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, 2020
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 incorporation or organization)	(I.R.S. Employer Identification Number)
2980 Fairview Park Drive	
Falls Church, Virginia	**22042**
(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	Trading Symbol(s)	Name of each exchange on which registered
Common Stock	NOC	New York Stock Exchange

Securities registered pursuant to Section 12(g) of the Act: None
Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes ☒ No ☐

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

Yes ☐ No ☒

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

Yes ☒ No ☐

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

Yes ☒ No ☐

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

Large Accelerated Filer ☒ Accelerated Filer ☐ Smaller Reporting Company ☐
Non-accelerated Filer ☐ Emerging Growth Company ☐

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

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, 2020, 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 $51.2 billion.

As of January 25, 2021, 166,718,384 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 2021 Annual Meeting of Shareholders are incorporated by reference in Part III of this Form 10-K.

NORTHROP GRUMMAN CORPORATION

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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 aerospace and defense company. We use our broad portfolio of capabilities and technologies to create and deliver innovative platforms, systems and solutions in space; manned and autonomous airborne systems, including strike; strategic deterrence systems; hypersonics; missile defense; weapons systems; cyber; command, control, communications and computers, intelligence, surveillance and reconnaissance (C4ISR); 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. In 2018, we acquired Orbital ATK, Inc., a global leader in the development and production of launch vehicles, missile products and satellites and other space systems. In the fourth quarter of 2020, we entered into a definitive agreement to sell our IT and mission support services business for $3.4 billion in cash, subject to regulatory approvals and customary closing conditions. The sale is expected to close in the first quarter of 2021. The business descriptions below reflect our business as of December 31, 2020 and will evolve subsequent to the planned divestiture of our IT and mission support services business.

Organization

From time to time, we acquire or dispose of businesses and realign contracts, programs or businesses among and within our operating segments. Internal realignments are typically designed to leverage existing capabilities more fully and to enhance efficient development and delivery of products and services. The operating results for all periods presented have been revised to reflect any such changes made through December 31, 2020. We are currently aligned in four operating sectors, which also comprise our reportable segments: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems.

AERONAUTICS SYSTEMS

Aeronautics Systems, headquartered in Palmdale, California, is a leader in the design, development, integration and production of autonomous and manned aircraft systems used for battle management, strike and intelligence, surveillance and reconnaissance (ISR). Aeronautics Systems' primary customers are the U.S. Air Force, the U.S. Navy, other U.S. government agencies and international customers. The sector is reported in two business areas that reflect our core capabilities: Autonomous Systems and Manned Aircraft.

Autonomous Systems – designs, develops, manufactures, integrates and sustains autonomous aircraft systems for strategic and tactical ISR missions. Strategic ISR programs include high-altitude long-endurance (HALE) autonomous systems, such as the U.S. Air Force RQ-4 Global Hawk, which provides near real-time high resolution imagery of land masses for theater awareness; the U.S. Navy MQ-4C Triton, which provides real-time ISR over vast ocean and coastal regions for maritime domain awareness; the North Atlantic Treaty Organization (NATO) Alliance Ground Surveillance (AGS) system for ISR missions conducted in multinational theater operations; and HALE autonomous ISR systems for Japan and the Republic of Korea. Tactical ISR programs include the U.S. Navy MQ-8B and -8C Fire Scout, ship-based vertical take-off and landing (VTOL) systems that provide situational awareness for maritime forces and precision targeting support; and the Firebird product line, which is available in manned, autonomous and optionally-piloted configurations, and provides flexibility through open architecture and plug-and-play mission payload integration.

Manned Aircraft – designs, develops, manufactures and integrates strategic long-range strike aircraft systems, tactical fighter aircraft and airborne battle management systems. Long-range strike aircraft programs include the U.S. Air Force's B-21 Raider long-range strike bomber and modernization and sustainment services for the B-2 Spirit bomber. Tactical fighter aircraft programs include the design, development, manufacture and integration of the F-35 Lightning II center fuselage and F/A-18 Super Hornet center/aft fuselage sections. Airborne battle management programs include the E-2D Advanced Hawkeye and E-8C Joint Surveillance Target Attack Radar System (JSTARS).

DEFENSE SYSTEMS

Defense Systems, headquartered in McLean, Virginia, is a leader in the design, development, production, integration, sustainment and modernization of weapon and mission systems for U.S. military and civilian agency customers, and a broad range of international customers. Major products and services include integrated battle management systems, weapons systems, mission system sustainment and modernization, information technology services and intelligence operations. The sector is reported in two business areas that reflect our core capabilities: Battle Management & Missile Systems, and Mission Readiness.

Battle Management & Missile Systems – designs, develops and integrates multi-domain command and control (C2) and weapons systems, including munitions and missiles. The business provides integration and interoperability of net-enabled battle management, sensors, targeting and surveillance systems, as well as air and missile defense C2 systems. It also develops and produces precision strike weapons; advanced propulsion, including high speed air-breathing systems; and high-performance gun systems and precision munitions. Competencies include system and software development; integration of weapon systems; tactical missile and component development and production; and production of advanced fuzes, munitions and defense electronics. Key programs include the Integrated Air and Missile Defense Battle Command System (IBCS) for the U.S. Army and Poland; Counter Rocket, Artillery and Mortar (C-RAM); the U.S. Navy's Advanced Anti-Radiation Guided Missile (AARGM); Guided Multiple Launch Rocket System (GMLRS); Precision Guidance Kit (PGK); and the Mission Command Training Program (MCTP).

Mission Readiness – provides full life cycle service and support for software, weapons systems and aircraft, and logistics support, sustainment, operations and modernization for air, sea and ground systems. It also provides full life cycle development, modernization and sustainment of information systems; security services including information and cyber operations; and intelligence analysis and support. Competencies include aircraft, electronics and software sustainment and engineering; electronic subsystems modernization; weapon systems logistics support; cyber; data analytics and decision support tools; and IT infrastructure including cloud. Key programs include AAQ-24 and APN-241 sensor sustainment; system sustainment and operations support for the B-2 Spirit bomber, E-8C JSTARS surveillance aircraft, KC-30A multi-role tanker, C-27J transport, UK E-3D Airborne Early Warning and Control System, Global Hawk, Triton, and F-35; the Social Security Administration Information Technology Support Services Contract (SSA-ITSSC); Counter Threat Messaging (CTM) for Joint Services; restricted intelligence operations; and Consular Systems Modernization (CSM) for Department of State.

MISSION SYSTEMS

Mission Systems, headquartered in Linthicum, Maryland, is a leader in advanced mission solutions and multifunction systems, primarily for the U.S. defense and intelligence community and international customers. Major products and services include C4ISR systems; radar, electro-optical/infrared (EO/IR) and acoustic sensors; electronic warfare systems; advanced communications and network systems; cyber solutions; intelligence processing systems; navigation; and maritime power, propulsion and payload launch systems. The sector is reported in four business areas that reflect our core capabilities: Airborne Sensors & Networks; Cyber & Intelligence Mission Solutions; Maritime/Land Systems & Sensors; and Navigation, Targeting & Survivability.

Airborne Sensors & Networks – delivers products, systems and services that support airborne platforms with advanced communications and network systems; multi-function radio frequency (RF) and EO/IR systems; radar, electronic warfare and situational awareness mission systems; and high altitude ISR sensors. Competencies include fire control, surveillance and early warning and control radar systems; electronic attack and electronic support systems; software defined radios and network gateways, communications and counter-communications systems; and multi-sensor processing. Key programs include Airborne Early Warning & Control (AEW&C); Battlefield Airborne Communications Node (BACN); F-35 fire control radar, Distributed Aperture System (DAS), and Communications, Navigation and Identification (CNI) integrated avionics system; LONGBOW Fire Control Radar (FCR); Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW); Scalable Agile Beam Radar (SABR); and restricted programs.

Cyber & Intelligence Mission Solutions – delivers products, systems and services that support full-spectrum cyber solutions, secure processing, transformational computing, advanced technology development, Signals Intelligence (SIGINT) mission 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; cyber survivability; ground software systems; SIGINT sensors and processing; and geospatial intelligence and data fusion, specializing in the collection, processing and exploitation of data. Key programs include exploitation and cyber programs; Enhanced Solutions for the Information Technology Enterprise (E-SITE); the Enterprise Application Managed Services (EAMS) program; the Transforming All-Source Analysis with Location-Based Object Services (TALOS); the Unified Platform System Coordinator program; the Airborne Signals Intelligence Payload (ASIP); and restricted programs.

Maritime/Land Systems & Sensors – delivers products, systems and services that enable maritime and ground platform mission capabilities via sensors, targeting and surveillance systems; electronic warfare systems; mission module integration; power, propulsion and control systems; and missile launchers. Competencies include ground and maritime radar systems; nuclear ship propulsion and power generation systems; shipboard missile and encapsulated payload launch systems; integrated bridge systems; unmanned maritime vehicles; high-resolution undersea sensors; deep-sea packaging; and mission integration. Key programs include the Surface Electronic Warfare Improvement Program (SEWIP) Block III; Ground/Air Task Oriented Radar (G/ATOR); submarine power, propulsion, launch and sensing systems for Ohio, Virginia and Columbia class submarines; AQS-24B Minehunting System; Littoral Combat Ship Mission Module Integration; DDG Modernization; Offshore Patrol Cutter; and restricted programs associated with the maritime operating domain.

Navigation, Targeting & Survivability – delivers products, systems and services that support aircraft platforms with targeting, self-protection and situational awareness mission systems; and provides embedded navigation and positioning sensors for a range of platforms including ships, aircraft, spacecraft and weapons. Competencies include EO/IR and RF self-protection; targeting and surveillance systems; digitized cockpits; and inertial navigation systems. Key programs include the LITENING Advanced Targeting Pod; Large Aircraft and Common Infrared Countermeasures (LAIRCM, DoN LAIRCM, CIRCM) systems; APR-39 DV(2) and EV(2) Radar Warning Receiver programs; AC/MC 130J Radio Frequency Countermeasures; the Embedded Global Positioning System (GPS)/Inertial Navigation Systems-Modernization (EGI-M) program; the UH-60V Black Hawk integrated mission equipment package; and restricted programs.

SPACE SYSTEMS

Space Systems, headquartered in Dulles, Virginia, is a leader in delivering end-to-end mission solutions through the design, development, integration, production and operation of space, missile defense, launch and strategic missile systems for national security, civil government, commercial and international customers. Major products include satellites and payloads; ground systems; missile defense systems and interceptors; launch vehicles and related propulsion systems; and strategic missiles. The sector is reported in two business areas that reflect our core capabilities: Launch & Strategic Missiles, and Space.

Launch & Strategic Missiles – designs, develops, manufactures and integrates large strategic missile systems; missile defense systems; small- and medium-class space launch vehicles to place satellites into earth orbit and escape trajectories; and suborbital launch vehicles that place payloads into a variety of high-altitude trajectories. Competencies include large strategic missile design, integration, production, and sustainment as well as the production of medium- and large-class rocket propulsion systems for human and cargo launch vehicles, hypersonic boosters and missile defense interceptors. Key programs include missile defense systems, interceptors, and boosters for the Missile Defense Agency's (MDA) Ground-based Midcourse Defense (GMD) system and Ground Based Interceptor (GBI); the Antares rocket used in the execution of our Commercial Resupply Services (CRS) contracts with the National Aeronautics and Space Administration (NASA); the development and production of solid rocket motors for NASA’s Space Launch System (SLS) heavy lift vehicle; medium-class solid rocket motors for the U.S. Navy's Trident II Fleet Ballistic Missile program; Ground Based Strategic Deterrent (GBSD) Engineering & Manufacturing Development (EMD) program; and the Intercontinental Ballistic Missile (ICBM) Ground Subsystem Support Contract (GSSC).

Space – designs, develops, manufactures and integrates spacecraft systems, subsystems, sensors, payloads and ground systems to deliver mission capability to national security, science and environmental, communications, on-orbit servicing, and human-rated space systems for earth orbit and deep-space exploration missions. Much of this business is performed through restricted programs. Key unrestricted programs include the Cygnus spacecraft used in the execution of our CRS contracts with NASA; Advanced Extremely High Frequency (AEHF), Enhanced Polar System (EPS), Evolved Strategic SATCOM (ESS), and Protected Tactical SATCOM (PTS) payloads providing survivable, protected communications to U.S. forces; Next-Generation Overhead Persistent Infrared Program (OPIR) satellites and payloads providing data for missile defense; and the James Webb Space Telescope (JWST), a large infrared telescope being built for NASA that will be deployed in space to study the origins of the universe.

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 84 percent, 83 percent and 82 percent of sales during the years ended December 31, 2020, 2019 and 2018, respectively. For further information on sales by customer type, contract type and geographic region, see Note 16 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. Boeing Company, General Dynamics, L3Harris Technologies, Lockheed Martin, and Raytheon Technologies 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, 2020, total backlog, which is equivalent to the company’s remaining performance obligations, was $81.0 billion as compared with $64.8 billion at December 31, 2019. For further information, see “Backlog” in “Management’s Discussion and Analysis of Financial Condition and Results of Operations” (MD&A) and Note 1 to the consolidated financial statements.

INTELLECTUAL PROPERTY

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

RAW MATERIALS

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

HUMAN CAPITAL

Creating a diverse, talented and inclusive workplace is central to our culture, employee engagement, innovation and excellence, and in performing and delivering on our commitments. Our culture is an important factor in our ability to continue attracting and retaining qualified employees, particularly those with security clearances and requisite skills in multiple areas, including science, technology, engineering and math. This focus was a factor in our ability to hire approximately 13,000 new employees in 2020.

Additional information regarding our human capital strategy is available in our comprehensive Sustainability Report and Proxy Statement that can be found on our company website. Information on our website, including our Sustainability Report, is not incorporated by reference into this Annual Report.

Our Values and Culture

Our values reflect our priorities and form the bedrock of our culture:

- We do the right thing – we earn trust, act with ethics, integrity and transparency, treat everyone with respect, value diversity and foster safe and inclusive environments.
- We do what we promise – we own the delivery of results, focused on quality.
- We commit to shared success – we work together to focus on the mission and take accountability for the sustainable success of our people, customers, shareholders, suppliers and communities.
- We pioneer – with fierce curiosity, dedication and innovation, we seek to solve the world's most challenging problems.

We believe our values are vital to the continued and future success of the company, and in our ability to attract and retain a diverse workforce. Our values are also integral to our commitment to long-term sustainability, with robust environmental, social and governance practices across our company.

Our annual employee survey gives employees the opportunity to provide feedback on our culture. This survey is managed by a third-party vendor to encourage candor and solicit feedback on many aspects of engagement, including company leadership, culture, inclusion and career development. In 2020, our employee response rate was 84%, an indication that our employees believe their feedback is important. Our leaders review the survey feedback and work with their teams to take action based on survey results.

Diversity, Equity and Inclusion

Diversity, equity and inclusion are, and have long been, critical to our culture and our company's success. This focus enhances engagement and increases innovation and quality, enabling us to deliver better performance for our shareholders, customers, and employees. Diversity is one of the company's non-financial ESG performance metrics and is reviewed by the Board of Directors. Across our total employee population, as of December 31, 2020, 25% are female, 36% are people of color, 18% are veterans and 8% are persons with disabilities. Over the past 10 years, at the vice president level, we have doubled the representation of females from 16% to 32% and increased the representation of people of color by approximately 65%, from 11% to 18%.

Talent Development

We develop and retain our employees with the skills and capabilities to support the company's growth and innovation. We offer our employees career-specific tools and resources and support development opportunities through our Education Assistance Program, early education rotation program, apprenticeships and robust training at all levels.

Collective Agreements

Approximately 4,000 employees are covered by 17 collective agreements in the U.S., of which we negotiated six renewals in 2020 and expect to negotiate five renewals in 2021.

See "Risk Factors" for further discussion regarding risks related to our workforce and employee relations.

REGULATORY MATTERS

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

Contracts
We generate the majority of our business from long-term contracts with the U.S. government for development, production and support activities. Unless otherwise specified in a contract, allowable and allocable costs are billed to contracts with the U.S. government pursuant to the Federal Acquisition Regulation (FAR) and U.S. government Cost Accounting Standards (CAS). Examples of costs incurred by us and not billed to the U.S. government in

accordance with the FAR and CAS include, but are not limited to, unallowable employee compensation costs, certain legal costs, charitable donations, interest expense and advertising 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.

See Note 1 to the consolidated financial statements and "Risk Factors" for further information regarding our contracts and Note 16 to the consolidated financial statements for sales by contract type.

The following table summarizes sales for the year ended December 31, 2020, 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	$ 17,706	$ 710	$ 22	$ 18,438	50 %
Fixed-price contracts	13,197	4,478	686	18,361	50 %
Total sales	$ 30,903	$ 5,188	$ 708	$ 36,799	100 %

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

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

Environmental

Our operations are subject to and affected by federal, state, local and foreign laws, regulations and enforcement actions relating to protection of the environment. In 2015, we announced our 2020 environmental sustainability goals: to reduce absolute greenhouse gas emissions by 30 percent from 2010 levels; to reduce potable water use by

20 percent from 2014 levels; and to achieve a 70 percent solid waste diversion rate (away from landfills). We are currently measuring our performance to those goals and are in the process of developing new environmental sustainability goals for 2021 and beyond.

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.

Industry and Economic Risks

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 84 percent of our sales in 2020; we have a number of large programs with the U.S. Department of the 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 even more so. We cannot predict the impact on existing, follow-on, replacement or future programs from potential changes in the threat environment, defense spending levels, government priorities, political leadership, procurement strategy, military strategy and planning; or broader changes in social, economic or political demands and priorities. The U.S. government also has the ability to delay, modify or cancel ongoing competitions, procurements and programs, as well as to change its future acquisition strategy.

