 23, 2019. 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 \$29 million as of December 31, 2018), plus interest, inflation adjustments and attorneys' fees, as authorized by Brazilian law, which amounts could be significant over time. The original suit

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sought R\$89 million (the equivalent of approximately \$23 million as of December 31, 2018) in damages. In October 2013, ECT asserted an additional damage claim of R\$22 million (the equivalent of approximately \$6 million as of December 31, 2018). 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 equivalent of approximately \$35 million as of December 31, 2018), 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 and awarded damages of R\$41 million (the equivalent of approximately \$11 million as of December 31, 2018) 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. Once the court officially publishes the decision, the parties will have 10 days to file a motion for clarification with the trial court or 30 days to file an appeal with the intermediate court of appeals.

The company previously identified and disclosed to the U.S. government various issues relating primarily to time-charging practices of some employees working on a particular program with remote deployments. In the fourth quarter of 2018, the Department of Justice concluded its investigations as to the company and settled the matter with the company. As part of the settlement, the company paid a total of \$30 million, largely in restitution and repayment, and agreed to continue to cooperate with the government's ongoing investigation.

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 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 and may become a party to various legal proceedings and disputes related to remediation and/or alleged environmental impacts in Bethpage, including with federal and state entities, local municipalities and water districts, insurance carriers and class action and individual plaintiffs alleging personal injury and property damage. 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, a putative class action complaint, naming Orbital ATK and two of its then-officers as defendants, Steven Knurr, et al. v. Orbital ATK, Inc., No. 16-cv-01031 (TSE-MSN), was filed in the United States District Court for the Eastern District of Virginia. The complaint asserts claims on behalf of purchasers of Orbital ATK securities for violations of Sections 10(b) and 20(a) of the Exchange Act and Rule 10b-5, 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, it 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. On April 24, 2017 and October 10, 2017, the plaintiffs filed amended complaints naming additional defendants and asserting

claims for alleged violations of additional sections of the Exchange Act and alleged false and misleading statements in Orbital ATK's Form S-4 filed in connection with the Orbital-ATK Merger. The complaint seeks damages, reasonable costs and expenses at trial, including counsel and expert fees, and such other relief as deemed appropriate by the Court. On August 8, 2018, plaintiffs sought leave to file an additional amended complaint; defendants filed an opposition. The parties engaged in mediation on November 6, 2018. On December 27, 2018, the parties reached a preliminary agreement to resolve the litigation for \$108 million, subject to agreement on additional terms and to court approval. On January 15, 2019, the court issued an order setting a schedule for final settlement approval proceedings. Consistent with that order, on January 30, 2019, the parties submitted a joint motion for preliminary settlement approval, with supporting documents. The schedule suggests a final approval settlement hearing in the second quarter of 2019. The company is also negotiating with and pursuing coverage litigation against various of its insurance carriers. The company intends vigorously to defend itself in connection with these matters.

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We currently expect related contingencies will continue to be included in the company's measurement period adjustments of the fair value of assets acquired and liabilities assumed in the Merger (see Note 2).

The SEC is investigating Orbital ATK's historical accounting practices relating to the restatement of Orbital's unaudited condensed consolidated financial statements for the quarterly periods ended July 5, 2015 and October 4, 2015 described in the Transition Report on Form 10-K for the nine-month period ending December 31, 2015 previously filed on March 15, 2016. The SEC is also investigating matters relating to a voluntary disclosure Orbital ATK made concerning the restatement described in Orbital ATK's Form 10-K/A for the nine-month period ending December 31, 2015 filed on February 24, 2017. The ultimate outcome of these matters, including any possible loss, cannot be predicted or reasonably estimated at this time and the company intends to continue to cooperate with the SEC.

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, 2018, 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 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, 2018, or its annual results of operations and/or cash flows.

Environmental Matters

The table below summarizes management's estimate of the range of reasonably possible future costs for environmental remediation, the amount accrued within that range, and the deferred costs expected to be recoverable through overhead charges on U.S. government contracts as of December 31, 2018 and 2017:

\$ in millions	Range of Reasonably Possible Future Costs ⁽¹⁾	Accrued Deferred	
		Costs ⁽²⁾	Costs ⁽³⁾
December 31, 2018	\$447 - \$835	\$ 461	\$ 343
December 31, 2017	405 - 792	410	207

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.

⁽²⁾ As of December 31, 2018, \$159 million is recorded in Other current liabilities and \$302 million is recorded in Other non-current liabilities.

As of December 31, 2018, \$127 million is deferred in Prepaid expenses and other current assets and \$216 million

⁽³⁾ is deferred in Other non-current assets. These amounts reflect a \$103 million increase during 2018 in our estimated recovery of certain environmental remediation costs and are evaluated for recoverability on a routine basis.

As a result of the Merger, we assumed certain environmental remediation liabilities that are included in the accrued costs above, along with the related deferred costs expected to be recoverable on U.S. government contracts.

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, 2018, or its annual results of operations and/or cash flows. With respect to Bethpage, as described in Note 11, we cannot at this time estimate the range of reasonably possible additional future costs that could result from potential changes to remediation standards or requirements to which we are subject.

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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, 2018, there were \$542 million of stand-by letters of credit and guarantees and \$201 million of surety bonds outstanding.

Indemnifications

The company has provided indemnification 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, 2018, or its annual results of operations and/or cash flows.

Operating Leases

Rental expense for operating leases was \$375 million, \$300 million and \$298 million in 2018, 2017 and 2016, respectively. These amounts are net of immaterial amounts of sublease rental income. Minimum rental commitments under long-term non-cancelable operating leases as of December 31, 2018 are payable 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

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 their 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 to these defined contribution plans for the years ended December 31, 2018, 2017 and 2016, were \$403 million, \$344 million and \$311 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 provides 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

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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

As discussed in Note 1, during the fourth quarter of 2018, we changed our accounting method related to the recognition of actuarial gains and losses for our pension and OPB plans. Under the new method, actuarial gains and losses are immediately recognized in net periodic benefit cost upon annual remeasurement in the fourth quarter, or on an interim basis as triggering events warrant remeasurement. These changes have been applied retrospectively to all prior years presented below. See Notes 1, 16, 17 and 18 for further information regarding the impact of the change in accounting principle on our consolidated financial statements.

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

\$ in millions	Year Ended December 31					
	Pension Benefits			Medical and Life Benefits		
	2018	2017	2016	2018	2017	2016
Components of net periodic benefit cost						
Service cost	\$404	\$388	\$390	\$21	\$20	\$29
Interest cost	1,226	1,250	1,302	76	85	95
Expected return on plan assets	(2,217)	(1,885)	(1,853)	(101)	(89)	(86)
Amortization of prior service credit	(58)	(57)	(60)	(21)	(22)	(22)
Mark-to-market expense (benefit)	699	(445)	1,041	(44)	(91)	(91)
Other	—	(7)	—	—	—	—
Net periodic benefit cost	\$54	\$(756)	\$820	\$(69)	\$(97)	\$(75)

Changes in Presentation

As discussed in Note 1, we adopted ASU 2017-07 on January 1, 2018 using the retrospective method, which changed the financial statement presentation of service costs and the other components of net periodic benefit cost. The service cost component continues to be included in operating income; however, the other components are now presented in Net FAS (non-service) pension benefit and MTM (expense) benefit in the consolidated statements of earnings and comprehensive income. In addition, interest on service cost, which has historically been included in service cost, is now presented in interest cost. Further, to conform our presentation of service costs for all plans, administrative expenses previously included in service cost for certain plans are now consistently presented in the MTM (expense) benefit component. As a result, the company reclassified interest on service cost of \$16 million and \$18 million and plan administrative expenses of \$20 million and \$38 million from service cost to the interest cost and MTM (expense) benefit components, respectively, for its pension plans for the years ended December 31, 2017 and 2016, respectively, to conform to the current year presentation. For the company's medical and life benefit plans, plan administrative expenses of \$2 million were reclassified from service cost to the MTM (expense) benefit component for the year ended December 31, 2017 and interest on service costs of \$1 million were reclassified from service cost to the interest cost component for the year ended December 31, 2016 to conform to the current year presentation. This change in presentation had no impact on net periodic benefit cost.

The table below summarizes the components of changes in unamortized prior service credit for the years ended December 31, 2016, 2017 and 2018:

\$ in millions	Pension Benefits	Medical and Life Benefits	Total
Changes in unamortized prior service credit			
Amortization of prior service credit	\$ 60	\$ 22	\$82

Tax expense	(11)	(9)	(20)
Change in unamortized prior service credit – 2016	49	13	62
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

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We expect to recognize \$59 million and \$3 million of prior year service credit related to our pension benefit and medical and life benefit plans, respectively, in net periodic benefit cost in 2019.

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

\$ in millions	Pension Benefits		Medical and Life Benefits	
	2018	2017	2018	2017
Plan Assets				
Fair value of plan assets at beginning of year	\$27,226	\$24,384	\$1,338	\$1,208
Net (loss) gain on plan assets	(1,043)	3,885	(65)	208
Employer contributions	370	596	38	45
Participant contributions	9	11	25	24
Benefits paid	(1,685)	(1,617)	(148)	(144)
Acquired plan assets	2,293	—	58	—
Other	(20)	(33)	1	(3)
Fair value of plan assets at end of year	27,150	27,226	1,247	1,338
Projected Benefit Obligation				
Projected benefit obligation at beginning of year	31,967	30,409	2,110	2,100
Service cost	404	388	21	20
Interest cost	1,226	1,250	76	85
Participant contributions	9	11	25	24
Actuarial loss (gain)	(2,561)	1,544	(211)	26
Benefits paid	(1,685)	(1,617)	(148)	(144)
Acquired benefit obligation	2,895	—	50	—
Other	(24)	(18)	7	(1)
Projected benefit obligation at end of year	32,231	31,967	1,930	2,110
Funded status	\$(5,081)	\$(4,741)	\$(683)	\$(772)

Classification of amounts recognized in the consolidated statements of financial position

Non-current assets	\$77	\$82	\$124	\$112
Current liability	(164)	(154)	(46)	(42)
Non-current liability	(4,994)	(4,669)	(761)	(842)

The accumulated benefit obligation for all defined benefit pension plans was \$31.9 billion and \$31.6 billion at December 31, 2018 and 2017, respectively.

Amounts for pension plans with accumulated benefit obligations in excess of fair value of plan assets are as follows:

\$ in millions	December 31	
	2018	2017
Projected benefit obligation	\$30,259	\$29,804
Accumulated benefit obligation	29,961	29,454
Fair value of plan assets	25,101	24,981

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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	
	2018	2017	2018	2017
Assumptions used to determine benefit obligation at 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		
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
Assumptions used to determine benefit cost for the year ended December 31				
Discount rate	3.68 %	4.19 %	3.66 %	4.13 %
Initial cash balance crediting rate assumed for the next year	2.75 %	3.10 %		
Rate to which the cash balance crediting rate is assumed to increase (the ultimate rate)	3.00 %	3.60 %		
Year that the cash balance crediting rate reaches the ultimate rate	2023	2022		
Expected long-term return on plan assets	8.00 %	8.00 %	7.65 %	7.70 %
Rate of compensation increase	3.00 %	3.00 %		
Initial health care cost trend rate assumed for the next year			6.50 %	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	2020

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 addition to our historical investment performance, we consider several factors, including current market data such as yields/price-earnings ratios, historical market returns over long periods and periodic surveys of investment managers' expectations. Using policy target allocation percentages and the asset class expected returns, we calculate a weighted-average expected long-term rate of return. 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.

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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, 2018:

	Asset Allocation Ranges
Cash and cash equivalents	0% - 12%
Global Public Equities	35% - 55%
Fixed-income securities	20% - 40%
Alternative investments	13% - 33%

The table below provides the fair values of the company's pension and Voluntary Employee Beneficiary Association (VEBA) trust plan assets at December 31, 2018 and 2017, by asset category. The table also identifies the level of inputs used to determine the fair value of assets in each category. See Note 1 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, 2018 and 2017, there were no investments expected to be sold at a value materially different than NAV.

\$ in millions	Level 1		Level 2		Level 3		Total	
	2018	2017	2018	2017	2018	2017	2018	2017
Asset category								
Cash and cash equivalents	\$209	\$55	\$2,655	\$4,086			\$2,864	\$4,141
U.S. equities	2,859	3,365			\$ 1		2,859	3,366
International equities	2,711	2,453			\$1 1		2,712	2,454
Fixed-income securities								
U.S. Treasuries	26	—	1,501	1,282			1,527	1,282
U.S. Government Agency			322	345			322	345
Non-U.S. Government			206	135			206	135
Corporate debt	34	—	4,141	4,406			4,175	4,406
Asset backed			297	255			297	255
High yield debt	11	—	153	866			164	866
Bank loans			20	248			20	248
Other Assets	15	15	51	3	2	2	68	20
Investments valued using NAV as a practical expedient								
U.S. equities							1,170	1,053
International equities							4,017	4,315
Fixed-income funds							1,386	129
Hedge funds							351	166
Opportunistic investments							1,367	873
Private equities							2,510	2,091
Real estate funds							2,382	2,419
Fair value of plan assets at the end of the year	\$5,865	\$5,888	\$9,346	\$11,626	\$3	\$ 4	\$28,397	\$28,564

There were no transfers of plan assets between the three levels of the fair value hierarchy during the years ended December 31, 2018 and 2017.

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

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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 \$76 million and \$34 million, derivative liabilities with a fair value of \$52 million and \$19 million, and net notional amounts of \$3.2 billion and \$3.3 billion, as of December 31, 2018 and 2017, 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 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, 2018 and 2017, 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, 2018 and 2017, there were no unfunded commitments.