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

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

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

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

U.S. government programs are subject to annual congressional budget authorization and appropriation processes. For many programs, Congress appropriates funds on an annual fiscal year basis even though the program performance period may extend over several years. Consequently, programs are often partially funded initially and additional funds are committed only as Congress makes further appropriations. If we incur costs in excess of funds obligated on a contract, we may be at risk for reimbursement of those costs unless and until additional funds are obligated to the contract. More broadly, 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 for such programs may be terminated or adjusted by the U.S. government or the prime contractor.

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

In August 2019, the Bipartisan Budget Act of 2019 was enacted, increasing spending caps under the Budget Control Act (BCA) for FY 2020 and FY 2021, the final two fiscal years covered by the BCA, and suspending the debt ceiling through July 31, 2021. In February 2020, the then President proposed a budget request for FY 2021, which addressed various capabilities highlighted in the U.S. National Security Strategy, the National Defense Strategy and the Missile Defense Review. On December 27, 2020, FY 2021 appropriations were enacted under the Consolidated Appropriations Act of 2021.

The budget environment and uncertainty surrounding the appropriations processes and the debt ceiling, remain significant short and long-term risks. Considerable uncertainty exists regarding how future budget and program decisions will unfold, including the defense spending priorities of the new Administration and Congress, and what challenges budget reductions will present for the defense industry. If annual appropriations bills are not timely enacted, the U.S. government may continue to operate under a continuing resolution, restricting new contract or program starts, presenting resource allocation challenges and placing limitations on some planned program budgets, and we may face a 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 could 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 could 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 previously indicated are areas of focus for future defense spending, changing priorities, budget pressures, defense spending cuts, challenges in the appropriations process, the debt ceiling and ongoing fiscal debates remain uncertain.

Significant delays or reductions in appropriations for our current and future programs; 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 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 2020, approximately half of our sales were derived from fixed-price contracts. We typically enter into fixed-price contracts where costs can be more reasonably estimated based on actual experience, such as for production programs. In addition, our contracts contain provisions relating to cost controls and audit rights. If the terms specified in our contracts are not met, our profitability may be reduced and we may incur a loss.

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

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

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

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, including new entrants. 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, are turning to commercial contractors, rather than traditional defense contractors, for some products and services, and 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 can result in contract modifications or the award decision being reversed and loss of the contract award. Even where a bid protest does not result in the loss of an award, the resolution can extend the time until the contract activity can begin, and delay earnings.

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

Legal and Regulatory Risks

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

The size, nature and complexity of our business make us susceptible to investigations, claims, disputes, enforcement actions, prosecutions, litigation and other legal proceedings, particularly those involving governments (including federal, state and outside the U.S.), which may be increasingly aggressive. We are and may become subject to investigations, claims, disputes, enforcement actions and administrative, civil or criminal litigation, arbitration or other legal proceedings globally and across a broad array of matters, including, but not limited to, government contracts, commercial transactions, false claims, false statements, antitrust, compliance with government orders, mischarging, contract performance, fraud, procurement integrity, products liability, warranty liability, the use of hazardous materials, personal injury claims, environmental, shareholder derivative actions, prior acquisitions and divestitures, intellectual property, tax, employees, export/import, anti-corruption, labor, health and safety, the COVID-19 pandemic and the company’s response to it, accidents, launch failures and employee benefits and plans, including plan administration, improper payments, and issues related to privacy and security (cyber and physical), as well as matters relating to the Orbital ATK Federal Trade Commission decision and order. These matters could divert financial and management resources; result in administrative, civil or criminal fines, penalties or other sanctions (which terms include judgments or convictions and consent or other voluntary decrees or agreements), compensatory, treble or other damages, non-monetary relief or actions, or other liabilities; and otherwise harm our business and our ability to obtain and retain awards. Government regulations provide that certain allegations against a contractor may lead to suspension or debarment from government contracts or suspension of export/import privileges for the company or one or more of its components. Suspension or debarment or criminal resolutions in particular could have a material adverse effect on the company because of our reliance on government contracts and export authorizations. An investigation, claim, dispute, enforcement action or litigation, even if not substantiated or fully indemnified or insured, could also negatively impact our reputation among our customers and the public, and make it substantially more difficult for us to compete effectively for business, obtain and retain awards or obtain adequate insurance in the future. Investigations, claims, disputes, enforcement actions, litigation or other legal proceedings could have a material adverse effect on our financial position, results of operations and/or cash flows.

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

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

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

U.S. government contractors (including their subcontractors and others with whom they do business) must comply with many significant procurement regulations and other specific legal requirements. These regulations and other requirements, although often customary in government contracting, increase our performance and compliance costs and risks and are regularly evolving. New laws, regulations or procurement requirements or changes to current ones (including, for example, regulations related to cybersecurity and related certification requirements for our company and our partners, privacy, information protection, cost accounting, recovery of employee compensation costs, counterfeit parts, pensions, anti-human trafficking, specialty metals, conflict minerals and use of certain non-US equipment) 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 accounting, and our compliance with applicable laws, regulations, terms and standards, as well as the adequacy of our systems and processes in meeting government requirements. Costs ultimately found to be unallowable or improperly allocated to a specific contract will not be reimbursed or must be refunded if already reimbursed. If an audit uncovers improper or illegal activities, we may be subject to civil and criminal penalties, sanctions, forfeiture of profits or suspension or debarment. Whether or not illegal activities are alleged, the U.S. government has the ability to decrease or withhold certain payments when it deems systems subject to its review to be inadequate, with significant financial impact, regardless of the ultimate outcome. 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, largely as a result of an increased focus on affordability, efficiencies, business systems, recovery of costs and a reprioritization of available defense funds to key areas for future defense spending. We have experienced and may continue to experience an increased number of audits and challenges to government accounting matters and business systems for current and past years, as well as a lengthened period of time required to close open audits, an increased number of broad requests for information and an increased risk of withholding of payments. For example, the thresholds for certain allowable costs in the U.S., including compensation costs, have been significantly reduced; the allowability of other types of costs, including certain costs related to environmental remediation and pensions, and certain assumptions used by the company to determine pension expense, are being challenged, debated and, in certain cases, modified, all with potentially significant financial costs to the company. The U.S. government is also pursuing alternatives to shift additional responsibility and performance risks to the contractor. The U.S. government has been pursuing and may continue to pursue policies that could negatively impact our profitability. Changes in procurement practices favoring incentive-based fee arrangements; different award criteria; non-traditional contract provisions; and government contract negotiation offers that indicate what our costs should be, among others, also may affect our profitability and predictability.

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

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

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 or new contaminants; imposition of fines, penalties, compensatory or other damages (including natural resource damages); a determination that certain remediation or other 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 incur, and expect to continue to incur, additional costs to meet environmental sustainability goals increasingly required by our stakeholders.

We also are and may become a party to various legal proceedings and disputes involving government and private parties (including individual and class actions, and water districts) 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. Applicable remediation standards and other requirements to which we are subject may continue to change, our costs may increase materially, and those costs may not be fully recoverable. We have reached a tentative agreement with the State of New York regarding the steps we will take to implement the State's Amended Record of Decision and to resolve certain other potential claims, including for natural resource damages. The State is preparing to file a new consent decree reflecting the agreement and to seek court approval. In addition, we are a party to various, and expect to become a party to additional, legal proceedings and disputes related to remediation, environmental impacts, costs, and the allowability of costs we incur, including with federal and state entities (including the United States Navy, the Defense Contract Management Agency, the state, local municipalities and water districts) and insurance carriers, as well as class action and individual plaintiffs alleging personal injury and property damage and seeking both monetary and non-monetary relief. These Bethpage matters could result in additional costs, fines, penalties, sanctions, compensatory or other damages, determinations on allowability, allocation, and insurance coverage, and non-monetary relief.

In addition, government and private parties could seek to hold us responsible for liabilities or obligations related to former operations that have been divested or spun-off (including our former shipbuilding business) and/or for which we believe 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.

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. (federal, state and local) 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 state or federal tax audits or related litigation could be materially different from our historical income tax provisions and accruals.

As a result of the acquisition of Orbital ATK, Inc. (OATK) in 2018, we are subject to outstanding tax audits and may be subject to future tax audits and legal challenges involving OATK and its subsidiaries, the spinoff of its then subsidiary Vista Outdoor Inc. (Vista) in 2015 and related matters. OATK has a tax matters agreement with Vista, pursuant to which, in certain circumstances and subject to certain limitations, Vista is required to indemnify OATK against taxes on the spinoff. However, there are circumstances pursuant to which we may be unable to obtain an indemnification payment or we may be required to indemnify Vista for such taxes under the tax matters agreement.

Changes in our tax provisions 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 or agreements, could have a material adverse effect on our financial position, results of operations and/or cash flows.

Business and Operational Risks

We face various risks related to health epidemics, pandemics and similar outbreaks, which may have material adverse effects on our business, financial position, results of operations and/or cash flows.

We face a wide variety of risks related to health epidemics, pandemics and similar outbreaks, including the global outbreak of coronavirus disease 2019 (“COVID-19”). Since first reported in late 2019, the COVID-19 pandemic has dramatically impacted the global health and economic environment, including millions of confirmed cases, business slowdowns or shutdowns, government challenges and market volatility of an unprecedented nature. Although we have, to date, managed to continue most of our operations, we cannot predict the future course of events nor can we assure that this global pandemic, including its economic impact, will not have a material adverse impact on our business, financial position, results of operations and/or cash flows. (For further information relating to our company’s experience to date, and various steps taken related to the risks presented by the COVID-19 pandemic, see Management’s Discussion and Analysis of Financial Condition and Results of Operations).

Our operations may be further impacted by the COVID-19 pandemic if significant portions of our workforce are unable to work effectively, including because of illness, quarantines or absenteeism; steps the company has taken to protect health and well-being; government actions; facility closures; work slowdowns or stoppages; inadequate supplies or resources (such as reliable personal protective equipment, testing and vaccines); or other circumstances related to COVID-19. Looking forward, we may be unable to perform fully on our contracts, we may experience interruptions in our business and we may incur liabilities and suffer losses as a result. We will continue to incur additional costs as a result of the COVID-19 outbreak, including to protect the health and well-being of our employees and as a result of impacts on operations and performance, which costs we may not be fully able to recover. We may be subject to additional regulatory requirements, enforcement actions and litigation, again with costs and liabilities that are not fully recoverable or insured. The continued spread of COVID-19 may also affect our ability to hire, develop and retain our talented and diverse workforce, and to maintain our corporate culture.

The continued global pandemic, including the economic impact, are likely also to cause further disruption in our supply chain. If our suppliers have increased challenges with their workforce (including as a result of illness, absenteeism or government orders), facility closures, access to necessary components and supplies, access to capital, and access to fundamental support services (such as shipping and transportation), they may be unable to provide the agreed-upon goods and services in a timely, compliant and cost-effective manner. We may incur additional costs and delays in our business, including as a result of higher prices, schedule delays or the need to identify and develop alternative suppliers, and we may need to provide additional resources to support our suppliers or otherwise continue performance under our contracts. In some instances, we may be unable to do that, incurring additional liabilities under our current contracts and hampering new ones.

The global COVID-19 crisis is putting extraordinary pressures on the U.S. government and governments around the world. It could cause delays or limits in the ability of the government and other customers to perform, including making timely payments and awards to us, negotiating contracts and agreeing appropriate costs for recovery, performing quality inspections, supporting testing, accepting delivery, approving security clearances (for individuals and facilities), and providing necessary personnel, equipment and facilities. In addition, as a result of the COVID-19 crisis, there may be changes in our customers' priorities and practices, as our customers in both the U.S. and globally confront competing budget priorities and limited resources. These changes may impact current and future programs, customer priorities, government payments and other practices, procurements, and funding decisions.

While we have significant sources of cash and liquidity and access to committed and uncommitted credit lines, a prolonged period of generating lower cash from operations could adversely affect both our financial condition and the achievement of our strategic objectives. Additionally, there can be no assurance that we will not face credit rating downgrades, and such downgrades could adversely affect our cost of funds, liquidity and access to capital markets. The current market volatility may also impact investment performance and our expected asset valuations and returns, which could materially impact the calculation of long-term liabilities such as our pension obligations.

We continue to work with our stakeholders (including customers, employees, suppliers and local communities) in an effort to address responsibly this global pandemic. We continue to monitor the situation, to assess further possible implications to our employees, business, supply chain and customers, and to take certain actions in an effort to mitigate various adverse consequences.

We expect that the longer the COVID-19 pandemic, including its economic disruption, continues, the greater the adverse impact on our business operations, financial performance and results of operations could be. Given the tremendous uncertainties and variables, we cannot at this time predict the impact of the global COVID-19 pandemic, or any future pandemic, but any one could have a material adverse impact on our business, financial position, results of operations and/or cash flows.

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

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

Changes in laws, regulations, political leadership and environment, political relations and instability, and/or security risks may dramatically affect our ability to conduct or continue to conduct business in international markets, including sales to customers outside the U.S. and purchases from suppliers outside the U.S. Our international business may be impacted by changes in U.S. and foreign national policies and priorities, and geopolitical relationships, any of which may be influenced by changes in the threat environment, political leadership, geopolitical uncertainties, world events, bilateral and multi-lateral relationships, government budgets, and economic and political factors more generally, and any of which could impact funding for programs, our ability to perform and/or export authorizations, or delay purchasing decisions or customer payments. We also could be affected by the legal, regulatory and economic impacts of Britain's 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 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 revoking the export authorization after the product is ordered. Our ability to conduct business outside of the U.S. also depends on our ability to attract and retain sufficient qualified personnel with the skills and/or security clearances in the markets in which we do business. More broadly, our ability effectively to pursue and execute contracts outside the U.S. also may be impacted by our ability to partner successfully with non-U.S. companies, including through joint ventures, teaming agreements, co-production or other arrangements, in support of such pursuits. This risk includes the ability to timely identify and negotiate appropriate arrangements with local partners as well as potential exposure for their actions. This risk may increase, depending on local requirements regarding who we partner with and under what circumstances, particularly where we are effectively required to partner with government-affiliated entities.

The products and services we provide, 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 business could be negatively impacted by cyber and other security threats or disruptions.

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

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

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

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

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

We rely on other companies to provide raw materials, chemicals and components and subsystems for our products and to produce hardware elements and sub-assemblies, provide software and intellectual property, provide information about the parts they supply to us, and perform some of the services we provide to our customers, and to do so in compliance with all applicable laws, regulations and contract terms. Disruptions or performance problems caused by our subcontractors and suppliers, failure to meet regulatory or contractual requirements, 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, materials or information, or perform the agreed-upon services in a timely, compliant and cost-effective manner or otherwise to meet the requirements of the contract or applicable regulations. Changes in political or economic conditions, including changes in defense budgets or credit availability or sanctions, or other changes impacting a subcontractor or supplier (including changes in ownership or operations), as well as their ability to retain talent and other resources, and requirements or changes in requirements imposed on them by other customers, could adversely affect the financial stability of our subcontractors and suppliers and/or their ability to perform. The inability of our suppliers to perform, or their inability to perform adequately, could also result in the need for us to transition to alternate suppliers, which could result in significant incremental cost and delay or the need for us to provide other resources to support our existing suppliers. This risk may increase as the demands grow for our subcontractors and suppliers to meet extensive government-related cyber and other requirements.

In connection with our U.S. government contracts, we are required to procure certain materials, components and parts from supply sources approved by the customer. Among many other examples, we require assured access to microelectronics. We also are facing increased and changing regulatory requirements, both domestically and internationally, many of which apply to our subcontractors and suppliers. As a prime, we are often responsible for not only our compliance with these regulatory requirements, but that of our subcontractors and suppliers too. In some cases, there may be only one supplier, or one domestic supplier, for certain components. 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 and related certification 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.

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, and who share our values and are able to operate effectively consistent with our culture. Outside the U.S., it is increasingly important that we are also able to attract and retain personnel with relevant local qualifications and experience. We are facing 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. There is also the risk that we are unable to achieve our diversity, equity and inclusion objectives or, more broadly, to meet sustainability goals increasingly required by our shareholders, employees and other stakeholders.

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

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

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

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

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

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

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

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

We have significant operations, including centers of excellence, located in regions that may be exposed to hurricanes, earthquakes, other damaging storms, water levels, wildfires 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, the nature, frequency and severity of which may be impacted by climate change, and delays in recovery may be significant.

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

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. We use and provide energetic materials and solid rocket motors, including products that involve highly explosive or flammable elements. We develop missile systems, and counter systems, including strategic deterrents, as well as subsystems and components. All of these activities subject us to various extraordinary risks, including (1) potential liabilities relating to nuclear or launch-related incidents, unintended initiation of energetic materials and explosions, including risk of personal injury, property damage and environmental harm; (2) 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 (3) to failed launches. We may be subject to reputational harm and potential liabilities arising out of a nuclear, launch or explosive incident, among others, whether or not the cause was within our control, and insurance may not be available. 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, 10 U.S.C. 2354, the Price-Anderson Nuclear Industries Indemnity Act and the Terrorism Risk Insurance Reauthorization Act, for certain risks, but those protections may not be available and they are limited in scope.