Hedge funds: The redemption period of hedge funds is generally monthly or quarterly with various notice requirements from 30 to 95 days. As of December 31, 2018 and 2017, there were no unfunded commitments.

Opportunistic investments: Opportunistic investments are primarily held in partnerships with a 5-10 year life. As of December 31, 2018 and 2017, unfunded commitments were \$1.1 billion and \$768 million, respectively.

Private equities: 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, 2018 and 2017, unfunded commitments were \$1.8 billion and \$1.4 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, 2018 and 2017, unfunded commitments were \$73 million and \$71 million, respectively.

For the years ended December 31, 2018 and 2017, 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, 2018:

\$ in millions	Pension Plans	Medical and Life Plans	Total
Year Ending December 31			
2019	\$ 1,781	\$ 153	\$1,934
2020	1,834	155	1,989
2021	1,880	142	2,022
2022	1,928	141	2,069
2023	1,970	139	2,109
2024 through 2028	10,384	651	11,035

In 2019, the company expects to contribute the required minimum funding of approximately \$91 million to its pension plans and approximately \$50 million to its medical and life benefit plans. During the year ended December 31, 2018, the company made voluntary pension contributions of \$280 million.

14. STOCK COMPENSATION PLANS AND OTHER COMPENSATION ARRANGEMENTS

Stock Compensation Plans

At December 31, 2018, 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 the 1993 Stock Plan for Non-Employee Directors (1993 SPND).

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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, 2018, 5.9 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 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 upon payment of 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. Prior to January 1, 2016, the Director Program and the 1993 SPND provided for quarterly award and vesting of an annual equity retainer in the form of deferred stock units (Automatic Stock Units) to be paid upon the conclusion of a director’s board service, or earlier, as specified by the director, if the director had five or more years of service.

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, 2018, 2017 and 2016 was \$86 million, \$94 million and \$93 million, respectively. The related tax benefits for stock-based compensation for the years ended December 31, 2018, 2017 and 2016 were \$27 million, \$48 million and \$85 million, respectively.

At December 31, 2018, there was \$108 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, 2016, 2017 and 2018, 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, 2016	1,586	\$ 122	1.2
Granted	483	186	
Vested	(872)	97	
Forfeited	(49)	143	
Outstanding at December 31, 2016	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

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 \$93 million, \$96 million and \$97 million during the years ended December 31, 2018, 2017 and 2016, 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:

	Year Ended December 31		
\$ in millions	2018	2017	2016
Minimum aggregate payout amount	\$36	\$38	\$39
Maximum aggregate payout amount	205	201	199

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, 2018, there was \$137 million of unrecognized compensation expense related to cash awards.

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15. 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:

\$ in millions	Year Ended December 31		
	2018	2017	2016
Sales			
Aerospace Systems	\$13,096	\$12,131	\$10,853
Innovation Systems	3,276	—	—
Mission Systems	11,709	11,470	11,161
Technology Services	4,297	4,687	4,765
Intersegment eliminations	(2,283)	(2,284)	(2,073)
Total sales	30,095	26,004	24,706
Operating income			
Aerospace Systems	1,411	1,289	1,198
Innovation Systems	343	—	—
Mission Systems	1,520	1,442	1,468
Technology Services	443	449	456
Intersegment eliminations	(270)	(277)	(258)
Total segment operating income	3,447	2,903	2,864
Net FAS (service)/CAS pension adjustment	613	638	457
Unallocated corporate expense	(277)	(319)	(39)
Other	(3)	(4)	(5)
Total operating income	\$3,780	\$3,218	\$3,277
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 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.

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Disaggregation of Revenue

Sales by Customer Type	Year Ended December 31					
	2018		2017		2016	
\$ in millions	\$	% ⁽³⁾	\$	% ⁽³⁾	\$	% ⁽³⁾
Aerospace Systems						
U.S. Government ⁽¹⁾	\$11,380	87 %	\$10,521	87 %	\$9,277	86 %
International ⁽²⁾	1,371	10 %	1,160	10 %	1,192	11 %
Other Customers	148	1 %	155	1 %	144	1 %
Intersegment sales	197	2 %	295	2 %	240	2 %
Aerospace Systems sales	13,096	100 %	12,131	100 %	10,853	100 %
Innovation Systems						
U.S. Government ⁽¹⁾	2,241	68 %	—	—	—	—
International ⁽²⁾	615	19 %	—	—	—	—
Other Customers	293	9 %	—	—	—	—
Intersegment sales	127	4 %	—	—	—	—
Innovation Systems sales	3,276	100 %	—	—	—	—
Mission Systems						
U.S. Government ⁽¹⁾	8,803	75 %	8,876	77 %	8,737	78 %
International ⁽²⁾	1,647	14 %	1,540	14 %	1,416	13 %
Other Customers	114	1 %	100	1 %	133	1 %
Intersegment sales	1,145	10 %	954	8 %	875	8 %
Mission Systems sales	11,709	100 %	11,470	100 %	11,161	100 %
Technology Services						
U.S. Government ⁽¹⁾	2,372	55 %	2,572	55 %	2,722	57 %
International ⁽²⁾	801	19 %	752	16 %	687	15 %
Other Customers	310	7 %	328	7 %	398	8 %
Intersegment sales	814	19 %	1,035	22 %	958	20 %
Technology Services sales	4,297	100 %	4,687	100 %	4,765	100 %
Total						
U.S. Government ⁽¹⁾	24,796	82 %	21,969	85 %	20,736	84 %
International ⁽²⁾	4,434	15 %	3,452	13 %	3,295	13 %
Other Customers	865	3 %	583	2 %	675	3 %
Total Sales	\$30,095	100 %	\$26,004	100 %	\$24,706	100 %

Sales to the U.S. government include sales from contracts for which we are the prime contractor, as well as those

⁽¹⁾ 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.

NORTHROP GRUMMAN CORPORATION

Sales by Contract Type	Year Ended December 31					
	2018		2017		2016	
\$ in millions	\$	% ⁽¹⁾	\$	% ⁽¹⁾	\$	% ⁽¹⁾
Aerospace Systems						
Cost-type	\$7,634	59%	\$7,193	61%	\$6,484	61%
Fixed-price	5,265	41%	4,643	39%	4,129	39%
Intersegment sales	197		295		240	
Aerospace System sales	13,096		12,131		10,853	
Innovation Systems						
Cost-type	843	27%	—	—	—	—
Fixed-price	2,306	73%	—	—	—	—
Intersegment sales	127		—		—	
Innovation System sales	3,276		—		—	
Mission Systems						
Cost-type	4,939	47%	5,311	51%	5,200	51%
Fixed-price	5,625	53%	5,205	49%	5,086	49%
Intersegment sales	1,145		954		875	
Mission System sales	11,709		11,470		11,161	
Technology Services						
Cost-type	1,588	46%	1,693	46%	1,770	46%
Fixed-price	1,895	54%	1,959	54%	2,037	54%
Intersegment sales	814		1,035		958	
Technology Services sales	4,297		4,687		4,765	
Total						
Cost-type	15,004	50%	14,197	55%	13,454	54%
Fixed-price	15,091	50%	11,807	45%	11,252	46%
Total Sales	\$30,095		\$26,004		\$24,706	

⁽¹⁾ Percentages calculated based on external customer sales.