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

In addition, our customers may use our products and services in connection with hazardous activities, in ways that can be unusually hazardous or risky, or in ways that are not intended, creating potential liabilities for our company as the provider of the products and services. In the event of an incident, if our customers fail to use our products properly or as intended, 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 rocket motors, or an incident or other damages related to or caused by the use of our products and services in connection with hazardous activities or risks, and if insurance coverage or indemnification or other protection was not fully available to cover our losses and liabilities, it could adversely affect our reputation and have a material adverse effect on our financial position, results of operations and/or cash flows.

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

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

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

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

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

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

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

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

Many of the markets in which we operate are characterized by rapidly changing technologies. The product, program and service needs of our customers change and evolve regularly. Our success in the competitive defense industry depends upon our ability to identify emerging technological trends, develop technologically advanced, innovative and cost-effective products and services and market these products and services to our customers in the U.S. and internationally. In addition, our ability to develop innovative and technologically advanced products depends, in part, on continued funding for, and investment in, research and development projects. Our success also depends on our continued access to assured suppliers of important technologies and components and our ability to provide the people, technologies, facilities, equipment and financial capacity needed to deliver those products and services with maximum efficiency. Our customers and markets also increasingly require us to be agile and efficient, and digitally enabled. If we are unable to develop new products and technologies in a timely fashion, 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.

General and Other Risk Factors

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

We endeavor to obtain insurance agreements from financially solid, responsible, highly rated counterparties in established markets to cover significant risks and liabilities (including, for example, natural disasters, space launches, hazardous operations, energetics and products liability). Not every risk or liability can be insured, and for risks that are or should be insurable, the policy limits and terms of coverage reasonably obtainable in the market may not be available or sufficient to cover all actual losses or liabilities incurred (including claims related to pandemics and communicable disease). Even if insurance coverage is available, we may not be able to obtain it at a price or on terms acceptable to us or without increasing exclusions. Disputes with insurance carriers, including over policy terms, reservation of rights, the applicability of coverage (including exclusions), compliance with provisions (including notice) and/or the insolvency of one or more of our insurers may significantly affect the availability or timing of recovery, and may impact our ability to obtain insurance coverage at reasonable rates in the future.

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

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

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

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

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

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

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

Item 1B. Unresolved Staff Comments

None.

FORWARD-LOOKING STATEMENTS AND PROJECTIONS

This Annual Report on Form 10-K and the information 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,” “outlook,” “trends,” “goals” and similar expressions generally identify these forward-looking statements. Forward-looking statements include, among other things, statements relating to our future financial condition, results of operations and/or cash flows. Forward-looking statements are based upon assumptions, expectations, plans and projections that we believe to be reasonable when made, but which may change over time. These statements are not guarantees of future performance and inherently involve a wide range of risks and uncertainties that are difficult to predict. Specific risks that could cause actual results to differ materially from those expressed or implied in these forward-looking statements include, but are not limited to, those identified under “Risk Factors” and other important factors disclosed in this report and from time to time in our other filings with the SEC. These risks and uncertainties are amplified by the global COVID-19 pandemic, which has caused and will continue to cause significant challenges, instability and uncertainty. They include:

- the impact of the COVID-19 outbreak or future epidemics on our business, including the potential for worker absenteeism, facility closures, work slowdowns or stoppages, supply chain disruptions, additional costs and liabilities, program delays, our ability to recover costs under contracts, changing government funding and acquisition priorities and processes, changing government payment rules and practices, insurance challenges, and potential impacts on access to capital, the markets and the fair value of our assets
- our dependence on the U.S. government for a substantial portion of our business
- significant delays or reductions in appropriations for our programs, and U.S. government funding and program support more broadly
- investigations, claims, disputes, enforcement actions, litigation and/or other legal proceedings
- the use of estimates when accounting for our contracts and the effect of contract cost growth and/or changes in estimated contract revenues and costs
- our exposure to additional risks as a result of our international business, including risks related to geopolitical and economic factors, suppliers, laws and regulations
- the improper conduct of employees, agents, subcontractors, suppliers, business partners or joint ventures in which we participate and the impact on our reputation and our ability to do business
- cyber and other security threats or disruptions faced by us, our customers or our suppliers and other partners
- the performance and financial viability of our subcontractors and suppliers and the availability and pricing of raw materials and components
- changes in procurement and other laws, regulations, contract terms and practices applicable to our industry, findings by the U.S. government as to our compliance with such requirements, and changes in our customers’ business practices globally
- increased competition within our markets and bid protests
- the ability to maintain a qualified workforce with the required security clearances and requisite skills
- our ability to meet performance obligations under our contracts, including obligations that require innovative design capabilities, are technologically complex, require certain manufacturing expertise or are dependent on factors not wholly within our control
- environmental matters, including unforeseen environmental costs and government and third party claims
- natural disasters
- health epidemics, pandemics and similar outbreaks
- 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 and postretirement benefit obligations
- our ability appropriately to exploit and/or protect intellectual property rights
- our ability to develop new products and technologies and maintain technologies, facilities, and equipment to win new competitions and meet the needs of our customers
- unanticipated changes in our tax provisions or exposure to additional tax liabilities
- changes in business conditions that could impact business investments and/or recorded goodwill or the value of other long-lived assets

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

Item 2. Properties

At December 31, 2020, we had approximately 51 million square feet of floor space at 530 separate locations, primarily in the U.S., for manufacturing, warehousing, research and testing, administration and various other uses.

At December 31, 2020, we leased to third parties approximately 189,000 square feet of our owned and leased facilities.

At December 31, 2020, we had major operations at the following locations:

Aeronautics Systems

El Segundo, Mojave, Palmdale, Redondo Beach and San Diego, CA; Melbourne and St. Augustine, FL; Iuka and Moss Point, MS; Beavercreek, OH; Oklahoma City, OK; and Clearfield, UT.

Defense Systems

Huntsville, AL; Mesa and Sierra Vista, AZ; Los Angeles, CA; Warner Robins, GA; Lake Charles, LA; Baltimore, Cumberland and Elkton, MD; Elk River and Plymouth, MN; Dulles, McLean, Radford and Richmond, VA; and Keyser, WV. Locations outside the U.S. include Australia.

Mission Systems

McClellan, San Diego, Sunnyvale and Woodland Hills, CA; Apopka, FL; Rolling Meadows, IL; Annapolis, Annapolis Junction, Elkridge, Halethorpe, Linthicum and Sykesville, MD; Bethpage and Williamsville, NY; Cincinnati, OH; Salt Lake City, UT; and Chantilly, Charlottesville and Fairfax, VA. Locations outside the U.S. include France, Germany, Italy and the United Kingdom.

Space Systems

Huntsville, AL; Chandler, Gilbert and Tempe, AZ; Azusa, Carson, Los Angeles, Manhattan Beach, Oxnard, Redondo Beach and San Diego, CA; Aurora and Colorado Springs, CO; Devens, MA; Beltsville, MD; Eden Prairie, MN; Brigham City, Clearfield, Magna, Ogden, Roy and Tremonton, UT; and Dulles and Sterling, VA.

Corporate

Falls Church and Lebanon, VA.

The following is a summary of our floor space at December 31, 2020:

Square feet (in thousands)	Owned	Leased	U.S. Government Owned/Leased	Total
Aeronautics Systems	3,415	6,263	3,270	12,948
Defense Systems	1,368	3,997	2,283	7,648
Mission Systems	7,933	4,580	—	12,513
Space Systems	9,350	7,092	545	16,987
Corporate	372	407	—	779
Total	22,438	22,339	6,098	50,875

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."

Consistent with SEC Regulation S-K Item 103, we have elected to disclose those environmental proceedings with a governmental entity as a party where the company reasonably believes such proceeding would result in monetary sanctions, exclusive of interest and costs, of $1.0 million or more.

Item 4. Mine Safety Disclosures

No information is required in response to this item.

PART II

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

COMMON STOCK

We have 800,000,000 shares authorized at a $1 par value per share, of which 166,717,179 shares and 167,848,424 shares were issued and outstanding as of December 31, 2020 and 2019, 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, 2020 and 2019.

MARKET INFORMATION

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

HOLDERS

As of January 25, 2021, there were 20,639 common shareholders of record.

PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

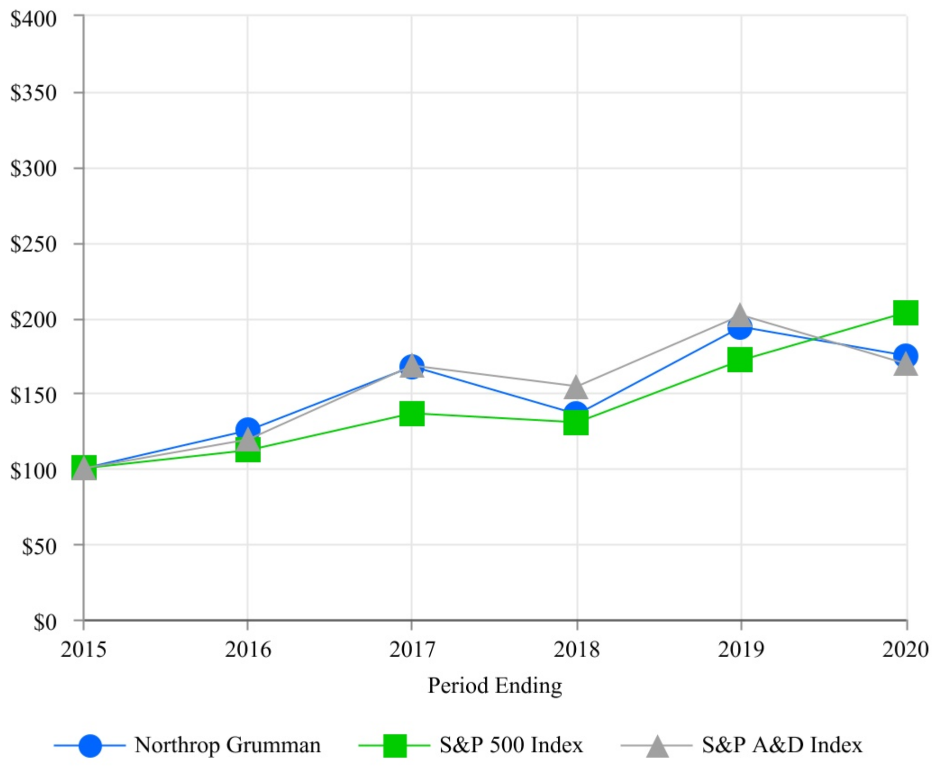
We had no repurchases of common stock during the three months ended December 31, 2020. On January 25, 2021, the company’s board of directors authorized a new share repurchase program of up to an additional $3.0 billion in share repurchases of the company’s common stock (the “2021 Repurchase Program”), bringing the total outstanding authorization up to $5.8 billion. By its terms, repurchases under the 2021 Repurchase Program will commence upon completion of the prior share repurchase program authorized on December 4, 2018 and will 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.

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

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, 2015, 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 The Boeing Company, General Dynamics Corporation, Howmet Aerospace Inc., Huntington Ingalls Industries Inc., L3Harris Technologies, Inc., Lockheed Martin Corporation, Northrop Grumman Corporation, Raytheon Technologies Corporation, Teledyne Technologies Incorporated, Textron, Inc., and TransDigm Group Incorporated.
- 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.

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

	Year Ended December 31									
$ in millions, except per share amounts		**2020**		2019		2018[1]		2017		2016
Sales	**$**	**36,799**	$	33,841	$	30,095	$	26,004	$	24,706
Operating income		**4,065**		3,969		3,780		3,218		3,277
Net earnings		**3,189**		2,248		3,229		2,869		2,043
Basic earnings per share	**$**	**19.08**	$	13.28	$	18.59	$	16.45	$	11.42
Diluted earnings per share		**19.03**		13.22		18.49		16.34		11.32
Cash dividends declared per common share		**5.67**		5.16		4.70		3.90		3.50
Year-End Financial Position										
Total assets[2]	**$**	**44,469**	$	41,089	$	37,653	$	35,128	$	25,815
Notes payable to banks and long-term debt		**15,003**		13,879		14,400		15,266		7,070
Other long-term obligations[2][3]		**10,049**		10,066		7,309		6,505		7,667
Financial Metrics										
Net cash provided by operating activities	**$**	**4,305**	$	4,297	$	3,827	$	2,613	$	2,813
Adjusted free cash flow[4]		**3,683**		3,128		2,764		2,010		1,893
Other Information										
Company-sponsored research and development expenses	**$**	**1,073**	$	953	$	764	$	639	$	705
Total backlog[5]		**80,969**		64,840		53,500		42,629		45,339
Square footage at year-end (in thousands)		**50,875**		53,780		53,283		35,379		34,112
Number of employees at year-end		**97,000**		90,000		85,000		70,000		67,000

(1) Selected financial data includes the operating results of Orbital ATK subsequent to the June 6, 2018 merger date.

(2) We adopted ASC Topic 842, *Leases*, on January 1, 2019 using the optional transition method and, as a result, did not recast years prior to 2019.

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

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

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

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

OVERVIEW

The following discussion should be read along with the financial statements included in this Form 10-K, as well as Part II, “Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations” of our Form 10-K for the year ended December 31, 2019 (“2019 Annual Report on Form 10-K”), as well as Exhibit 99.3 of our Form 8-K that we filed with the SEC on April 29, 2020, which recasts the disclosures in certain portions of the 2019 Annual Report on Form 10-K to reflect changes in the company’s reportable segments, both of which provide additional information on comparisons of years 2019 and 2018.

Acquisition of Orbital ATK

On June 6, 2018 (the “Merger Date”), the company completed its previously announced acquisition of Orbital ATK, Inc. (“Orbital ATK”) (the “Merger”). On the Merger date, Orbital ATK became a wholly-owned subsidiary of the company and its name was changed to Northrop Grumman Innovation Systems, Inc. We established Innovation Systems as a new, fourth business sector. The operating results of legacy Innovation Systems subsequent to the Merger Date have been included in the company’s consolidated results of operations and, upon our January 1, 2020 sector realignment, are reflected in the Space Systems, Defense Systems and Aeronautics Systems sectors. See Note 2 to the consolidated financial statements for further information regarding the acquisition of Orbital ATK.

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

Disposition of IT and Mission Support Services Business

On December 7, 2020, we entered into a definitive agreement to sell our IT and mission support services business for $3.4 billion in cash. The IT and mission support services business is comprised of the majority of the Information Solutions and Services (IS&S) division of Defense Systems (excluding our Vinnell Arabia business); select cyber, intelligence and missions support programs, which are part of the Cyber and Intelligence Mission Solutions (CIMS) division of Mission Systems; and the Space Technical Services business unit of Space Systems. The assets and liabilities of the IT and mission support services business were classified as held for sale in the consolidated statement of financial position as of December 31, 2020 and no impairment losses were recognized in the consolidated statement of earnings and comprehensive income for the year ended December 31, 2020. We expect to complete the sale of the IT and mission support services business in the first quarter of 2021, subject to regulatory approvals and customary closing conditions. See Note 2 to the consolidated financial statements for further information regarding the disposition.

COVID-19

Coronavirus disease 2019 (“COVID-19”) was first reported in late 2019 and has since dramatically impacted the global health and economic environment, including millions of confirmed cases, business slowdowns or shutdowns, government challenges and market volatility. In March 2020, the World Health Organization characterized COVID-19 as a global pandemic, and the President declared a national emergency concerning the COVID-19 outbreak. The company’s leadership, our crisis management and business resumption teams, and local site leadership continue closely to monitor and address the developments, including the impact on our company, our employees, our customers, our suppliers and our communities. The company has considered and continues to consider guidance from the Centers for Disease Control (CDC), other health organizations, federal, state and local governmental authorities, and our customers, among others. We have taken, and continue to take, robust actions to help protect the health, safety and well-being of our employees, to support our suppliers and local communities, and to continue to serve our customers. Our goals have been to lessen the immediate potential adverse impacts, both health and economic, and to continue to position the company for long-term success. Like the communities in which we serve, our actions have varied depending on the spread of COVID-19 and local health requirements, the needs of our employees and the needs of our business. Among other actions, we have required or enabled employees to work from home or remotely where practicable, and expanded IT and communication support to enhance their productivity; adjusted work spaces and shift schedules to facilitate social distancing for those who continue to work in our facilities; enhanced cleaning and disinfecting procedures at our facilities; required face coverings and worked to procure and distribute personal protective equipment (PPE); implemented health checks and visitor protocols; restricted travel; provided additional benefits to our employees, including for those most at risk; and contributed financial and manufacturing resources to supporting critical national requirements, such as for PPE. Along with the Northrop Grumman Foundation, we have provided grants for global, national and local organizations that support frontline healthcare workers, address food insecurity, advance efforts for vaccines, increase student access to technology and provide support to vulnerable populations; donated PPE items to emergency response teams and healthcare professionals, including N95 masks and Tyvek suits; and established a COVID-19 relief matching gift program for employees. More recently, we have sought to assist state and local governments as they start to distribute and deliver vaccines.

Earlier in the COVID-19 pandemic and at times of higher transmission, many state and local jurisdictions implemented mandatory stay-at-home or shelter-in-place orders. Most of those orders exempted some or all of the defense industrial base, including Northrop Grumman and many of our suppliers, as part of the essential or critical infrastructure. Our facilities have largely remained open and many of our employees who cannot work remotely are continuing to come to work and support our customers' national security and mission-essential operations. Towards the end of the second quarter of 2020, some state and local jurisdictions started to lift mandatory stay-at-home or shelter-in-place orders and started gradually to ease restrictions. We started to implement, or prepared to implement certain return to office plans to allow some employees who had been working remotely gradually to return to the workplace. Later in 2020, as the number of cases began to rise again, and particularly in the fourth quarter of 2020, we paused or reversed many of our efforts to bring more employees back to the work place. In the fourth quarter of 2020 and the first quarter of 2021, after FDA approval, we began to explore how the company could best facilitate the provision of vaccinations to our personnel in accordance with federal guidance and state and local vaccination plans. Absenteeism rates (including because of employees in quarantine or those suffering from COVID-19) and the impacts on productivity have fluctuated significantly, especially as local cases and transmission rates have changed. Throughout, we have worked to adapt and to take robust actions to protect the health, safety and well-being of our employees and to serve our customers, considering, among other things, local circumstances, state and local requirements and guidance from the CDC. We have also taken various steps in efforts to support our suppliers, with a particular focus on critical small and midsized business partners, including passing through increased progress payments from DoD to our suppliers and accelerating payments to certain suppliers.

We have experienced and expect to continue to experience various increased costs to maintain our operations, including as a result of actions taken to protect the health, safety and well-being of our employees; because of illness, quarantines, and absenteeism; as a result of government actions; and because of disruption and stress among our suppliers and customers. We have also experienced certain lower costs, including those related to employee travel, some health benefits and personal time off. We continue to monitor this situation closely and cannot predict how it will change, including the extent of any increase in the number of COVID-19 cases and the costs and impacts to us. Our customers have generally continued to make timely payments, and we are working with them to consider the possibility of additional cost recoveries. Again, however, our customers are facing tremendous demands and budget pressures, and we cannot predict how this may change and how they will continue to allocate limited resources.

The company's overall 2020 revenue and operating income were not significantly impacted by COVID-19. However, our employees, suppliers and customers, the company and our global community are facing tremendous challenges and we cannot predict how this dynamic situation will evolve or the impact it will have on the company. For further information on the potential impact to the company of COVID-19, see "Risk Factors."

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 2021 reflecting the impact of and uncertainty surrounding geopolitical tensions globally and financial market volatility and the COVID-19 pandemic. The global economy may also be affected by Britain's 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 and changing political environment and substantial fiscal and economic challenges, which affect funding for discretionary and non-discretionary budgets. The Budget Control Act of 2011 (BCA) mandated spending caps for all federal discretionary spending across a ten-year period (FY 2012 through FY 2021), including specific limits for defense and non-defense spending. In prior years, these spending caps have been revised by separate bills for specific fiscal years.

In August 2019, the Bipartisan Budget Act of 2019 was enacted, increasing spending caps under the Budget Control Act (BCA) for FY 2020 and FY 2021, the final two fiscal years covered by the BCA, and suspending the debt ceiling through July 31, 2021. In February 2020, the then President proposed a budget request for FY 2021, which addressed various capabilities highlighted in the U.S. National Security Strategy, the National Defense Strategy and the Missile Defense Review. On December 27, 2020, FY 2021 appropriations were enacted under the Consolidated Appropriations Act of 2021. In 2020, Congress also passed several emergency COVID-19 relief bills addressing certain impacts of the pandemic. It is continuing to consider other responses to the COVID-19 crisis, with broader implications for the defense industry and the overall economic environment, including the national debt. With a new President and Administration, a new Congress and pressing debt and needs, it is difficult to predict the specific course of future defense budgets. However, the threat remains very substantial and we believe that our capabilities, particularly in space, missiles, missile defense, hypersonics, counter-hypersonics, survivable aircraft and mission systems should help our customers to meet the threats and, as a result, continue to allow for long-term profitable growth in our business.

The political environment, federal budget and debt ceiling are expected to continue to be the subject of considerable debate, which could have material 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 life cycle (e.g., cost-type, fixed-price, development, production, and/or sustainment).

CONSOLIDATED OPERATING RESULTS

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

Selected financial highlights are presented in the table below:

	Year Ended December 31			% Change in	
$ in millions, except per share amounts	**2020**	2019	2018	**2020**	2019
Sales	**$ 36,799**	$ 33,841	$ 30,095	**9 %**	12 %
Operating costs and expenses	**32,734**	29,872	26,315	**10 %**	14 %
Operating costs and expenses as a % of sales	**89.0 %**	88.3 %	87.4 %		
Operating income	**4,065**	3,969	3,780	**2 %**	5 %
Operating margin rate	***11.0 %***	*11.7 %*	*12.6 %*		
Mark-to-market pension and OPB expense	**(1,034)**	(1,800)	(655)	**(43)%**	175 %
Federal and foreign income tax expense	**539**	300	513	**80 %**	(42)%
Effective income tax rate	***14.5 %***	*11.8 %*	*13.7 %*		
Net earnings	**3,189**	2,248	3,229	**42 %**	(30)%
Diluted earnings per share	**19.03**	13.22	18.49	**44 %**	(29)%

Sales

2020 sales increased $3.0 billion, or 9 percent, due to higher sales at all four sectors.

See “Segment Operating Results” below for further information by segment and “Product and Service Analysis” for product and service detail. See Note 16 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

2020 operating income increased $96 million, or 2 percent, primarily due to an increase in segment operating income, partially offset by higher unallocated corporate expense and a lower net FAS (service)/CAS pension adjustment. 2020 operating margin rate declined to 11.0 percent from 11.7 percent principally due to a lower segment operating margin rate, higher unallocated corporate expense and lower net FAS (service)/CAS pension adjustment.

2020 G&A costs as a percentage of sales decreased to 9.3 percent from 9.7 percent, primarily due to higher sales volume, partially offset by higher independent research and development costs.

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

Mark-to-Market Pension and OPB Expense

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

	Year Ended December 31		
$ in millions	**2020**	2019	2018
Actuarial (losses) gains on projected benefit obligation	**$ (3,570)**	$ (4,866)	$ 2,772
Actuarial gains (losses) on plan assets	**2,536**	3,066	(3,426)
Other	**—**	—	(1)
MTM expense	**$ (1,034)**	$ (1,800)	$ (655)

2020 MTM expense of $1.0 billion was primarily driven by a 71 basis point decrease in the discount rate from year end 2019, partially offset by actual net plan asset returns of approximately 16.2 percent compared to our 8.0 percent asset return assumption.

Federal and Foreign Income Taxes

The 2020 effective tax rate increased to 14.5 percent from 11.8 percent in 2019. MTM expense reduced the 2020 effective tax rate by 1.3 percentage points and the 2019 effective tax rate by 3.7 percentage points. See Note 7 to the consolidated financial statements for additional information.

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

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Net earnings	**$ 3,189**	$ 2,248	$ 3,229	**42 %**	(30)%
MTM expense	**1,034**	1,800	655	**(43)%**	175 %
MTM-related deferred state tax benefit[1]	**(54)**	(81)	(29)	**(33)%**	179 %
Federal tax benefit of items above[2]	**(206)**	(361)	(131)	**(43)%**	176 %
MTM expense, net of tax	**774**	1,358	495	**(43)%**	174 %
MTM-adjusted net earnings	**$ 3,963**	$ 3,606	$ 3,724	**10 %**	(3)%

[1] MTM expense is expected to be deductible on our future state tax returns. The deferred state tax benefit was calculated using the company's blended state tax rate of 5.25 percent in 2020 and 4.50 percent in 2019 and 2018 and included in Unallocated corporate expense within operating income.

[2] MTM expense is expected to be deductible on our future federal tax returns. The federal tax benefit in each period was calculated by subtracting the deferred state tax benefit from MTM expense and applying the 21 percent federal statutory rate.

Net earnings increased $941 million, or 42 percent, in 2020 principally due to a $584 million decrease in our MTM expense, net of tax. Excluding this impact, MTM-adjusted net earnings increased by $357 million, or 10 percent, primarily due to increases in our FAS (non-service) benefit and operating income, partially offset by higher income tax and interest expense.

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	
	2020	2019	2018	**2020**	2019
Diluted earnings per share	**$ 19.03**	$ 13.22	$ 18.49	**44 %**	(29)%
MTM expense per share	**6.17**	10.59	3.76	**(42)%**	182 %
MTM-related deferred state tax benefit per share[1]	**(0.32)**	(0.48)	(0.17)	**(33)%**	182 %
Federal tax benefit of items above per share[2]	**(1.23)**	(2.12)	(0.75)	**(42)%**	183 %
MTM expense per share, net of tax	**4.62**	7.99	2.84	**(42)%**	181 %
MTM-adjusted diluted earnings per share	**$ 23.65**	$ 21.21	$ 21.33	**12 %**	(1)%

[1] MTM expense is expected to be deductible on our future state tax returns. The deferred state tax benefit was calculated using the company's blended state tax rate of 5.25 percent in 2020 and 4.50 percent in 2019 and 2018 and included in Unallocated corporate expense within operating income.

[2] MTM expense is expected to be deductible on our future federal tax returns. The federal tax benefit in each period was calculated by subtracting the deferred state tax benefit from MTM expense and applying the 21 percent federal statutory rate.

Diluted earnings per share increased $5.81, or 44 percent, principally due to a $3.37 increase associated with lower MTM expense, net of tax. Excluding this impact, MTM-adjusted diluted earnings per share increased $2.44, or 12 percent, reflecting a 10 percent increase in MTM-adjusted net earnings and a 1 percent decrease in weighted-average diluted shares outstanding.

SEGMENT OPERATING RESULTS

Basis of Presentation
Effective January 1, 2020, the company reorganized its sectors to better align the company's broad portfolio to serve its customers' needs. At December 31, 2020, the company was aligned in four operating sectors, which also comprise our reportable segments: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems. The segment operating results below include sales and operating income for legacy Innovation Systems subsequent to the Merger date. For a more complete description of each segment's products and services, see "Business."

Beginning in the second quarter of 2020, the company no longer considers certain unallowable costs as part of management's evaluation of segment operating performance. As a result, certain unallowable costs, which were previously included in segment operating results, are now reported in Unallocated corporate expense within operating income. This change has been applied retrospectively in the accompanying financial information. See Part II, Item 5 in the Quarterly Report on Form 10-Q for the quarter ended June 30, 2020 for further information regarding the impact of this change on the company's prior period segment information.

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

Aeronautics Systems	Defense Systems	Mission Systems	Space Systems
Autonomous Systems	Battle Management & Missile Systems	Airborne Sensors & Networks	Launch & Strategic Missiles
Manned Aircraft	Mission Readiness	Cyber & Intelligence Mission Solutions	Space
		Maritime/Land Systems & Sensors	
		Navigation, Targeting & Survivability	

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

Segment Operating Income and Margin Rate

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

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Segment operating income	**$ 4,188**	$ 3,978	$ 3,514	**5 %**	13 %
Segment operating margin rate	***11.4 %***	*11.8 %*	*11.7 %*		
CAS pension expense	**827**	832	1,017	**(1)%**	(18)%
Less: FAS (service) pension expense	**(409)**	(367)	(404)	**11 %**	(9)%
Net FAS (service)/CAS pension adjustment	**418**	465	613	**(10)%**	(24)%
Intangible asset amortization and PP&E step-up depreciation	**(322)**	(390)	(220)	**(17)%**	NM
MTM-related deferred state tax benefit[1]	**54**	81	29	**(33)%**	179 %
Other unallocated corporate expense	**(273)**	(165)	(156)	**65 %**	6 %
Unallocated corporate expense	**(541)**	(474)	(347)	**14 %**	37 %
Total operating income	**$ 4,065**	$ 3,969	$ 3,780	**2 %**	5 %

[1] Represents the deferred state tax benefit associated with MTM expense, which is recorded in Unallocated corporate expense consistent with other changes in deferred state taxes.

Segment Operating Income and Margin Rate

2020 segment operating income increased $210 million, or 5 percent, and reflects higher operating income at all four sectors. Segment operating margin rate decreased to 11.4 percent from 11.8 percent principally due to a lower operating margin rate at Aeronautics Systems.

Net FAS (service)/CAS Pension Adjustment

The decrease in our 2020 net FAS (service)/CAS pension adjustment is primarily due to higher FAS (service) pension expense largely as a result of changes in actuarial assumptions as of December 31, 2019.

Unallocated Corporate Expense
The increase in 2020 unallocated corporate expense is primarily due to the absence in 2020 of an $89 million benefit related to the favorable resolution of a cost accounting litigation matter and $60 million of higher state tax expense in the current year. State tax expense increased principally due to changes in deferred state income taxes, including a lower MTM-related deferred state tax benefit, and an increase in reserves, in part, for potential unallowable costs associated with state apportionment. These increases were partially offset by $68 million of lower intangible asset amortization and PP&E step-up depreciation.

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	**2020**	2019	2018
Favorable EAC adjustments	**$ 1,082**	$ 1,040	$ 1,019
Unfavorable EAC adjustments	**(616)**	(560)	(442)
Net EAC adjustments	**$ 466**	$ 480	$ 577

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

	Year Ended December 31		
$ in millions	**2020**	2019	2018
Aeronautics Systems[(1)]	**$ 77**	$ 143	$ 271
Defense Systems[(1)]	**148**	99	75
Mission Systems	**216**	189	172
Space Systems[(1)]	**33**	63	73
Eliminations	**(8)**	(14)	(14)
Net EAC adjustments	**$ 466**	$ 480	$ 577

(1) Amounts reflect EAC adjustments after the percent complete on legacy 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.

AERONAUTICS SYSTEMS

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Sales	**$ 12,169**	$ 11,116	$ 10,293	**9 %**	8 %
Operating income	**1,206**	1,188	1,128	**2 %**	5 %
Operating margin rate	***9.9 %***	*10.7 %*	*11.0 %*		

Sales
2020 sales increased $1.1 billion, or 9 percent, due to higher sales in both Manned Aircraft and Autonomous Systems. Higher volume on restricted programs, including a $444 million sale of equipment to a restricted customer, E-2D and Triton were partially offset by lower volume on the B-2 Defensive Management System Modernization program as it nears completion. See Note 1 to the consolidated financial statements for further detail on the sale of equipment described above.

Operating Income
2020 operating income increased $18 million, or 2 percent, due to higher sales partially offset by a lower operating margin rate. 2020 operating margin rate decreased to 9.9 percent from 10.7 percent principally due to lower net EAC adjustments as well as the sale of equipment to a restricted customer, which was dilutive to the overall sector margin rate.

DEFENSE SYSTEMS

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Sales	**$ 7,543**	$ 7,495	$ 6,612	**1 %**	13 %
Operating income	**846**	793	697	**7 %**	14 %
Operating margin rate	***11.2 %***	*10.6 %*	*10.5 %*		

Sales
2020 sales increased $48 million, or 1 percent, due to higher volume in both business areas. Battle Management & Missile Systems sales increased primarily due to higher volume on the Guided Missile Launch Rocket System (GMLRS), the Advanced Anti-Radiation Guided Missile (AARGM), the Counter-Rocket, Artillery and Mortar program and other missile products, partially offset by lower volume on programs nearing completion, including an international weapons program and the close-out of our contract at the Army's Lake City ammunition plant. Mission Readiness sales increased principally due to higher volume on restricted and international programs, partially offset by lower volume on the Hunter sustainment program as it nears completion.

Operating Income
2020 operating income increased $53 million, or 7 percent, primarily due to a higher operating margin rate. Operating margin increased to 11.2 percent from 10.6 percent principally due to improved performance at Battle Management & Missile Systems and Mission Readiness.

MISSION SYSTEMS

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Sales	**$ 10,080**	$ 9,410	$ 8,949	**7 %**	5 %
Operating income	**1,459**	1,408	1,245	**4 %**	13 %
Operating margin rate	***14.5 %***	*15.0 %*	*13.9 %*		

Sales
2020 sales increased $670 million, or 7 percent, due to higher volume across all four business areas. Airborne Sensors & Networks sales increased principally due to higher airborne radar volume, including the F-35, Multi-role Electronically Scanned Array (MESA) and Scalable Agile Beam Radar (SABR) programs, and higher restricted volume. Navigation, Targeting & Survivability sales increased primarily due to higher volume on self-protection, avionics and targeting programs, including LITENING, partially offset by lower volume on infrared countermeasures programs. Maritime/Land Systems & Sensors sales increased primarily due to higher volume on marine systems and restricted programs, partially offset by lower international commercial volume due, in part, to COVID-19-related impacts. Cyber & Intelligence Mission Solutions sales increased principally due to higher restricted volume, partially offset by lower volume on an intelligence program as it nears completion.

Operating Income
2020 operating income increased $51 million, or 4 percent, due to higher sales, partially offset by a lower operating margin rate. Operating margin rate decreased to 14.5 percent from 15.0 percent primarily due to lower margin rates at Maritime/Land Systems & Sensors, including COVID-19-related impacts on certain international commercial businesses.

SPACE SYSTEMS

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Sales	**$ 8,744**	$ 7,425	$ 5,845	**18 %**	27 %
Operating income	**893**	794	644	**12 %**	23 %
Operating margin rate	***10.2 %***	*10.7 %*	*11.0 %*		

Sales
2020 sales increased $1.3 billion, or 18 percent, due to higher sales in both Space and Launch & Strategic Missiles. Space sales were driven by higher volume on restricted programs and the Next Generation Overhead Persistent Infrared and NASA Artemis programs. Launch & Strategic Missiles sales increased due to ramp-up on the Ground

Based Strategic Deterrent program and higher volume on launch vehicles and hypersonics programs, partially offset by lower volume on the Ground-based Midcourse Defense program.

Operating Income

2020 operating income increased $99 million, or 12 percent, due to higher sales, partially offset by a lower operating margin rate. Operating margin rate decreased to 10.2 percent from 10.7 percent principally due to lower net EAC adjustments and changes in contract mix.