NORTHROP GRUMMAN CORPORATION

Sales by Geographic Region	Year Ended December 31					
	2018		2017		2016	
\$ in millions	\$	% ⁽²⁾	\$	% ⁽²⁾	\$	% ⁽²⁾
Aerospace Systems						
United States	\$11,528	89%	\$10,676	90%	\$9,421	89%
Asia/Pacific	705	6%	649	6%	579	5%
All other ⁽¹⁾	666	5%	511	4%	613	6%
Intersegment sales	197		295		240	
Aerospace Systems sales	13,096		12,131		10,853	
Innovation Systems						
United States	2,534	80%	—	—	—	—
Asia/Pacific	151	5%	—	—	—	—
All other ⁽¹⁾	464	15%	—	—	—	—
Intersegment sales	127		—		—	
Innovation Systems sales	3,276		—		—	
Mission Systems						
United States	8,917	85%	8,976	86%	8,870	86%
Asia/Pacific	659	6%	671	6%	514	5%
All other ⁽¹⁾	988	9%	869	8%	902	9%
Intersegment sales	1,145		954		875	
Mission Systems sales	11,709		11,470		11,161	
Technology Services						
United States	2,682	77%	2,900	79%	3,120	82%
Asia/Pacific	151	4%	141	4%	119	3%
All other ⁽¹⁾	650	19%	611	17%	568	15%
Intersegment sales	814		1,035		958	
Technology Services sales	4,297		4,687		4,765	
Total						
United States	25,661	85%	22,552	87%	21,411	87%
Asia/Pacific	1,666	6%	1,461	5%	1,212	5%
All other ⁽¹⁾	2,768	9%	1,991	8%	2,083	8%
Total Sales	\$30,095		\$26,004		\$24,706	

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

⁽²⁾ Percentages calculated based on external customer sales.

NORTHROP GRUMMAN CORPORATION

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:

\$ in millions	Year Ended December 31					
	2018		2017		2016	
	Sales	Operating Income	Sales	Operating Income	Sales	Operating Income
Intersegment sales and operating income						
Aerospace Systems	\$197	\$ 23	\$295	\$ 33	\$240	\$ 28
Innovation Systems	127	1	—	—	—	—
Mission Systems	1,145	165	954	141	875	136
Technology Services	814	81	1,035	103	958	94
Total	\$2,283	\$ 270	\$2,284	\$ 277	\$2,073	\$ 258

Assets

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

\$ in millions	December 31	
	2018	2017
Assets		
Aerospace Systems	\$9,750	\$8,497
Innovation Systems	10,368	—
Mission Systems	11,047	10,389
Technology Services	2,957	3,014
Segment assets	34,122	21,900
Corporate assets ⁽¹⁾	3,531	13,228
Total assets	\$37,653	\$35,128

(1) Corporate assets principally consist of cash and cash equivalents, 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:

\$ in millions	Year Ended December 31					
	2018			2017		
	Capital Expenditures	2017	2016	Capital Expenditures	2017	2016
Aerospace Systems	\$781	\$665	\$451	\$243	\$234	\$216
Innovation Systems	141	—	—	84	—	—
Mission Systems	206	164	372	134	131	140
Technology Services	18	15	6	45	40	37
Corporate	103	84	91	294	70	63
Total	\$1,249	\$928	\$920	\$800	\$475	\$456

(1) Beginning in 2018, corporate amounts include the amortization of other 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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NORTHROP GRUMMAN CORPORATION

16. UNAUDITED SELECTED QUARTERLY DATA

Unaudited quarterly financial results are set forth in the following tables. It is legacy Northrop Grumman'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 uses a "fiscal" calendar by closing its books on a Sunday near these quarter-end dates and will continue this practice until its business processes are aligned with legacy Northrop Grumman's. This practice is only used at interim periods within a reporting year.

2018

In millions, except per share amounts	1st Qtr	2nd Qtr ⁽¹⁾	3rd Qtr ⁽¹⁾	4th Qtr ⁽¹⁾
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

2018 - Impact of Accounting Change⁽²⁾

In millions, except per share amounts	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sales	\$—	\$ —	\$ —	\$ —
Operating income	(6)	(6)	(6)	23
Net earnings	101	100	100	(394)
Basic earnings per share	0.58	0.57	0.58	(2.29)
Diluted earnings per share	0.58	0.57	0.57	(2.28)

2017

In millions, except per share amounts	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sales	\$6,410	\$6,473	\$6,569	\$6,552
Operating income	853	864	829	672
Net earnings	770	677	750	672
Basic earnings per share	4.41	3.88	4.31	3.86
Diluted earnings per share	4.37	3.86	4.28	3.83
Weighted-average common shares outstanding	174.8	174.5	174.2	174.2
Weighted-average diluted shares outstanding	176.1	175.5	175.3	175.5

NORTHROP GRUMMAN CORPORATION

2017 - Impact of Accounting Change⁽²⁾

In millions, except per share amounts	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sales	\$—	\$ —	\$ —	\$ —
Operating income	(9)	(9)	(8)	(32)
Net earnings	120	122	107	525
Basic earnings per share	0.60	0.70	0.62	3.01
Diluted earnings per share	0.60	0.70	0.61	2.99

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

⁽²⁾ Table reflects the effects of the Accounting change described in Note 1 on our unaudited selected quarterly financial data.

NORTHROP GRUMMAN CORPORATION

17. 2018 IMPACT OF ACCOUNTING METHOD CHANGE

The following tables summarize the effects of the Accounting change described in Note 1 on our consolidated statement of earnings and comprehensive income, statement of cash flows and statement of changes in shareholders' equity for the year ended December 31, 2018 and consolidated statement of financial position as of December 31, 2018:

CONSOLIDATED STATEMENT OF EARNINGS AND COMPREHENSIVE INCOME

	Year Ended December 31, 2018		
	As Computed Under Previous Method	Effect of Accounting Change	As Reported Under New Method
\$ in millions, except per share amounts			
Operating income	\$3,775	\$ 5	\$ 3,780
Other (expense) income			
Interest expense	(562)	—	(562)
Net FAS (non-service) pension benefit	514	535	1,049
Mark-to-market pension and OPB expense	—	(655)	(655)
Other, net	132	(2)	130
Earnings before income taxes	3,859	(117)	3,742
Federal and foreign income tax expense	537	(24)	513
Net earnings	\$3,322	\$ (93)	\$ 3,229
Basic earnings per share	\$19.12	\$ (0.53)	\$ 18.59
Diluted earnings per share	\$19.03	\$ (0.54)	\$ 18.49

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

	December 31, 2018		
	As Computed Under Previous Method	Effect of Accounting Change	As Reported Under New Method
\$ in millions			
Retained earnings	\$13,965	\$ (5,897)	\$ 8,068
Accumulated other comprehensive (loss) income	(5,949)	5,897	(52)

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENT OF CASH FLOWS

\$ in millions	December 31, 2018		
	As Computed Under Previous Method	Effect of Accounting Change	As Reported Under New Method
Operating activities			
Net earnings	\$3,322	\$ (93)	\$ 3,229
Adjustments to reconcile to net cash provided by operating activities:			
Depreciation and amortization	800	—	800
Mark-to-market pension and OPB expense	—	655	655
Stock-based compensation	86	—	86
Deferred income taxes	263	(29)	234
Changes in assets and liabilities:			
Accounts receivable, net	202	—	202
Unbilled receivables, net	(297)	—	(297)
Inventoried costs, net	(37)	—	(37)
Prepaid expenses and other assets	(56)	—	(56)
Accounts payable and other liabilities	381	—	381
Income taxes payable, net	(258)	—	(258)
Retiree benefits ⁽¹⁾	(550)	(533)	(1,083)
Other, net	(29)	—	(29)
Net cash provided by operating activities	\$3,827	\$ —	\$ 3,827

(1) Includes company contributions to our pension and OPB plans as well as net periodic benefit costs, excluding MTM pension and OPB expense, which is presented as a separate non-cash item above.

CONSOLIDATED STATEMENT OF CHANGES IN SHAREHOLDERS' EQUITY

\$ in millions	Year ended December 31, 2018		
	As Computed Under Previous Method	Effect of Accounting Change	As Reported Under New Method
Retained earnings			
Beginning of year	\$11,632	\$ (4,719)	\$ 6,913
Impact from adoption of ASU 2018-02 and ASU 2016-01	1,064	(1,085)	(21)
Common stock repurchased	(1,225)	—	(1,225)
Net earnings	3,322	(93)	3,229
Dividends declared	(822)	—	(822)
Stock compensation	(6)	—	(6)
End of year	13,965	(5,897)	8,068
Accumulated other comprehensive (loss) income			
Beginning of year	(4,718)	4,719	1
Impact from adoption of ASU 2018-02 and ASU 2016-01	(1,064)	1,085	21
Other comprehensive loss, net of tax	(167)	93	(74)

NORTHROP GRUMMAN CORPORATION

18. RECAST 2017 AND 2016 FINANCIAL INFORMATION

Our prior period consolidated financial statements were recast for the retrospective adoption of ASC Topic 606 and ASU 2017-07 and the Accounting change described in Note 1. The following tables summarize the effects of these changes on our consolidated statements of earnings and comprehensive income, statements of cash flows and statements of changes in shareholders' equity for the years ended December 31, 2017 and 2016 and consolidated statement of financial position as of December 31, 2017.

CONSOLIDATED STATEMENT OF EARNINGS AND COMPREHENSIVE INCOME

\$ in millions, except per share amounts	Year Ended December 31, 2017				As Adjusted
	As Previously Reported	Impact of: ASC Topic 606	ASU 2017-07	Accounting Change	
Sales					
Product	\$ 16,038	\$ 326	\$ —	\$ —	\$ 16,364
Service	9,765	(125)	—	—	9,640
Total sales	25,803	201	—	—	26,004
Operating costs and expenses					
Product	12,271	239	(18)	35	12,527
Service	7,578	(42)	(12)	23	7,547
General and administrative expenses	2,655	57	—	—	2,712
Operating income	3,299	(53)	30	(58)	3,218
Other (expense) income					
Interest expense	(360)	—	—	—	(360)
Net FAS (non-service) pension (expense) income	—	—	(44)	743	699
Mark-to-market pension and OPB benefit	—	—	—	536	536
Other, net	110	—	14	12	136
Earnings before income taxes	3,049	(53)	—	1,233	4,229
Federal and foreign income tax expense (benefit)	1,034	(33)	—	359	1,360
Net earnings	\$ 2,015	\$ (20)	\$ —	\$ 874	\$ 2,869
Basic earnings per share	\$ 11.55	\$ (0.11)	\$ —	\$ 5.01	\$ 16.45
Weighted-average common shares outstanding, in millions	174.4	—	—	—	174.4
Diluted earnings per share	\$ 11.47	\$ (0.11)	\$ —	\$ 4.98	\$ 16.34
Weighted-average diluted shares outstanding, in millions	175.6	—	—	—	175.6
Net earnings (from above)	\$ 2,015	\$ (20)	\$ —	\$ 874	\$ 2,869
Other comprehensive income (loss)					
Change in unamortized benefit plan costs, net of tax expense of \$35	830	—	—	(874)	(44)
Change in cumulative translation adjustment	(4)	—	—	—	(4)
Other, net	2	—	—	—	2
Other comprehensive income (loss), net of tax	828	—	—	(874)	(46)
Comprehensive income	\$ 2,843	\$ (20)	\$ —	\$ —	\$ 2,823

NORTHROP GRUMMAN CORPORATION

\$ in millions, except per share amounts	Year Ended December 31, 2016				As Adjusted
	As Previously Reported	Impact of: ASC Topic 606	ASU 2017-07	Accounting Change	
Sales					
Product	\$14,738	\$342	\$ —	\$ —	\$15,080
Service	9,770	(144)	—	—	9,626
Total sales	24,508	198	—	—	24,706
Operating costs and expenses					
Product	11,002	286	(86)	(5)	11,197
Service	7,729	(68)	(58)	(3)	7,600
General and administrative expenses	2,584	48	—	—	2,632
Operating income	3,193	(68)	144	8	3,277
Other (expense) income					
Interest expense	(301)	—	—	—	(301)
Net FAS (non-service) pension (expense) income	—	—	(141)	752	611
Mark-to-market pension and OPB expense	—	—	—	(950)	(950)
Other, net	31	—	(3)	16	44
Earnings before income taxes	2,923	(68)	—	(174)	2,681
Federal and foreign income tax expense (benefit)	723	(24)	—	(61)	638
Net earnings	\$2,200	\$(44)	\$ —	\$ (113)	\$2,043
Basic earnings per share	\$12.30	\$(0.25)	\$ —	\$ (0.63)	\$11.42
Weighted-average common shares outstanding, in millions	178.9	—	—	—	178.9
Diluted earnings per share	\$12.19	\$(0.24)	\$ —	\$ (0.63)	\$11.32
Weighted-average diluted shares outstanding, in millions	180.5	—	—	—	180.5
Net earnings (from above)	\$2,200	\$(44)	\$ —	\$ (113)	\$2,043
Other comprehensive loss					
Change in unamortized benefit plan costs, net of tax expense of \$20	(175)	—	—	113	(62)
Change in cumulative translation adjustment	(50)	—	—	—	(50)
Other, net	(1)	—	—	—	(1)
Other comprehensive loss, net of tax	(226)	—	—	113	(113)
Comprehensive income	\$1,974	\$(44)	\$ —	\$ —	\$1,930