PRODUCT AND SERVICE ANALYSIS

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

	Year Ended December 31					
$ in millions	**2020**		2019		2018	
Segment Information:	**Sales**	**Operating Costs and Expenses**	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses
Aeronautics Systems						
Product	**$ 10,437**	**$ 9,435**	$ 9,387	$ 8,428	$ 8,665	$ 7,731
Service	**1,610**	**1,417**	1,626	1,407	1,555	1,369
Intersegment eliminations	**122**	**111**	103	93	73	65
Total Aeronautics Systems	**12,169**	**10,963**	11,116	9,928	10,293	9,165
Defense Systems						
Product	**3,024**	**2,740**	2,784	2,572	1,703	1,521
Service	**3,791**	**3,305**	4,020	3,513	4,159	3,718
Intersegment eliminations	**728**	**652**	691	617	750	676
Total Defense Systems	**7,543**	**6,697**	7,495	6,702	6,612	5,915
Mission Systems						
Product	**6,744**	**5,757**	6,022	5,073	5,790	4,992
Service	**2,557**	**2,201**	2,660	2,314	2,441	2,109
Intersegment eliminations	**779**	**663**	728	615	718	603
Total Mission Systems	**10,080**	**8,621**	9,410	8,002	8,949	7,704
Space Systems						
Product	**6,810**	**6,084**	5,659	5,021	4,311	3,798
Service	**1,826**	**1,672**	1,683	1,535	1,471	1,343
Intersegment eliminations	**108**	**95**	83	75	63	60
Total Space Systems	**8,744**	**7,851**	7,425	6,631	5,845	5,201
Segment Totals						
Total Product	**$ 27,015**	**$ 24,016**	$ 23,852	$ 21,094	$ 20,469	$ 18,042
Total Service	**9,784**	**8,595**	9,989	8,769	9,626	8,539
Total Segment(1)	**$ 36,799**	**$ 32,611**	$ 33,841	$ 29,863	$ 30,095	$ 26,581

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

Product Sales and Costs

2020 product sales increased $3.2 billion, or 13 percent, due to higher product sales at all four sectors, including restricted programs and E-2D at Aeronautics Systems; restricted programs, Next Gen OPIR and GBSD at Space Systems; restricted, F-35 and airborne radar programs at Mission Systems; and AARGM, GMLRS and other missile products at Defense Systems.

2020 product costs increased $2.9 billion, or 14 percent, consistent with the higher product sales described above and reflects lower product margins at Mission Systems and Aeronautics Systems.

Service Sales and Costs

2020 service sales decreased $205 million, or 2 percent, primarily due to lower service sales at Defense Systems principally due to lower volume on the Hunter sustainment program and a shift toward more product content in the lifecycle of certain programs.

2020 service costs decreased $174 million, or 2 percent, consistent with the lower service sales described above.

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.

Backlog consisted of the following at December 31, 2020 and 2019:

	2020			2019	
$ in millions	**Funded**	**Unfunded**	**Total Backlog**	Total Backlog	% Change in 2020
Aeronautics Systems	**$ 10,587**	**$ 13,415**	**$ 24,002**	$ 26,021	**(8)%**
Defense Systems	**6,942**	**1,189**	**8,131**	8,481	**(4)%**
Mission Systems	**9,444**	**4,361**	**13,805**	14,226	**(3)%**
Space Systems	**5,569**	**29,462**	**35,031**	16,112	**117 %**
Total backlog	**$ 32,542**	**$ 48,427**	**$ 80,969**	$ 64,840	**25 %**

2020 net awards totaled $52.9 billion. Significant 2020 new awards include $17.4 billion for restricted programs ($9.0 billion at Space Systems, $6.0 billion at Aeronautics Systems and $2.2 billion at Mission Systems), $13.3 billion for the Ground Based Strategic Deterrent EMD program, $1.9 billion for Next Gen OPIR, $1.7 billion for F-35, $0.9 billion for Triton, $0.9 billion for E-2D and $0.8 billion for Global Hawk.

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 adjusted free cash flow, a non-GAAP measure described in more detail below.

As of December 31, 2020, we had cash and cash equivalents of $4.9 billion; approximately $276 million was held outside of the U.S. by foreign subsidiaries. In March 2020, we issued $2.25 billion of unsecured senior notes for general corporate purposes, including debt repayment and working capital, to help preserve financial flexibility in light of uncertainty resulting from the COVID-19 pandemic. In April 2020, we entered into a one-year $500 million uncommitted credit facility to provide an additional source of potential financing. On October 15, 2020, the company repaid $1.0 billion of unsecured senior notes upon maturity.

The Coronavirus Aid, Relief, and Economic Security Act (the "CARES Act") established a program with provisions to allow U.S. companies to defer the employer's portion of social security taxes between March 27, 2020 and December 31, 2020 and pay such taxes in two installments in 2021 and 2022. Under Section 3610, the CARES Act also authorized the government to reimburse qualifying contractors for certain costs of providing paid leave to employees as a result of COVID-19. The company has begun to seek, and anticipates continuing to seek, recovery for certain COVID-19-related costs under Section 3610 of the CARES Act and through our contract provisions. In addition, the U.S. Department of Defense (DoD) has taken steps to increase the rate for certain progress payments from 80 percent to 90 percent for costs incurred and work performed on relevant contracts. While it is unclear how much we will be able to recover, in particular under Section 3610, we believe these actions should continue to mitigate some potential COVID-19-related negative impacts to our operating cash flows in 2021.

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 $1.3 billion at December 31, 2020, and are expected to be paid with cash on hand.

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

	Year Ended December 31		
$ in millions	**2020**	2019	2018
Net earnings	**$ 3,189**	$ 2,248	$ 3,229
Non-cash items[1]	**2,601**	2,683	1,775
Changes in assets and liabilities:			
Trade working capital	**227**	128	(65)
Retiree benefits, excluding MTM expense	**(1,678)**	(703)	(1,083)
Other, net	**(34)**	(59)	(29)
Net cash provided by operating activities	**$ 4,305**	$ 4,297	$ 3,827

[1] Includes depreciation and amortization, MTM expense, stock based compensation expense and deferred income taxes.

2020 cash provided by operating activities was comparable to the prior period and reflects higher net earnings and improved trade working capital as well as a $750 million discretionary pre-tax pension contribution ($593 million after-tax) as compared to a $120 million discretionary pre-tax pension contribution ($95 million after-tax) in the prior year period.

Adjusted Free Cash Flow
Adjusted 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, plus proceeds from sale of equipment to a customer (not otherwise included in net cash provided by operating activities) and the after-tax impact of discretionary pension contributions. Adjusted free cash flow includes proceeds from the sale of equipment to a customer as such proceeds were generated in a customer sales transaction. It also includes the after-tax impact of discretionary pension contributions for consistency and comparability of financial performance. This measure may not be defined and calculated by other companies in the same manner. We use adjusted 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 adjusted free cash flow:

	Year Ended December 31			% Change in	
$ in millions	**2020**	2019	2018	**2020**	2019
Net cash provided by operating activities	**$ 4,305**	$ 4,297	$ 3,827	**— %**	12 %
Capital expenditures	**(1,420)**	(1,264)	(1,249)	**12 %**	1 %
Proceeds from sale of equipment to a customer	**205**	—	—	**NM**	NM
After-tax discretionary pension contributions	**593**	95	186	**524 %**	(49)%
Adjusted free cash flow	**$ 3,683**	$ 3,128	$ 2,764	**18 %**	13 %

2020 adjusted free cash flow increased $555 million, principally driven by higher net earnings and improved trade working capital as well as $205 million in proceeds from the sale of equipment to a customer, partially offset by higher capital expenditures.

Investing Cash Flow
2020 net cash used in investing activities was comparable to the prior period and reflects higher capital expenditures, as well as $205 million in proceeds from the sale of equipment to a customer.

Financing Cash Flow
2020 net cash used in financing activities decreased to $432 million from $2.4 billion principally due to $2.2 billion of net proceeds from the issuance of long-term debt in the first quarter of 2020.

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, 2020, 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	2021	2022- 2023	2024- 2025	2026 and beyond
Long-term debt	$ 15,091	$ 742	$ 2,558	$ 1,506	$ 10,285
Interest payments on long-term debt	8,473	596	1,126	996	5,755
Operating leases	2,022	298	495	327	902
Purchase obligations[(1)]	17,761	8,279	4,065	2,941	2,476
Other long-term liabilities[(2)]	1,619	370	579	157	513
Total contractual obligations	$ 44,966	$ 10,285	$ 8,823	$ 5,927	$ 19,931

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

(2) Other long-term liabilities, including their current portions, primarily consist of total accrued environmental reserves, deferred compensation, and other miscellaneous liabilities. It excludes obligations for uncertain tax positions of $1.5 billion as we are not able to reasonably estimate the timing of future cash flows related to such positions.

The table above excludes estimated minimum funding requirements for the company’s pension and OPB plans, as set forth by the Employee Retirement Income Security Act, as amended. For further information about future minimum contributions for these plans, see Note 13 to the consolidated financial statements. Further details regarding long-term debt and operating leases can be found in Notes 10 and 15, respectively, to the consolidated financial statements.

CRITICAL ACCOUNTING POLICIES, ESTIMATES AND JUDGMENTS

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

Revenue Recognition

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

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

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

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

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

Retirement Benefits

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

Discount Rate – The discount rate represents the interest rate used to determine the present value of future cash flows currently expected to be required to settle our pension and OPB obligations. The discount rate is generally based on the yield of high-quality corporate fixed-income investments. At the end of each year, we determine the discount rate using a theoretical bond portfolio model of bonds rated AA or better to match the notional cash outflows related to projected benefit payments for each of our significant benefit plans. Taking into consideration the factors noted above, our weighted-average composite pension discount rate was 2.68 percent at December 31, 2020, and 3.39 percent at December 31, 2019.

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, 2020 discount rate assumption would have the following estimated effects on 2020 pension and OPB obligations, which would be reflected in the 2020 MTM expense (benefit), and 2021 expected pension and OPB expense:

$ in millions	25 Basis Point Decrease in Rate	25 Basis Point Increase in Rate
2021 pension and OPB (benefit) expense	$ (45)	$ 42
2020 pension and OPB obligation and MTM expense (benefit)	1,471	(1,385)

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 used for FAS purposes tends to move in concert with the discount rate but has an offsetting effect on pension benefit obligations and the related MTM expense (benefit). The minimum cash balance crediting rate allowed under the plan is 2.25 percent. The cash balance crediting rate assumption has been set to the minimum threshold of 2.25 percent as of December 31, 2020, and will remain at 2.25 percent through 2026. Holding all other assumptions constant, an increase or decrease of 25 basis points in the December 31, 2020 cash balance crediting rate assumption would have the following estimated effects on the 2020 pension benefit obligation, which would be reflected in the 2020 MTM expense (benefit), and 2021 expected pension expense:

$ in millions	25 Basis Point Decrease in Rate	25 Basis Point Increase in Rate
2021 pension (benefit) expense	$ —	$ 11
2020 pension obligation and MTM expense (benefit)	—	169

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 2020, the Investment Committee of the company's benefit plans reviewed and approved the plans' major asset class allocations. The current asset allocation is approximately 40% public equities, 35% fixed-income, 20% alternatives and 5% cash. 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 2020 was approximately 11.2 percent and our 20-year and 30-year rolling average rates of return were approximately 8.0 percent and 10.2 percent, respectively, each determined on an arithmetic basis and net of expenses. Our 2020 actual net plan asset returns were approximately 16.2 percent.

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

For determining 2020 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 7.66 percent. For 2021 FAS expense, we have assumed an expected long-term rate of return on pension plan assets of 7.5 percent and 7.22 percent on OPB plans. We decreased the EROA assumption following an assessment of the historical and anticipated long-term returns of various asset classes, including consideration of recent Federal Reserve policy changes that are expected to extend the duration of the current low interest rate environment. Holding all other assumptions constant, an increase or decrease of 25 basis points in our December 31, 2020 EROA assumption would have the following estimated effects on 2021 expected pension and OPB expense:

$ in millions	25 Basis Point Decrease	25 Basis Point Increase
2021 pension and OPB expense (benefit)	$ 88	$ (88)

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 2021 MTM expense (benefit):

$ in millions	100 Basis Point Decrease	100 Basis Point Increase
2021 MTM expense (benefit)	$ 351	$ (351)

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

Mortality Rate – Mortality assumptions are used to estimate life expectancies of plan participants. In October 2014, the Society of Actuaries Retirement Plans Experience Committee (RPEC) issued updated mortality tables and a mortality improvement scale, which reflected longer life expectancies than previously projected. In October 2019, the RPEC issued an updated mortality base table (the Private Retirement Plans Mortality table for 2012 (Pri-2012)), which we adopted after reviewing our own historical mortality experience. In October 2020, the RPEC released a new projection scale (MP-2020) that included a reshaping of the long-term mortality improvement assumption. The MP-2020 projection scale includes long-term mortality improvement assumptions greater than 1.0% at earlier ages, but trends down more rapidly than the prior projection scales. After considering the information released by the RPEC in October 2020, we adopted the full MP-2020 projection scale while continuing to use the Pri-2012 White Collar table. Accordingly, we updated the mortality assumptions used in calculating our pension and OPB obligations recognized at December 31, 2020, and the amounts estimated for our 2021 pension and OPB expense.

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

Litigation, Commitments and Contingencies

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

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

Income Tax Matters – The evaluation of tax positions taken in a filed tax return, or planned to be taken in a future tax return or claim, requires the use of judgment. We establish reserves for uncertain tax positions when, despite the belief that our tax positions are supportable, there remains uncertainty in a tax position taken in our filed tax returns or planned to be taken in a future tax return or claim. The company follows a recognition and measurement approach, considering the facts, circumstances, and information available at the reporting date. Judgment is exercised by the company in determining the level of evidence necessary and appropriate to support its assessment using all available information. The technical merits of a given tax position are derived from sources of authority in the tax law and their applicability to the facts and circumstances of the position. In measuring the tax position, the company considers the amounts and probabilities of the outcomes that could be realized upon settlement. When it is more likely than not that a tax position will be sustained, we record the largest amount of tax benefit with a greater than 50 percent likelihood of being realized upon ultimate settlement with a taxing authority. To the extent we prevail in matters for which reserves have been established or are required to pay amounts in excess of reserves, there could be a significant impact on our consolidated financial position and annual results of operations. During 2020, we increased our gross unrecognized tax benefits by approximately $346 million, primarily related to state apportionment, our methods of accounting associated with the timing of revenue recognition and related costs, and the 2017 Tax Act.

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

Goodwill and Other Purchased Intangible Assets

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

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

Impairment Testing – We test for impairment of goodwill annually at each of our reporting units, which comprise our operating segments. The results of our annual goodwill impairment tests as of December 31, 2020 and 2019, 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, 2020, 2019 and 2018.

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. During 2020, we considered COVID-19-related impacts on our business and determined there were no impairment indicators requiring us to perform an interim goodwill impairment test.

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 we expect the reporting units 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, 2020, 2019 and 2018.

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, 2020, we had no significant off-balance sheet arrangements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

EQUITY RISK

We are exposed to market risk with respect to our portfolio of marketable securities with a fair value of $396 million at December 31, 2020. 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 credit facilities for which there were no borrowings outstanding at December 31, 2020. At December 31, 2020, we have $15.0 billion of long-term debt, primarily consisting of fixed-rate debt, with a fair value of approximately $18.2 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, 2020, foreign currency forward contracts with a notional amount of $133 million were outstanding. At December 31, 2020, a 10 percent unfavorable foreign exchange rate movement would not have a material impact on our consolidated financial position, annual results of operations and/or cash flows.

INFLATION RISK

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

Item 8. Financial Statements and Supplementary Data

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

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

Opinion on the Financial Statements

We have audited the accompanying consolidated statements of financial position of Northrop Grumman Corporation and subsidiaries (the “Company”) as of December 31, 2020 and 2019, 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, 2020, and the related notes (collectively referred to as the “financial statements”). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2020 and 2019, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2020, 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, 2020, 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 27, 2021 expressed an unqualified opinion on the Company’s internal control over financial reporting.

Change in Accounting Principle

The Company changed its method of accounting for leases in 2019 due to the adoption of ASC 842, *Leases*.

Basis for Opinion

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

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

Critical Audit Matters

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

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

Critical Audit Matter Description

As more fully described in Note 1 to the financial statements, the Company recognizes substantially all revenue as control is transferred to the customer on their long-term contracts over time using the cost-to-cost method (cost incurred relative to total cost estimated at completion). Use of the cost-to-cost-method requires the Company to make reasonably dependable estimates regarding the revenue and costs associated with the design, manufacture and delivery of their products or services. The Company estimates profit on these contracts as the difference between total estimated sales and total estimated costs at completion and recognizes that profit as costs are incurred. Cost estimates on contracts requiring development work are inherently more uncertain as to future events than production contracts, and, as a result, there is typically more variability in those estimates. Certain of these contracts are fixed price in nature, which results in greater financial risk associated with unanticipated cost growth. Alternatively, cost-type contracts may have award or incentive fees that are subject to uncertainty and may be earned over extended periods or towards the end of the contract. As a result, the estimation of costs required to complete these contracts and the expected revenues that will be earned is complex and requires significant judgment.