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENT OF FINANCIAL POSITION

\$ in millions	December 31, 2017			
	As Previously Reported	Impact of: ASC Topic 606	Accounting Change	As Adjusted
Assets				
Cash and cash equivalents	\$11,225	\$—	\$ —	\$11,225
Accounts receivable, net	829	225	—	1,054
Unbilled receivables, net	3,147	318	—	3,465
Inventoried costs, net	780	(382)	—	398
Prepaid expenses and other current assets	368	77	—	445
Total current assets	16,349	238	—	16,587
Property, plant and equipment, net of accumulated depreciation of \$5,066 for 2017	4,225	—	—	4,225
Goodwill	12,455	—	—	12,455
Intangible assets, net	52	—	—	52
Deferred tax assets	475	(28)	—	447
Other non-current assets	1,361	1	—	1,362
Total assets	\$34,917	\$211	\$ —	\$35,128
Liabilities				
Trade accounts payable	\$1,661	\$—	—	\$1,661
Accrued employee compensation	1,382	—	—	1,382
Advance payments and amounts in excess of costs incurred	1,617	144	—	1,761
Other current liabilities	2,305	(17)	—	2,288
Total current liabilities	6,965	127	—	7,092
Long-term debt, net of current portion of \$867 for 2017	14,399	—	—	14,399
Pension and OPB plan liabilities	5,511	—	—	5,511
Other non-current liabilities	994	—	—	994
Total liabilities	27,869	127	—	27,996
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: 2017—174,085,619	174	—	—	174
Paid-in capital	44	—	—	44
Retained earnings	11,548	84	(4,719)	6,913
Accumulated other comprehensive (loss) income	(4,718)	—	4,719	1
Total shareholders' equity	7,048	84	—	7,132
Total liabilities and shareholders' equity	\$34,917	\$211	\$ —	\$35,128

Other, net	(125)	—	—	(125)
Net cash provided by operating activities	\$2,813	\$—	\$—	\$2,813

(1) Includes company contributions to our pension and OPB plans as well as net periodic benefit costs, excluding MTM pension and OPB expense, which is presented as a separate non-cash item above.

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NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

The adoption of ASC Topic 606 and ASU 2017-07 and our Accounting change did not have an impact on the changes in common stock and paid-in capital for the years ended December 31, 2017 and 2016.

Year Ended December 31, 2017

\$ in millions, except per share amounts	As Previously Reported	Impact of:		As Adjusted
		ASC Topic 606	Accounting Change	
Retained earnings				
Beginning of year	\$10,630	\$104	\$ (5,593)	\$ 5,141
Common stock repurchased	(371)	—	—	(371)
Net earnings	2,015	(20)	874	2,869
Dividends declared	(687)	—	—	(687)
Stock compensation	(39)	—	—	(39)
End of year	11,548	84	(4,719)	6,913
Accumulated other comprehensive (loss) income				
Beginning of year	(5,546)	—	5,593	47
Other comprehensive income (loss), net of tax	828	—	(874)	(46)
End of year	(4,718)	—	4,719	1
Total shareholders' equity	\$7,048	\$84	\$ —	\$ 7,132

Year Ended December 31, 2016

\$ in millions, except per share amounts	As Previously Reported	Impact of:		As Adjusted
		ASC Topic 606	Accounting Change	
Retained earnings				
Beginning of year	\$10,661	\$148	\$ (5,480)	\$ 5,329
Common stock repurchased	(1,548)	—	—	(1,548)
Net earnings	2,200	(44)	(113)	2,043
Dividends declared	(633)	—	—	(633)
Stock compensation	(50)	—	—	(50)
End of year	10,630	104	(5,593)	5,141
Accumulated other comprehensive (loss) income				
Beginning of year	(5,320)	—	5,480	160
Other comprehensive income (loss), net of tax	(226)	—	113	(113)
End of year	(5,546)	—	5,593	47
Total shareholders' equity	\$5,259	\$104	\$ —	\$ 5,363

NORTHROP GRUMMAN CORPORATION

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 (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, 2018, 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 Securities and Exchange Commission'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

As previously discussed, we completed our acquisition of Orbital ATK during the second quarter of 2018 (see Note 2 to the consolidated financial statements). We are in the process of integrating certain controls and related procedures for legacy Orbital ATK with those of legacy Northrop Grumman. Other than integrating such controls, during the three months ended December 31, 2018, 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. In accordance with SEC rules, management elected to exclude Orbital ATK, acquired on June 6, 2018, from its assessment of the effectiveness of the company's internal control over financial reporting as of December 31, 2018. Orbital ATK, which subsequently became Northrop Grumman Innovation Systems, represents approximately 10 percent of the company's consolidated total assets, excluding the preliminary value of goodwill and purchased intangible assets, as of December 31, 2018 and 10 percent and 10 percent of the company's consolidated sales and operating income, respectively, for the year ended December 31, 2018. Based on its assessment, management has concluded that the company's internal control over financial reporting was effective as of December 31, 2018.

Deloitte & Touche LLP issued an attestation report dated January 30, 2019, 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, 2018, 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
Chief Executive Officer and President

/s/ Kenneth L. Bedingfield
Corporate Vice President and Chief Financial Officer
January 30, 2019

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, 2018, 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, 2018, 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, 2018 of the Company and our report dated January 30, 2019 expressed an unqualified opinion on those financial statements and included an explanatory paragraph concerning the Company’s election during 2018 to change its method of accounting for recognizing pension and other postretirement benefit plans actuarial gains and losses as well as the change in the manner in which it accounts for revenue from contracts with customers due to the adoption of the new revenue standard during 2018.

As described in Management’s Report on Internal Control over Financial Reporting, management excluded from its assessment the internal control over financial reporting at Orbital ATK, Inc., which was acquired by the Company on June 6, 2018 and subsequently became Northrop Grumman Innovation Systems, and whose financial statements represent approximately 10 percent of the Company’s consolidated total assets, excluding the preliminary value of goodwill and purchased intangible assets, as of December 31, 2018, and 10 percent and 10 percent of the Company’s consolidated sales and operating income, respectively, for the year ended December 31, 2018. Accordingly, our audit did not include the internal control over financial reporting at Northrop Grumman Innovation Systems.

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 30, 2019

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NORTHROP GRUMMAN CORPORATION

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 2019 Annual Meeting of Stockholders, to be filed with the Securities and Exchange Commission (SEC) within 120 days after the end of the company's fiscal year.

EXECUTIVE OFFICERS

Our executive officers as of January 30, 2019, 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.

Name	Age	Office Held	Since	Recent Business Experience
Kathy J. Warden	47	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)
Wesley G. Bush	57	Chairman	2019	Chairman and Chief Executive Officer (2018); Chairman, Chief Executive Officer and President (2011-2017)
Ann M. Addison	57	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)
Patrick M. Antkowiak	58	Corporate Vice President and Chief Strategy and Technology Officer	2019	Corporate Vice President and Chief Technology Officer (2014-2019); Vice President and General Manager, Advanced Concepts and Technologies Division, Former Electronic Systems Sector (2010-2014)
Kenneth L. Bedingfield	46	Corporate Vice President and Chief Financial Officer	2015	Vice President, Finance (2014-2015); Vice President, Business Management and Chief Financial Officer, Aerospace Systems Sector (2013-2014)
Mark A. Caylor	54	Corporate Vice President and President, Mission Systems Sector	2018	Corporate Vice President and President, Enterprise Services and Chief Strategy Officer (2014-2017); Corporate Vice President and President, Enterprise Shared Services (2013-2014)
Sheila C. Cheston	60	Corporate Vice President and General Counsel	2010	
Michael A. Hardesty	47	Corporate Vice President, Controller, and Chief Accounting Officer	2013	
Christopher T. Jones	54	Corporate Vice President and President, Technology Services Sector	2016	Corporate Vice President and President, Former Technical Services Sector (2013-2015)

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Name	Age	Office Held	Since	Recent Business Experience
Lesley A. Kalan	45	Corporate Vice President, Government Relations	2018	Vice President, Legislative Affairs (2010-2017)
Blake E. Larson	59	Corporate Vice President and President, Innovation Systems Sector	2018	Chief Operating Officer, Orbital ATK, Inc. (2015-2018); Senior Vice President and President, Aerospace Group, Alliant Techsystems, Inc. (2010-2015)
Janis G. Pamiljans	58	Corporate Vice President and President, Aerospace Systems Sector	2017	Vice President and General Manager, Strategic Systems Division, Aerospace Systems Sector (2015-2017); Vice President and General Manager, Unmanned Systems (now Autonomous Systems), Aerospace Systems Sector (2012-2014)
Denise M. Peppard	62	Corporate Vice President	2019	Corporate Vice President and Chief Human Resources Officer (2011-2018)
David T. Perry	54	Corporate Vice President and Chief Global Business Officer	2019	Corporate Vice President and Chief Global Business Development Officer (2012-2019)
Shawn N. Purvis	45	Corporate Vice President and President of Enterprise Services	2018	Vice President and Chief Information Officer (2016-2017); Vice President and General Manager, Cyber Division, Former Information Systems Sector (2014-2016); Vice President and Business Manager, Integrated Intelligence Systems Business Unit, Former Information Systems Sector (2012-2014)
Lucy C. Ryan	45	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 2019 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 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 2019 Annual Meeting of Shareholders.

NORTHROP GRUMMAN CORPORATION

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 2019 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 2019 Annual Meeting of Shareholders.

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

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 2019 Annual Meeting of Shareholders.

Item 14. Principal Accountant Fees and Services

The information as to Principal Accountant Fees and Services will be incorporated herein by reference to the Proxy Statement for the 2019 Annual Meeting of Shareholders.

NORTHROP GRUMMAN CORPORATION

PART IV

Item 15. Exhibits and 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

- Agreement and Plan of Merger among Titan II, Inc. (formerly Northrop Grumman Corporation), Northrop
2(a) 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)
Separation and Distribution Agreement dated as of March 29, 2011, among Titan II, Inc. (formerly Northrop
2(b) 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)
Agreement and Plan of Merger dated as of September 17, 2017, among Northrop Grumman Corporation,
2(c) Neptune Merger, Inc. and Orbital ATK, Inc. (incorporated by reference to Exhibit 2.1 to Form 8-K filed
September 18, 2017)
Transaction Agreement dated as of April 28, 2014, among Alliant Techsystems Inc., Vista Spinco Inc., Vista
2(d) 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)
- Amended and Restated Certificate of Incorporation of Northrop Grumman Corporation dated May 29, 2012
3(a) (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)
Registration Rights Agreement dated as of January 23, 2001, by and among Northrop Grumman Corporation
4(a) (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)
Indenture dated as of October 15, 1994, between Northrop Grumman Corporation (now Northrop Grumman
4(b) 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)
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
4(c) 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)

NORTHROP GRUMMAN CORPORATION

- 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) Form of Officers' Certificate (without exhibits) establishing the terms of Northrop Grumman Corporation's (now
- 4(d) 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(e) Form of Northrop Grumman Corporation's (now Northrop Grumman Systems Corporation's) 7.875% Debentures
- 4(f) due 2026 (incorporated by reference to Exhibit 4.6 to Form S-4 Registration Statement No. 333-02653 filed April 19, 1996)
- Form of Officers' Certificate establishing the terms of Northrop Grumman Corporation's (now Northrop
- 4(g) 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)
- 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
- 4(h) 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)
- 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
- 4(i) 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)
- 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),
- 4(j) 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)
- 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
- 4(k) 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)
- 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
- 4(l) 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)
- Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and Mellon
- 4(m) 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)

First Supplemental Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems 4(n) 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.)

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- 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(o) 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)
- 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(q) 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(r) 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(s) First Supplemental Indenture dated as of July 30, 2009, 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 July 30, 2009, File No. 001-16411)
- 4(t) Form of Northrop Grumman Corporation's 5.05% Senior Note due 2019 (incorporated by reference to Exhibit B to Exhibit 4(a) to Form 8-K filed July 30, 2009, File No. 001-16411)
- 4(u) 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(v) 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(w) 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(x) 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)
- 4(y) 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(z)

NORTHROP GRUMMAN CORPORATION

- Fifth Supplemental Indenture, dated as of May 31, 2013, between Northrop Grumman Corporation and The
4(aa) 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(bb) 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(cc) 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)
Sixth Supplemental Indenture, dated as of February 6, 2015, between Northrop Grumman Corporation and The
4(dd) 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)
4(ee) 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)
Seventh Supplemental Indenture, dated as of December 1, 2016, between Northrop Grumman Corporation and
4(ff) 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)
4(gg) 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)
Eighth Supplemental Indenture, dated as of October 13, 2017, between Northrop Grumman Corporation and
4(hh) 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)
4(ii) 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)
Form of 2.550% Senior Note due 2022 (incorporated by reference to Exhibit B to Exhibit 4.1 to Form 8-K filed
4(jj) October 13, 2017)
Form of 2.930% Senior Note due 2025 (incorporated by reference to Exhibit C to Exhibit 4.1 to Form 8-K filed
4(kk) October 13, 2017)
4(ll) 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)
4(mm) 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)
Credit Agreement, dated as of August 17, 2018, among Northrop Grumman Corporation, as Borrower;
10(a) 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)
Form of Guarantee dated as of April 3, 2001, by Northrop Grumman Corporation of the indenture indebtedness
10(b) 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)
Form of Guarantee dated as of April 3, 2001, by Northrop Grumman Corporation of Northrop Grumman
10(c) Systems Corporation indenture indebtedness (incorporated by reference to Exhibit 10.11 to Form 8-K and filed
April 17, 2001, File No. 001-16411)