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

How the Critical Audit Matter Was Addressed in the Audit

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

- We tested the effectiveness of controls over the estimates of total costs and revenues on such contracts, including development costs and any related award or incentive fee estimates for the relevant performance obligations.
- We selected certain long-term contracts for testing and performed the following procedures:
  - Evaluated whether the recognition of revenue over time on such contracts was appropriate based on the terms and conditions of each contract, including whether continuous transfer of control to the customer occurred as progress was made toward fulfilling the performance obligation.
  - Tested management’s identification of distinct performance obligations by evaluating whether the underlying goods and services were highly interdependent and interrelated.
  - Tested management’s determination of the transaction price, including any award or incentive fees, based on the consideration expected to be received in accordance with the rights and obligations established under the contracts and any contractual modifications.
  - Evaluated the estimates of total cost and revenue for the performance obligation by:
    - Conducting inquiries at the relevant program locations, or virtually, (as a result of the COVID-19 pandemic and remote working environment) regarding any challenges related to the program.
    - Comparing costs incurred to date to the costs management estimated to be incurred to date.
    - Evaluating management’s ability to achieve the estimates of total cost and revenue by performing corroborating inquiries with the Company’s program and business management, and testing management’s process used to develop the estimates based on their work plans, engineering specifications, program labor, and supplier contracts. This includes management’s process to identify COVID-19 impacts to programs, which could include forecasted cost impacts and assumptions on the ability to recover those costs.
    - Comparing management’s estimates for the selected contracts to costs and revenues of similar performance obligations, when applicable.
  - Tested the mathematical accuracy of management’s calculation of revenue recognized during the period for the performance obligations.

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

Critical Audit Matter Description

The Company files income tax returns in the U.S. federal jurisdiction and in various state and foreign jurisdictions. Uncertain tax positions reflect the Company’s expected treatment of tax positions taken in a filed tax return, or planned to be taken in a future tax return or claim, which have not been reflected in measuring income tax expense or taxes payable for financial reporting purposes. Until these positions are sustained by the taxing authorities or the statute of limitations concerning such issues lapses, the Company does not generally recognize the tax benefits resulting from such positions and reports the tax effects as a liability for uncertain tax positions in its consolidated statements of financial position. The Company has recognized increased uncertain tax positions in recent years principally related to state apportionment, the methods of accounting associated with the timing of revenue recognition and related costs, and the 2017 Tax Act. Until the matters are resolved, the outcome is inherently uncertain and the Company discloses a summary of changes in their uncertain tax positions within the notes to their financial statements.

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

How the Critical Audit Matter Was Addressed in the Audit

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

- We tested the effectiveness of internal controls relating to the identification and completeness of, and recognition for, uncertain tax positions, including management’s controls over the underlying key assumptions and inputs used to derive the estimates.
- With the assistance of our income tax specialists, we selected specific uncertain tax positions for testing and performed the following procedures:
  - Inquired both in-person and virtually (as a result of the COVID-19 pandemic and the remote working environment) of the Company’s tax department, financial reporting department, and other personnel directly involved in the development of the estimates.
  - Obtained supporting documentation and evaluated how the Company supported the position, including the assumptions and estimates used for measurement, and how the taxing authorities have historically challenged the tax position, if applicable.
  - Obtained and read opinions provided by external counsel, as applicable, regarding the tax position taken by the Company.
  - Evaluated whether the uncertain tax position met the “more likely than not” recognition threshold.
  - Evaluated the appropriateness and consistency of the methodologies and assumptions used by management when developing these estimates.
- We tested the mathematical accuracy of management’s calculations.

/s/ Deloitte & Touche LLP
McLean, Virginia
January 27, 2021
We have served as the Company’s auditor since 1975.

CONSOLIDATED STATEMENTS OF EARNINGS AND COMPREHENSIVE INCOME

	Year Ended December 31		
$ in millions, except per share amounts	**2020**	2019	2018
Sales			
Product	**$ 27,015**	$ 23,852	$ 20,469
Service	**9,784**	9,989	9,626
Total sales	**36,799**	33,841	30,095
Operating costs and expenses			
Product	**21,559**	18,675	15,785
Service	**7,762**	7,907	7,519
General and administrative expenses	**3,413**	3,290	3,011
Operating income	**4,065**	3,969	3,780
Other (expense) income			
Interest expense	**(593)**	(528)	(562)
FAS (non-service) pension benefit	**1,198**	800	1,049
Mark-to-market pension and OPB expense	**(1,034)**	(1,800)	(655)
Other, net	**92**	107	130
Earnings before income taxes	**3,728**	2,548	3,742
Federal and foreign income tax expense	**539**	300	513
Net earnings	**$ 3,189**	$ 2,248	$ 3,229
Basic earnings per share	**$ 19.08**	$ 13.28	$ 18.59
Weighted-average common shares outstanding, in millions	**167.1**	169.3	173.7
Diluted earnings per share	**$ 19.03**	$ 13.22	$ 18.49
Weighted-average diluted shares outstanding, in millions	**167.6**	170.0	174.6
Net earnings (from above)	**$ 3,189**	$ 2,248	$ 3,229
Other comprehensive loss			
Change in unamortized prior service credit, net of tax expense of $14 in 2020, $15 in 2019 and $19 in 2018	**(41)**	(47)	(60)
Change in cumulative translation adjustment and other, net	**10**	2	(14)
Other comprehensive loss, net of tax	**(31)**	(45)	(74)
Comprehensive income	**$ 3,158**	$ 2,203	$ 3,155

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

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

	December 31	
$ in millions, except par value	**2020**	2019
Assets		
Cash and cash equivalents	**$ 4,907**	$ 2,245
Accounts receivable, net	**1,501**	1,326
Unbilled receivables, net	**5,140**	5,334
Inventoried costs, net	**759**	783
Prepaid expenses and other current assets	**1,402**	997
Assets of disposal group held for sale	**1,635**	—
Total current assets	**15,344**	10,685
Property, plant and equipment, net of accumulated depreciation of $6,335 for 2020 and $5,850 for 2019	**7,071**	6,912
Operating lease right-of-use assets	**1,533**	1,511
Goodwill	**17,518**	18,708
Intangible assets, net	**783**	1,040
Deferred tax assets	**311**	508
Other non-current assets	**1,909**	1,725
Total assets	**$ 44,469**	$ 41,089
Liabilities		
Trade accounts payable	**$ 1,806**	$ 2,226
Accrued employee compensation	**1,997**	1,865
Advance payments and billings in excess of costs incurred	**2,517**	2,237
Other current liabilities	**3,002**	3,106
Liabilities of disposal group held for sale	**258**	—
Total current liabilities	**9,580**	9,434
Long-term debt, net of current portion of $742 for 2020 and $1,109 for 2019	**14,261**	12,770
Pension and other postretirement benefit plan liabilities	**6,498**	6,979
Operating lease liabilities	**1,343**	1,308
Other non-current liabilities	**2,208**	1,779
Total liabilities	**33,890**	32,270
Commitments and contingencies (Note 12)		
Shareholders' equity		
Preferred stock, $1 par value; 10,000,000 shares authorized; no shares issued and outstanding	**—**	—
Common stock, $1 par value; 800,000,000 shares authorized; issued and outstanding: 2020—166,717,179 and 2019—167,848,424	**167**	168
Paid-in capital	**58**	—
Retained earnings	**10,482**	8,748
Accumulated other comprehensive loss	**(128)**	(97)
Total shareholders' equity	**10,579**	8,819
Total liabilities and shareholders' equity	**$ 44,469**	$ 41,089

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

CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year Ended December 31		
$ in millions	**2020**	2019	2018
Operating activities			
Net earnings	**$ 3,189**	$ 2,248	$ 3,229
Adjustments to reconcile to net cash provided by operating activities:			
Depreciation and amortization	**1,267**	1,265	800
Mark-to-market pension and OPB expense	**1,034**	1,800	655
Stock-based compensation	**90**	127	86
Deferred income taxes	**210**	(509)	234
Changes in assets and liabilities:			
Accounts receivable, net	**(285)**	122	202
Unbilled receivables, net	**160**	(335)	(297)
Inventoried costs, net	**18**	(135)	(37)
Prepaid expenses and other assets	**(147)**	(78)	(56)
Accounts payable and other liabilities	**719**	617	381
Income taxes payable, net	**(238)**	(63)	(258)
Retiree benefits	**(1,678)**	(703)	(1,083)
Other, net	**(34)**	(59)	(29)
Net cash provided by operating activities	**4,305**	4,297	3,827
Investing activities			
Acquisition of Orbital ATK, net of cash acquired	**—**	—	(7,657)
Capital expenditures	**(1,420)**	(1,264)	(1,249)
Proceeds from sale of equipment to a customer	**205**	—	—
Other, net	**4**	57	28
Net cash used in investing activities	**(1,211)**	(1,207)	(8,878)
Financing activities			
Payments of long-term debt	**(1,027)**	(500)	(2,276)
Net proceeds from issuance of long-term debt	**2,239**	—	—
Payments to credit facilities	**(78)**	(31)	(320)
Net (repayments of) borrowings on commercial paper	**—**	(198)	198
Common stock repurchases	**(490)**	(744)	(1,263)
Cash dividends paid	**(953)**	(880)	(821)
Payments of employee taxes withheld from share-based awards	**(66)**	(65)	(85)
Other, net	**(57)**	(6)	(28)
Net cash used in financing activities	**(432)**	(2,424)	(4,595)
Increase (decrease) in cash and cash equivalents	**2,662**	666	(9,646)
Cash and cash equivalents, beginning of year	**2,245**	1,579	11,225
Cash and cash equivalents, end of year	**$ 4,907**	$ 2,245	$ 1,579

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

CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

	Year Ended December 31		
$ in millions, except per share amounts	**2020**	2019	2018
Common stock			
Beginning of year	**$ 168**	$ 171	$ 174
Common stock repurchased	**(1)**	(3)	(4)
Shares issued for employee stock awards and options	**—**	—	1
End of year	**167**	168	171
Paid-in capital			
Beginning of year	**—**	—	44
Common stock repurchased	**—**	—	(34)
Stock compensation	**63**	—	(10)
Other	**(5)**	—	—
End of year	**58**	—	—
Retained earnings			
Beginning of year	**8,748**	8,068	6,913
Impact from adoption of ASU 2018-02 and ASU 2016-01	**—**	—	(21)
Common stock repurchased	**(479)**	(751)	(1,225)
Net earnings	**3,189**	2,248	3,229
Dividends declared	**(951)**	(880)	(822)
Stock compensation	**(36)**	63	(6)
Other	**11**	—	—
End of year	**10,482**	8,748	8,068
Accumulated other comprehensive loss			
Beginning of year	**(97)**	(52)	1
Impact from adoption of ASU 2018-02 and ASU 2016-01	**—**	—	21
Other comprehensive loss, net of tax	**(31)**	(45)	(74)
End of year	**(128)**	(97)	(52)
Total shareholders' equity	**$ 10,579**	$ 8,819	$ 8,187
Cash dividends declared per share	**$ 5.67**	$ 5.16	$ 4.70

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

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Nature of Operations
Northrop Grumman Corporation (herein referred to as “Northrop Grumman,” the “company,” “we,” “us,” or “our”) is a leading global aerospace and defense company. We use our broad portfolio of capabilities and technologies to create and deliver innovative platforms, systems and solutions in space; manned and autonomous airborne systems, including strike; strategic deterrence systems; hypersonics; missile defense; weapons systems; cyber; command, control, communications and computers, intelligence, surveillance and reconnaissance (C4ISR); 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.

Effective January 1, 2020, the company reorganized its sectors to better align the company’s broad portfolio to serve its customers’ needs. At December 31, 2020, the company was aligned in four operating sectors, which also comprise our reportable segments: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems.

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 legacy Innovation Systems subsequent to the Merger date have been included in the company’s consolidated results of operations and, upon our January 1, 2020 sector realignment, are reflected in the Space Systems, Defense Systems and Aeronautics Systems sectors. 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. 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
Beginning in the second quarter of 2020, the company no longer considers certain unallowable costs and environmental matters that are principally managed at the corporate office as part of management’s evaluation of segment operating performance. As a result, certain unallowable compensation and other costs, which were previously included in segment operating results, are now reported in Unallocated corporate expense within operating income. In addition, certain accrued and deferred costs, as well as unallowable costs, if any, associated with certain environmental matters that were previously reflected in segment assets and operating results are now reflected in corporate assets and Unallocated corporate expense within operating income. The impact of these changes are reflected in the amounts in this Form 10-K. See Part II, Item 5 in the Quarterly Report on Form 10-Q for the quarter ended June 30, 2020 for further information regarding the impact of these changes on the company’s prior period segment operating income.

On December 7, 2020, we entered into a definitive agreement to sell our IT and mission support services business for $3.4 billion in cash. The IT and mission support services business is comprised of the majority of the Information Solutions and Services (IS&S) division of Defense Systems (excluding our Vinnell Arabia business); select cyber, intelligence and missions support programs, which are part of the Cyber and Intelligence Mission Solutions (CIMS) division of Mission Systems; and the Space Technical Services business unit of Space Systems. The assets and liabilities of the IT and mission support services business were classified as held for sale in the consolidated statement of financial position as of December 31, 2020 and no impairment losses were recognized in the consolidated statement of earnings and comprehensive income for the year ended December 31, 2020. We expect to complete the sale of the IT and mission support services business in the first quarter of 2021, subject to regulatory approvals and customary closing conditions. See Note 2 for further information regarding the divestiture and Note 8 for the allocation of goodwill to the divestiture.

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 development or production of goods, the provision of services, or a combination of both. The company classifies sales as product or service based on the predominant attributes of each performance obligation.

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

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

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

Contract Estimates

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

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

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

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

	Year Ended December 31		
$ in millions, except per share data	**2020**	2019	2018
Revenue	**$ 504**	$ 538	$ 631
Operating income	**466**	480	577
Net earnings[(1)]	**368**	379	456
Diluted earnings per share[(1)]	**2.20**	2.23	2.61

[(1)] Based on a 21% federal statutory tax rate.

EAC adjustments on a single performance obligation can have a material effect on the company's financial statements. When such adjustments occur, we generally disclose the nature, underlying conditions and financial impact of the adjustments. No such adjustments were material to the financial statements during the years ended December 31, 2020 and 2019. During the second quarter of 2018, the company recognized $69 million of favorable EAC adjustments on multiple restricted programs at Aeronautics 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 an option or IDIQ task order is exercised or awarded.

Company backlog as of December 31, 2020 was $81.0 billion. We expect to recognize approximately 40 percent and 60 percent of our December 31, 2020 backlog as revenue over the next 12 and 24 months, respectively, with the remainder to be recognized thereafter.

Contract Assets and Liabilities

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

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

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

Net contract assets are as follows:

$ in millions		**December 31, 2020**		December 31, 2019	$ Change	% Change
Unbilled receivables, net	**$**	**5,140**	$	5,334	$ (194)	(4)%
Advance payments and amounts in excess of costs incurred		**(2,517)**		(2,237)	(280)	13 %
Net contract assets	**$**	**2,623**	$	3,097	$ (474)	(15)%

The change in the balances of the company's contract assets and liabilities primarily results from timing differences between revenue recognition and customer billings and/or payments. Net contract assets as of December 31, 2020 decreased 15 percent from the prior year, due to an increase in Advance payments and amounts in excess of costs incurred as well as lower Unbilled receivables, net. Higher Advance payments and amounts in excess of costs incurred were driven by Mission Systems and Space Systems. Lower Unbilled receivables, net were driven by Defense Systems and were partially offset by higher Unbilled receivables, net at Aeronautics Systems and Space Systems.

The amount of revenue recognized for the years ended December 31, 2020, 2019 and 2018 that was included in the contract liability balance at the beginning of each year was $1.6 billion, $1.3 billion and $1.3 billion, respectively.

Disaggregation of Revenue

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

General and Administrative Expenses

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

Research and Development

Company-sponsored research and development activities primarily include efforts related to government programs. Company-sponsored IR&D expenses totaled $1.1 billion, $953 million and $764 million in 2020, 2019 and 2018, respectively, which represented 2.9 percent, 2.8 percent and 2.5 percent of total sales, respectively. Customer-funded research and development activities are charged directly to the related contracts.

Income Taxes

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

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

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

Cash and Cash Equivalents

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

Fair Value of Financial Instruments

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

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

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

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

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

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

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

The company uses derivative financial instruments to manage its exposure to foreign currency exchange risk related to receipts from customers and payments to suppliers denominated in foreign currencies (i.e., foreign currency forward contracts). For foreign currency forward contracts, where model-derived valuations are appropriate, the company utilizes the income approach to determine the fair value and uses the applicable London Interbank Offered Rate (LIBOR) swap rates.

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

Inventoried Costs

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

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

Cash Surrender Value of Life Insurance Policies

The company maintains whole life insurance policies on a group of executives, which are recorded at their cash surrender value as determined by the insurance carrier. The company also has split-dollar life insurance policies on former officers and executives from acquired businesses, which are recorded at the lesser of their cash surrender value or premiums paid. These policies are utilized as a partial funding source for deferred compensation and other non-qualified employee retirement plans. As of December 31, 2020 and 2019, the carrying values associated with these policies were $419 million and $380 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:

		December 31	
Useful life in years, $ in millions	Useful Life	**2020**	2019
Land and land improvements	Up to 40[1]	**$ 628**	$ 619
Buildings and improvements	Up to 45	**2,762**	2,575
Machinery and other equipment	Up to 20	**7,206**	6,997
Capitalized software costs	3-5	**602**	606
Leasehold improvements	Lease Term[2]	**2,208**	1,965
Property, plant and equipment, at cost		**13,406**	12,762
Accumulated depreciation		**(6,335)**	(5,850)
Property, plant and equipment, net		**$ 7,071**	$ 6,912

[1] Land is not a depreciable asset.

[2] Leasehold improvements are depreciated over the shorter of the useful life of the asset or lease term.