NORTHROP GRUMMAN CORPORATION

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) Northrop Grumman Corporation Non-Employee Directors Equity Participation Plan (Amended and Restated January 1, 2008) (incorporated by reference to Exhibit 10(q) to Form 10-K for the year ended December 31, 2007, filed February 20, 2008, File No. 001-16411)

+10(g) 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)

- 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)
- (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)

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)

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)

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)

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)

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)

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)

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)

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)

NORTHROP GRUMMAN CORPORATION

(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)

(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)

(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)

(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)

(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)

(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)

(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)

*(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

+10(h) 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)

(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)

(iii) Grant Certificate Specifying the Terms and Conditions Applicable to 2015 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.1 to Form 8-K filed February 20, 2015)

(iv)

Grant Certificate Specifying the Terms and Conditions Applicable to 2015 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 February 20, 2015)

Northrop Grumman Supplemental Plan 2 (Amended and Restated Effective as of January 1, 2014)
+10(i) (incorporated by reference to Exhibit 10(l) to Form 10-K for the year ended December 31, 2013, Filed
February 3, 2014)

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- (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)
- (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)
- (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)
- +10(j) 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)
- +*10(k) Severance Plan for Elected and Appointed Officers of Northrop Grumman Corporation (Amended and Restated Effective January 1, 2019)
- +10(l) Non-Employee Director Compensation Term Sheet, effective May 17, 2017 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2017, filed July 26, 2017)
- +10(m) 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)
- +10(n) 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(o) 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)
- +10(p) 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(q) 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(r) Northrop Grumman Innovation Systems Nonqualified Deferred Compensation Plan, as amended and restated January 1, 2019
- +10(s) Trust Agreement for Alliant Techsystems Inc. Nonqualified Deferred Compensation Plan effective January 1, 2003 (incorporated by reference to Exhibit 10.9.2 to Alliant Techsystems, Inc. (now known as Northrop Grumman Innovation Systems, Inc.) Form 10-K for the year ended March 31, 2003 filed June 18, 2003, File No. 001-10582)
- (i) First Amendment to the Trust Agreement for Alliant Techsystems Inc. Nonqualified Deferred Compensation Plan, dated January 28, 2013 (incorporated by reference to Exhibit 10.12 to Form 10-Q for the quarter ended June 30, 2018, filed July 25, 2018)

NORTHROP GRUMMAN CORPORATION

- Orbital ATK, Inc. Executive Officer Incentive Plan (as of May 4, 2016) (incorporated by reference to Exhibit +10(t) 10.1 to Orbital ATK, Inc. (now known as Northrop Grumman Innovation Systems, Inc.) Form 8-K filed May 5, 2016)
- +*10(u) Northrop Grumman Savings Excess Plan (Amended and Restated Effective as of January 1, 2019)
- +*10(v) Northrop Grumman Officers Retirement Account Contribution Plan (Amended and Restated Effective as of January 1, 2019)
- +*10(w) Northrop Grumman Corporation Special Officer Retiree Medical Plan (Amended and Restated Effective October 1, 2018)
- +*10(x) Northrop Grumman Innovation Systems Defined Benefit Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2019
- +*10(y) Northrop Grumman Innovation Systems Defined Contribution Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2019
- +10(z) Executive Basic Life Insurance Policy (Certificate No. 46) dated July 1, 2013 (incorporated by reference to Exhibit 10(w) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018)
- (i) Amendment to Executive Life Insurance Policy effective July 1, 2016 (incorporated by reference to Exhibit 10(w)(i) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018)
- +10(aa) Executive Accidental Death, Dismemberment and Plegia Insurance Policy Terms applicable to Executive Officers dated January 1, 2009 (incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2009, filed April 22, 2009, File No. 001-16411)
- (i) Amendment to Executive Accidental Death, Dismemberment and Plegia Insurance Policy Terms dated April 9, 2009 (incorporated by reference to Exhibit 10(x)(i) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018)
- +10(bb) Executive Long-Term Disability Insurance Policy as amended by Amendment No. 7 dated December 29, 2016 and effective as of January 1, 2017 (incorporated by reference to Exhibit 10(y) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018)
- +10(cc) 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)
- +*10(dd) Group Personal Excess Liability Policy dated October 20, 2016 and effective as of January 1, 2018
- +10(ee) 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)
- +10(ff) Relocation Agreement between Northrop Grumman Systems Corporation and Janis G. Pamiljans dated March 8, 2017 (incorporated by reference to Exhibit 10(gg) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018)
- +10(gg) 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-Q for quarter ended June 30, 2018, filed July 25, 2018)
- *18 Preferability Letter of Independent Registered Public Accounting Firm dated January 30, 2019
- *21 Subsidiaries

NORTHROP GRUMMAN CORPORATION

*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

Northrop Grumman Corporation Annual Report on Form 10-K for the fiscal year ended December 31, 2018, formatted in XBRL (Extensible Business Reporting Language); (i) the Consolidated Statements of Earnings and

*101 Comprehensive Income, (ii) Consolidated Statements of Financial Position, (iii) Consolidated Statements of Cash Flows, (iv) Consolidated Statements of Changes in Shareholders' Equity, and (v) Notes to Consolidated Financial Statements

+ Management contract or compensatory plan or arrangement

* Filed with this Report

** Furnished with this Report

Item 16. Form 10-K Summary

None.

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NORTHROP GRUMMAN CORPORATION

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on the 30th day of January 2019.

NORTHROP GRUMMAN CORPORATION

By: /s/ Michael A. Hardesty

Michael A. Hardesty

Corporate Vice President, Controller, and Chief Accounting Officer

(Principal Accounting Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed on behalf of the registrant this the 30th day of January 2019, by the following persons and in the capacities indicated.

Signature

Title

Wesley G. Bush*

Chairman and Director

Kathy J. Warden*

Chief Executive Officer and President (Principal Executive Officer), and Director

Kenneth L. Bedingfield*

Corporate Vice President and Chief Financial Officer (Principal Financial Officer)

Michael A. Hardesty

Corporate Vice President, Controller and Chief Accounting Officer

Marianne C. Brown*

Director

Donald E. Felsinger*

Director

Ann M. Fudge*

Director

Bruce S. Gordon*

Director

William H. Hernandez*

Director

Madeleine A. Kleiner*

Director

Karl J. Krapek*

Director

Gary Roughead*

Director

Thomas M. Schoewe*

Director

James S. Turley*

Director

Mark A. Welsh III*

Director

*By: /s/ Jennifer C. McGarey
Jennifer C. McGarey
Corporate Vice President and Secretary
Attorney-in-Fact
pursuant to a power of attorney

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