During the fourth quarter of 2020, the company completed a sale of equipment to a customer on a restricted Aeronautics Systems program for $444 million. The company previously intended to use the equipment for internal purposes so we recognized the acquisition costs as capital expenditures and included the equipment in property, plant and equipment. As we regularly sell this type of equipment to customers in the ordinary course of business, we recorded the sale as a revenue transaction and included the net book value of the equipment in Operating costs and expenses. We recognized operating income in connection with the sale at a margin rate that was dilutive to the Aeronautics Systems margin rate. Although we generally classify proceeds from revenue transactions as cash inflows from operating activities, we recognized the proceeds from this transaction as cash inflows from investing activities, consistent with our prior recognition of the cost to acquire the equipment as capital expenditures. The company received cash payments of $205 million related to the equipment sale during 2020, and included it in Proceeds from sale of equipment to a customer in the consolidated statement of cash flows. The remaining $239 million was included in non-cash investing activities at December 31, 2020 and is expected to be collected in 2021.

Non-cash investing activities also include capital expenditures incurred but not yet paid of $72 million, $166 million and $185 million as of December 31, 2020, 2019 and 2018, respectively.

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

Leases
The company leases certain buildings, land and equipment. Under ASC 842, at contract inception we determine whether a contract is or contains a lease and whether the lease should be classified as an operating or finance lease.

Operating lease balances are included in Operating lease right-of-use assets, Other current liabilities, and Operating lease liabilities in our consolidated statements of financial position.

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

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

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

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

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

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

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

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

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

Stock Compensation

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

Accumulated Other Comprehensive Loss

The components of accumulated other comprehensive loss are as follows:

	December 31	
$ in millions	**2020**	2019
Unamortized prior service credit, net of tax expense of $3 for 2020 and $17 for 2019	**$ 10**	$ 51
Cumulative translation adjustment and other, net	**(138)**	(148)
Total accumulated other comprehensive loss	**$ (128)**	$ (97)

Related Party Transactions

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

Accounting Standards Updates

Accounting standards updates adopted and/or issued, but not effective until after December 31, 2020, are not expected to have a material effect on the company’s consolidated financial position, annual results of operations and/or cash flows.

2. ACQUISITIONS AND DISPOSITIONS

Acquisition of Orbital ATK

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

The operating results of legacy Innovation Systems subsequent to the Merger date are included in the company’s consolidated results of operations and reflected in the Space Systems, Defense Systems and Aeronautics Systems sectors. We recognized customer sales of $3.1 billion, operating income of $342 million and net earnings of $273 million for the period from the Merger date to December 31, 2018.

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

Purchase Price Allocation

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

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

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

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

[1] Included in Other current liabilities in the consolidated statements of financial position.

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

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

The purchase price allocation resulted in the recognition of $6.3 billion of goodwill, which was allocated to the Space Systems, Defense Systems and Aeronautics Systems sectors. The goodwill recognized is attributable to expected revenue synergies generated by the integration of Northrop Grumman 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.

Unaudited Supplemental Pro Forma Information
The following table presents unaudited pro forma financial information prepared in accordance with Article 11 of Regulation S-X for the year ended December 31, 2018 and computed as if Orbital ATK had been included in our results as of January 1, 2017:

$ in millions, except per share amounts	
Sales	**$ 32,319**
Net earnings	**3,417**
Diluted earnings per share	**19.57**

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

1. The elimination of intercompany sales and costs of sales between the company and Orbital ATK of $80 million for the year ended December 31, 2018.
2. The elimination of nonrecurring transaction costs incurred by the company and Orbital ATK in connection with the Merger of $71 million for the year ended December 31, 2018.
3. The recognition of additional depreciation expense, net of removal of historical depreciation expense, of $8 million related to the step-up in fair value of acquired property, plant and equipment for the year ended December 31, 2018.
4. The recognition of additional amortization expense, net of removal of historical amortization expense, of $90 million related to the fair value of acquired intangible assets for the year ended December 31, 2018.
5. 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 for the year ended December 31, 2018.
6. The income tax effect on the pro forma adjustments, which was calculated using the 21% federal statutory tax rate in effect in 2018, of $(5) million for the year ended December 31, 2018.

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.

Disposition of IT and Mission Support Services Business
On December 7, 2020, we entered into a definitive agreement to sell our IT and mission support services business for $3.4 billion in cash. The IT and mission support services business is comprised of the majority of the Information Solutions and Services (IS&S) division of Defense Systems (excluding our Vinnell Arabia business); select cyber, intelligence and missions support programs, which are part of the Cyber and Intelligence Mission Solutions (CIMS) division of Mission Systems; and the Space Technical Services business unit of Space Systems.

The pretax profit of the IT and mission support services business was $247 million, $245 million and $288 million for the years ended December 31, 2020, 2019 and 2018, respectively.

The carrying amounts of the major classes of assets and liabilities of the IT and mission support services business classified as held for sale as of December 31, 2020 are as follows:

$ in millions		
Accounts receivable, net	$	110
Unbilled receivables, net		269
Other current assets		9
Property, plant and equipment		14
Operating lease right-of-use assets		38
Goodwill[1]		1,195
Total assets of disposal group held for sale	$	1,635
Trade accounts payable		(99)
Accrued employee compensation		(59)
Advance payments and billings in excess of costs incurred		(31)
Other current liabilities		(42)
Non-current operating lease liabilities		(27)
Total liabilities of disposal group held for sale	$	(258)

[1] See Note 8 for a summary by reportable segment of Goodwill reclassified to Assets of disposal group held for sale.

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 0.5 million, 0.7 million and 0.9 million shares for the years ended December 31, 2020, 2019 and 2018, respectively.

Share Repurchases
On September 16, 2015, the company's board of directors authorized a share repurchase program of up to $4.0 billion of the company's common stock (the "2015 Repurchase Program"). Repurchases under the 2015 Repurchase Program commenced in March 2016 and were completed in March 2020.

On December 4, 2018, the company's board of directors authorized a share repurchase program of up to an additional $3.0 billion in share repurchases of the company's common stock (the "2018 Repurchase Program"). Repurchases under the 2018 Repurchase Program commenced in March 2020 upon the completion of the company's 2015 Repurchase Program. We had no repurchases of common stock during the three months ended December 31, 2020. As of December 31, 2020, repurchases under the 2018 Repurchase Program totaled $0.2 billion; $2.8 billion remained under this share repurchase authorization. By its terms, the 2018 Repurchase Program is set to expire when we have used all authorized funds for repurchases.

On January 25, 2021, 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 "2021 Repurchase Program"), bringing the total outstanding authorization up to $5.8 billion. By its terms, repurchases under the 2021 Repurchase Program will commence upon completion of the 2018 Repurchase Program and will 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 2020	2019	2018
September 16, 2015	$ 4,000	15.4	$ 260.33	March 2020	**0.9**	3.2	3.8
December 4, 2018	$ 3,000	0.5	$ 326.20		**0.5**	—	—
					1.4	3.2	3.8

[1] Includes commissions paid.

Dividends on Common Stock

In May 2020, the company increased the quarterly common stock dividend 10 percent to $1.45 per share from the previous amount of $1.32 per share.

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

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

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

4. ACCOUNTS RECEIVABLE, NET

Accounts receivable, net represent amounts billed and due from customers. Substantially all accounts receivable at December 31, 2020 are expected to be collected in 2021. The company does not believe it has significant exposure to credit risk as the majority of our accounts receivable are due from the U.S. government either as the ultimate customer or in connection with foreign military sales.

Accounts receivable, net consisted of the following:

$ in millions	December 31 2020	2019
Due from U.S. government [1]	**$ 956**	$ 1,030
Due from international and other customers	**578**	329
Accounts receivable, gross	**1,534**	1,359
Allowance for expected credit losses	**(33)**	(33)
Accounts receivable, net	**$ 1,501**	$ 1,326

[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, 2020 are expected to be billed and collected in 2021. Progress and performance-based payments are reflected as an offset to the related unbilled receivable balances.

Unbilled receivables, net consisted of the following:

$ in millions	December 31	
	2020	2019
Due from U.S. government [1]		
Unbilled receivables	**$ 19,315**	$ 17,347
Progress and performance-based payments received	**(14,615)**	(12,838)
Total due from U.S. government	**4,700**	4,509
Due from international and other customers		
Unbilled receivables	**3,361**	4,063
Progress and performance-based payments received	**(2,881)**	(3,193)
Total due from international and other customers	**480**	870
Unbilled receivables, net of progress and performance-based payments received	**5,180**	5,379
Allowance for expected credit losses	**(40)**	(45)
Unbilled receivables, net	**$ 5,140**	$ 5,334

[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.

6. INVENTORIED COSTS, NET

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

Inventoried costs, net consisted of the following:

$ in millions	December 31	
	2020	2019
Production costs of contracts in process	**$ 451**	$ 476
G&A expenses	**41**	31
	492	507
Progress and performance-based payments received	**(62)**	(41)
	430	466
Product inventory and raw material	**329**	317
Inventoried costs, net	**$ 759**	$ 783

7. INCOME TAXES

Federal and foreign income tax expense consisted of the following:

$ in millions	Year Ended December 31		
	2020	2019	2018
Federal income tax expense:			
Current	**$ 246**	$ 758	$ 292
Deferred	**288**	(474)	213
Total federal income tax expense	**534**	284	505
Foreign income tax expense:			
Current	**3**	10	7
Deferred	**2**	6	1
Total foreign income tax expense	**5**	16	8
Total federal and foreign income tax expense	**$ 539**	$ 300	$ 513

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:

	Year Ended December 31								
$ in millions		**2020**			2019			2018	
Income tax expense at statutory rate	**$**	**783**	**21.0 %**	$	535	21.0 %	$	786	21.0 %
Research credit		**(206)**	**(5.5)**		(216)	(8.5)		(186)	(5.0)
Foreign derived intangible income		**(55)**	**(1.5)**		(28)	(1.1)		(16)	(0.4)
Stock compensation - excess tax benefits		**(10)**	**(0.2)**		(14)	(0.5)		(27)	(0.7)
Impacts related to the 2017 Tax Act		**—**	**—**		—	—		(84)	(2.2)
Other, net		**27**	**0.7**		23	0.9		40	1.0
Total federal and foreign income taxes	**$**	**539**	**14.5 %**	$	300	11.8 %	$	513	13.7 %

The year to date 2020 effective tax rate increased to 14.5 percent from 11.8 percent in the same period of 2019. MTM expense reduced the 2020 effective tax rate by 1.3 percentage points and the 2019 effective tax rate by 3.7 percentage points.

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

In March 2020, the CARES Act was enacted. The CARES Act includes certain changes to U.S. tax law that impact the company, including a technical correction to the 2017 Tax Cuts and Jobs Act, which makes certain qualified improvement property eligible for bonus depreciation. The CARES Act did not have a significant impact on the company's 2020 effective tax rate. In addition, in December 2020, final revenue recognition regulations under IRC Section 451(b) were issued, which did not have a significant impact on the company's 2020 effective tax rate. We are evaluating the impact of the 451(b) regulations on 2021 and beyond.

Income tax payments, net of refunds received, were $312 million, $324 million and $270 million for the years ended December 31, 2020, 2019 and 2018, respectively. Taxes receivable, which are included in Prepaid expenses and other current assets in the consolidated statements of financial position, were $792 million and $551 million as of December 31, 2020 and 2019, respectively.

Uncertain Tax Positions

We file income tax returns in the U.S. federal jurisdiction and in various state and foreign jurisdictions. The Northrop Grumman 2014-2018 federal tax returns and refund claims related to its 2007-2016 federal tax returns are currently under Internal Revenue Service (IRS) examination. In addition, legacy Orbital ATK federal tax returns for the year ended March 31, 2015, the nine-month transition period ended December 31, 2015 and calendar years 2016-2017 are currently under appeal with the IRS.

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

The change in unrecognized tax benefits during 2020, 2019 and 2018, excluding interest, is as follows:

	December 31		
$ in millions	**2020**	2019	2018
Unrecognized tax benefits at beginning of the year	**$ 1,223**	$ 748	$ 283
Additions based on tax positions related to the current year	**187**	158	293
Additions for tax positions of prior years	**270**	400	207
Reductions for tax positions of prior years	**(190)**	(65)	(23)
Settlements with taxing authorities	**(7)**	(15)	(7)
Other, net	**(2)**	(3)	(5)
Net change in unrecognized tax benefits	**258**	475	465
Unrecognized tax benefits at end of the year	**$ 1,481**	$ 1,223	$ 748

Our 2020 increase in unrecognized tax benefits was primarily related to state apportionment, our methods of accounting associated with the timing of revenue recognition and related costs, and the 2017 Tax Act. It is reasonably possible that within the next 12 months our unrecognized tax benefits related to the final revenue recognition regulations under IRC Section 451(b), as referenced above, and future regulatory interpretations of existing tax laws may change. At this time, we cannot reasonably estimate these changes.

Our unrecognized tax liabilities, which include $144 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, $607 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.

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:

	December 31	
$ in millions	**2020**	2019
Deferred Tax Assets		
Retiree benefits	**$ 1,738**	$ 1,827
Accrued employee compensation	**360**	336
Provisions for accrued liabilities	**232**	166
Inventory	**849**	684
Stock-based compensation	**40**	38
Operating lease liabilities	**435**	411
Tax credits	**343**	166
Other	**112**	73
Gross deferred tax assets	**4,109**	3,701
Less: valuation allowance	**(307)**	(160)
Net deferred tax assets	**3,802**	3,541
Deferred Tax Liabilities		
Goodwill	**533**	515
Purchased intangibles	**201**	262
Property, plant and equipment, net	**737**	584
Operating lease right-of-use assets	**423**	404
Contract accounting differences	**1,513**	1,225
Other	**84**	43
Deferred tax liabilities	**3,491**	3,033
Total net deferred tax assets	**$ 311**	$ 508

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, 2020, the company has available tax credits and unused net operating losses of $419 million and $364 million, respectively, that may be applied against future taxable income. The majority of tax credits and net operating losses expire in 2022 through 2046, 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 $221 million and $31 million as of December 31, 2020, respectively.

Undistributed Foreign Earnings

As of December 31, 2020, 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. 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

Changes in the carrying amounts of goodwill for the years ended December 31, 2019 and 2020, were as follows:

$ in millions	Aeronautics Systems	Defense Systems	Mission Systems	Space Systems	Total
Balance as of December 31, 2018	$ 3,467	$ 4,377	$ 6,062	$ 4,766	$ 18,672
Acquisition of Orbital ATK[1]	—	—	—	37	37
Other[3]	—	(1)	—	—	(1)
Balance as of December 31, 2019	$ 3,467	$ 4,376	$ 6,062	$ 4,803	$ 18,708
Reclassification to assets of disposal group held for sale[2]	—	**(966)**	**(181)**	**(48)**	**(1,195)**
Other[3]	—	**5**	—	—	**5**
Balance as of December 31, 2020	**$ 3,467**	**$ 3,415**	**$ 5,881**	**$ 4,755**	**$ 17,518**

(1) Represents changes to goodwill resulting from measurement period adjustments recorded in 2019 associated with Orbital ATK's purchase price allocation.

(2) Represents the reclassification of goodwill to assets of disposal group held for sale due to the pending divestiture of our IT and mission support services business (See Note 2).

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

At December 31, 2020 and 2019, accumulated goodwill impairment losses totaled $417 million and $153 million at Aeronautics Systems and Space Systems, respectively.

Other Purchased Intangible Assets

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

	December 31	
$ in millions	**2020**	2019
Gross customer-related and other intangible assets	**$ 3,362**	$ 3,356
Less accumulated amortization	**(2,579)**	(2,316)
Net customer-related and other intangible assets	**$ 783**	$ 1,040

Amortization expense for 2020, 2019 and 2018, was $262 million, $332 million and $203 million, respectively. As of December 31, 2020, the expected future amortization of purchased intangibles for each of the next five years is as follows:

$ in millions	
2021	$ 205
2022	197
2023	79
2024	56
2025	44

9. FAIR VALUE OF FINANCIAL INSTRUMENTS

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

	December 31, 2020			December 31, 2019		
$ in millions	**Level 1**	**Level 2**	**Total**	Level 1	Level 2	Total
Financial Assets (Liabilities)						
Marketable securities	**$ 377**	**$ 1**	**$ 378**	$ 364	$ 1	$ 365
Marketable securities valued using NAV			**18**			17
Total marketable securities	**377**	**1**	**396**	364	1	382
Derivatives	**—**	**—**	**—**	—	(3)	(3)

The notional value of the company's foreign currency forward contracts at December 31, 2020 and 2019 was $133 million and $98 million, respectively. At December 31, 2020, no portion of the notional value was designated as a cash flow hedge. The portion of notional value designated as a cash flow hedge at December 31, 2019 was $7 million.

The derivative fair values and related unrealized gains/losses at December 31, 2020 and 2019 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, 2020 and 2019.

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

10. DEBT

Commercial Paper

The company maintains a commercial paper program that serves as a source of short-term financing with capacity to issue unsecured commercial paper notes up to $2.0 billion. There were no commercial paper borrowings outstanding at December 31, 2020 and December 31, 2019, respectively. The outstanding balance of commercial paper borrowings is recorded in Other current liabilities in the consolidated statements of financial position.

Credit Facilities

In August 2018, the company entered into a five-year senior unsecured credit facility in an aggregate principal amount of $2.0 billion (the "2018 Credit Agreement"). In October 2019, the company amended the 2018 Credit Agreement to extend its maturity date by one year from August 2023 to August 2024. 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, 2020, there was no balance outstanding under this facility. Commercial paper borrowings reduce the amount available for borrowing under the 2018 Credit Agreement.

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 $163 million as of December 31, 2020) (the "2016 Credit Agreement"). The 2016 Credit Agreement is guaranteed by the company. The company exercised the second option to extend the maturity to December 2020. In the fourth quarter of 2020, the remaining credit facility balance of £50 million (the equivalent of approximately $68 million as of December 31, 2020) was paid in full and the credit facility was terminated. Borrowings outstanding under this facility in prior periods are recorded in Other current liabilities in the consolidated statements of financial position.

Our credit agreements contain generally customary terms and conditions, including covenants restricting the company's ability to sell all or substantially all of its assets, merge or consolidate with another entity or undertake other fundamental changes and incur liens. The company also cannot permit the ratio of its debt to capitalization (as set forth in the credit agreements) to exceed 65 percent. At December 31, 2020, the company was in compliance with all covenants under its credit agreements.

Unsecured Senior Notes

In March 2020, the company issued $2.25 billion of unsecured senior notes for general corporate purposes, including debt repayment and working capital, as follows:

- $750 million of 4.40% senior notes due 2030 (the "2030 Notes"),

- $500 million of 5.15% senior notes due 2040 (the "2040 Notes") and
- $1.0 billion of 5.25% senior notes due 2050 (the "2050 Notes").

We refer to the 2030 Notes, the 2040 Notes and the 2050 Notes, together, as the "notes." Interest on the notes is payable semi-annually in arrears. The notes are generally subject to redemption, in whole or in part, at the company's discretion at any time, or from time to time, prior to maturity at a redemption price equal to the greater of 100% of the principal amount of the notes to be redeemed or an applicable "make-whole" amount, plus accrued and unpaid interest.

Long-term debt consists of the following:

		December 31	
$ in millions		**2020**	2019
Fixed-rate notes and debentures, maturing in	**Interest rate**		
2020	2.08%	**$ —**	$ 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
2030	4.40%	**750**	—
2031	7.75%	**466**	466
2040	5.05% - 5.15%	**800**	300
2043	4.75%	**950**	950
2045	3.85%	**600**	600
2047	4.03%	**2,250**	2,250
2050	5.25%	**1,000**	—
Credit facilities	1.89%	**—**	78
Other	Various	**235**	272
Debt issuance costs		**(75)**	(64)
Total long-term debt		**15,003**	13,879
Less: current portion[1]		**742**	1,109
Long-term debt, net of current portion		**$ 14,261**	$ 12,770

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

The estimated fair value of long-term debt was $18.2 billion and $15.1 billion as of December 31, 2020 and 2019, 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 $572 million, $521 million and $456 million for the years ended December 31, 2020, 2019 and 2018, respectively.

Maturities of long-term debt as of December 31, 2020, are as follows:

$ in millions		
Year Ending December 31		
2021	$	742
2022		1,505
2023		1,053
2024		3
2025		1,503
Thereafter		10,285
Total principal payments		15,091
Unamortized premium on long-term debt, net of discount		(13)
Debt issuance costs		(75)
Total long-term debt	$	15,003

11. INVESTIGATIONS, CLAIMS AND LITIGATION

On May 4, 2012, the company commenced an action, *Northrop Grumman Systems Corp. v. United States*, in the U.S. Court of Federal Claims. This lawsuit relates to an approximately $875 million firm fixed-price contract awarded to the company in 2007 by the U.S. Postal Service (USPS) for the construction and delivery of flats sequencing systems (FSS) as part of the postal automation program. The FSS were delivered. The company's lawsuit 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. In the course of the litigation, the United States subsequently amended its counterclaim, reducing it to seek approximately $193 million. 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 February 3, 2020, after extensive discovery and motions practice, the parties commenced what was expected to be a seven-week trial. The first four weeks of trial concluded, but the court postponed the remaining estimated three weeks as a result of COVID-19-related concerns. The court resumed trial in November 2020, and following additional COVID-related interruptions, plans to resume trial again during the first week of February 2021. Although the ultimate outcome of this matter, including any possible loss, cannot be predicted or reasonably estimated at this time, the company intends vigorously to pursue and defend the matter.

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 (NYSDEC), the New York State Department of Health and other federal, state and local governmental authorities, to address legacy environmental conditions in Bethpage. In December 2019, the State of New York issued an Amended Record of Decision seeking to impose additional remedial requirements beyond measures the company previously had been taking; the State also communicated that it was assessing potential natural resource damages. In December 2020, the parties reached a tentative agreement regarding the steps the company will take to implement the State's Amended Record of Decision and to resolve certain potential other claims, including for natural resource damages. The State of New York is preparing to file a new consent decree reflecting the agreement and to seek court approval. We have incurred, and expect to continue to incur, as included in Note 12, substantial remediation costs related to the legacy Bethpage environmental conditions. Applicable remediation standards and other requirements to which we are subject may continue to change, our costs may increase materially and those costs may not be fully recoverable. In addition, we are a party to various, and expect to become a party to additional, legal proceedings and disputes related to remediation, environmental impacts, costs, and the allowability of costs we incur, including with federal and state entities (including the Navy, Defense Contract Management Agency, the State, local municipalities and water districts) and insurance carriers, as well as class action and individual plaintiffs alleging personal injury and property damage and seeking both monetary and non-monetary relief. These Bethpage matters could result in additional costs, fines, penalties, sanctions, compensatory or other damages, 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.

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, 2020, or its annual results of operations and/or cash flows.

12. COMMITMENTS AND CONTINGENCIES

U.S. Government Cost Claims and Contingencies

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, 2020, or its annual results of operations and/or cash flows.

The U.S. government has raised questions about an interest rate assumption used by the company to determine our CAS pension expense in previous years and in our current forward pricing rate proposal. On June 1, 2020, the government provided written notice that the assumptions the company used during the period 2013-2019 were potentially noncompliant with CAS. We submitted a formal response on July 31, 2020, which we believe demonstrates the appropriateness of the assumptions used. On November 24, 2020, the government replied to the company's response, disagreeing with our position and requesting additional input. We are engaging further with the government. The sensitivity to changes in interest rate assumptions makes it reasonably possible the outcome of this matter could have a material adverse effect on our financial position, results of operations and/or cash flows, although we are not currently able to estimate a range of any potential loss.

Environmental Matters

The table below summarizes the amount accrued for environmental remediation costs, management's estimate of the amount of reasonably possible future costs in excess of accrued costs and the deferred costs expected to be recoverable through overhead charges on U.S. government contracts as of December 31, 2020 and 2019:

$ in millions	Accrued Costs[1][2]	Reasonably Possible Future Costs in excess of Accrued Costs[2]	Deferred Costs[3]
December 31, 2020	**$ 614**	**$ 346**	**$ 529**
December 31, 2019	531	448	436

[1] As of December 31, 2020, $237 million is recorded in Other current liabilities and $377 million is recorded in Other non-current liabilities.

[2] Estimated remediation costs are not discounted to present value. The reasonably possible future costs in excess of accrued costs do not take into consideration amounts expected to be recoverable through overhead charges on U.S. government contracts.

[3] As of December 31, 2020, $210 million is deferred in Prepaid expenses and other current assets and $319 million is deferred in Other non-current assets. These amounts are evaluated for recoverability on a routine basis.

Although management cannot predict whether new information gained as our environmental remediation projects progress, or as changes in facts and circumstances occur, will materially affect the estimated liability accrued, except with respect to Bethpage, we do not anticipate that future remediation expenditures associated with our currently identified projects will have a material adverse effect on the company's consolidated financial position as of December 31, 2020, or its annual results of operations and/or cash flows.

With respect to Bethpage, as discussed in Note 11, in December 2019, the State of New York issued an Amended Record of Decision, seeking to impose additional remedial requirements beyond those the company previously had been taking; the State also communicated that it was assessing potential natural resource damages. In December

2020, the parties reached a tentative agreement regarding the steps the company will take to implement the State's Amended Record of Decision and to resolve the certain potential other claims, including for natural resource damages. The State of New York is preparing to file a new consent decree reflecting the agreement and to seek court approval. As discussed in Note 11, the applicable remediation standards and other requirements to which we are subject may continue to change, our costs may increase materially, and those costs may not be fully recoverable.

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, 2020, there were $456 million of stand-by letters of credit and guarantees and $94 million of surety bonds outstanding.

Indemnifications
The company has provided indemnifications for certain environmental, income tax and other potential liabilities in connection with certain of its divestitures. The settlement of these liabilities is not expected to have a material adverse effect on the company's consolidated financial position as of December 31, 2020, or its annual results of operations and/or cash flows.

13. RETIREMENT BENEFITS

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

U.S. Defined Contribution Plans – The company also sponsors defined contribution plans covering the majority of its employees, including certain employees covered under collective bargaining agreements. Company contributions vary depending on date of hire, with a majority of employees being eligible for employer matching of employee contributions. Based on date of hire, certain employees are eligible to receive a company non-elective contribution or an enhanced matching contribution in lieu of a defined benefit pension plan benefit. The company's contributions to these defined contribution plans for the years ended December 31, 2020, 2019 and 2018, were $590 million, $481 million and $403 million, respectively.

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

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

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

Summary Plan Results

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

	Year Ended December 31					
	Pension Benefits			Medical and Life Benefits		
$ in millions	**2020**	2019	2018	**2020**	2019	2018
Components of net periodic benefit cost (benefit)						
Service cost	**$ 409**	$ 367	$ 404	**$ 17**	$ 16	$ 21
Interest cost	**1,226**	1,360	1,226	**67**	80	76
Expected return on plan assets	**(2,376)**	(2,101)	(2,217)	**(102)**	(92)	(101)
Amortization of prior service cost (credit)	**(59)**	(59)	(58)	**4**	(3)	(21)
Mark-to-market expense (benefit)	**1,034**	1,783	699	**—**	17	(44)
Other	**10**	—	—	**2**	—	—
Net periodic benefit cost (benefit)	**$ 244**	$ 1,350	$ 54	**$ (12)**	$ 18	$ (69)

The table below summarizes the components of changes in unamortized prior service credit (cost) for the years ended December 31, 2018, 2019 and 2020:

$ in millions	Pension Benefits	Medical and Life Benefits	Total
Changes in unamortized prior service credit			
Amortization of prior service credit	$ 58	$ 21	$ 79
Tax expense	(14)	(5)	(19)
Change in unamortized prior service credit – 2018	44	16	60
Amortization of prior service credit	59	3	62
Tax expense	(14)	(1)	(15)
Change in unamortized prior service credit – 2019	45	2	47
Amortization of prior service credit (cost)	**59**	**(4)**	**55**
Tax expense	**(15)**	**1**	**(14)**
Change in unamortized prior service credit (cost) – 2020	**$ 44**	**$ (3)**	**$ 41**

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.

	Pension Benefits		Medical and Life Benefits	
$ in millions	**2020**	2019	**2020**	2019
Plan Assets				
Fair value of plan assets at beginning of year	**$ 30,646**	$ 27,150	**$ 1,392**	$ 1,247
Net gain on plan assets	**4,802**	5,025	**218**	234
Employer contributions	**851**	221	**36**	42
Participant contributions	**8**	8	**24**	24
Benefits paid	**(1,865)**	(1,763)	**(155)**	(156)
Acquired plan assets	**—**	—	**—**	—
Other	**10**	5	**—**	1
Fair value of plan assets at end of year	**34,452**	30,646	**1,515**	1,392
Projected Benefit Obligation				
Projected benefit obligation at beginning of year	**36,914**	32,231	**2,048**	1,930
Service cost	**409**	367	**17**	16
Interest cost	**1,226**	1,360	**67**	80
Participant contributions	**8**	8	**24**	24
Actuarial loss	**3,455**	4,708	**115**	159
Benefits paid	**(1,865)**	(1,763)	**(155)**	(156)
Acquired benefit obligation	**—**	—	**—**	—
Other	**35**	3	**3**	(5)
Projected benefit obligation at end of year	**40,182**	36,914	**2,119**	2,048
Funded status	**$ (5,730)**	$ (6,268)	**$ (604)**	$ (656)

Pension Benefits

The increase in our pension assets for the year ended December 31, 2020 was principally driven by net plan asset returns of 16.2 percent and a $750 million discretionary pension contribution. In 2019, pension assets increased primarily due to net plan asset returns of 19.1 percent.

The increase in our projected benefit obligation for the year ended December 31, 2020, was primarily driven by a 71 basis point decrease in the discount rate from year end 2019. In 2019, our projected benefit obligation increased primarily due to a 92 basis point decrease in the discount rate from year end 2018 as well as a change in our mortality assumptions.

	Pension Benefits		Medical and Life Benefits	
$ in millions	**2020**	2019	**2020**	2019
Classification of amounts recognized in the consolidated statements of financial position				
Non-current assets	**$ 211**	$ 124	**$ 179**	$ 151
Current liability	**(180)**	(173)	**(46)**	(47)
Non-current liability	**(5,761)**	(6,219)	**(737)**	(760)

The accumulated benefit obligation for all defined benefit pension plans was $39.6 billion and $36.5 billion at December 31, 2020 and 2019, respectively.

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

	December 31	
$ in millions	**2020**	2019
Projected benefit obligation	**$ 37,681**	$ 34,715
Accumulated benefit obligation	**37,135**	34,305
Fair value of plan assets	**31,741**	28,324

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	
	2020	2019	**2020**	2019
Assumptions used to determine benefit obligation at December 31				
Discount rate	**2.68 %**	3.39 %	**2.58 %**	3.35 %
Initial cash balance crediting rate assumed for the next year	**2.25 %**	2.39 %		
Rate to which the cash balance crediting rate is assumed to increase (the ultimate rate)	**2.25 %**	2.64 %		
Year that the cash balance crediting rate reaches the ultimate rate	**2026**	2025		
Rate of compensation increase	**3.00 %**	3.00 %		
Initial health care cost trend rate assumed for the next year			**5.60 %**	5.90 %
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	**3.39 %**	4.31 %	**3.35 %**	4.30 %
Initial cash balance crediting rate assumed for the next year	**2.39 %**	3.00 %		
Rate to which the cash balance crediting rate is assumed to increase (the ultimate rate)	**2.64 %**	3.25 %		
Year that the cash balance crediting rate reaches the ultimate rate	**2025**	2024		
Expected long-term return on plan assets	**8.00 %**	8.00 %	**7.66 %**	7.67 %
Rate of compensation increase	**3.00 %**	3.00 %		
Initial health care cost trend rate assumed for the next year			**5.90 %**	6.20 %
Rate to which the health care cost trend rate is assumed to decline (the ultimate trend rate)			**5.00 %**	5.00 %
Year that the health care cost trend rate reaches the ultimate trend rate			**2023**	2023

For 2021 FAS expense, we have assumed an expected long-term rate of return on pension plan assets of 7.5 percent and 7.22 percent on OPB plans. We decreased the EROA assumption for 2021 FAS expense following an assessment of the historical and anticipated long-term returns of various asset classes, including consideration of recent Federal Reserve policy changes that are expected to extend the duration of the current low interest rate environment.

Plan Assets and Investment Policy

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

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

For the majority of the plans' assets, the investment policies require that the asset allocation be maintained within the following ranges as of December 31, 2020:

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

The table below provides the fair values of the company's pension and Voluntary Employee Beneficiary Association (VEBA) trust plan assets at December 31, 2020 and 2019, 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. As of December 31, 2020 and 2019, there were no investments expected to be sold at a value materially different than NAV.

	Level 1		Level 2		Level 3		Total	
$ in millions	**2020**	2019	**2020**	2019	**2020**	2019	**2020**	2019
Asset category								
Cash and cash equivalents	**$ 120**	$ 233	**$ 1,238**	$ 2,572			**$ 1,358**	$ 2,805
U.S. equities	**2,981**	3,341					**2,981**	3,341
International equities	**3,354**	3,271			**$ 2**	$ 2	**3,356**	3,273
Fixed-income securities								
U.S. Treasuries	**22**	20	**2,273**	2,716			**2,295**	2,736
U.S. Government Agency			**258**	297			**258**	297
Non-U.S. Government			**332**	194			**332**	194
Corporate debt	**31**	28	**6,228**	4,513			**6,259**	4,541
Asset backed			**1,080**	892			**1,080**	892
High yield debt	**24**	30	**48**	104			**72**	134
Bank loans			**59**	33			**59**	33
Other assets	**(2)**	(9)	**59**	59	**2**	2	**59**	52
Investments valued using NAV as a practical expedient								
U.S. equities							**1,567**	1,131
International equities							**7,193**	5,636
Fixed-income funds							**1,959**	438
Hedge funds							**65**	246
Opportunistic investments							**2,499**	1,459
Private equity funds							**2,627**	2,454
Real estate funds							**2,180**	2,376
Payables, net							**(232)**	—
Fair value of plan assets at the end of the year	**$ 6,530**	$ 6,914	**$ 11,575**	$ 11,380	**$ 4**	$ 4	**$ 35,967**	$ 32,038

There were no transfers of plan assets into or out of Level 3 of the fair value hierarchy during the years ended December 31, 2020 and 2019.

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

Other assets include derivative assets with a fair value of $29 million and $49 million, derivative liabilities with a fair value of $27 million and $53 million, and net notional amounts of $2.3 billion and $3.6 billion, as of December 31, 2020 and 2019, 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, monthly or quarterly with a notice requirement less than 90 days. As of December 31, 2020 and 2019, 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, 2020, unfunded commitments were $2 million. There were no unfunded commitments as of December 31, 2019.

Hedge funds: Consist of closed-end funds with a 5-10 year life as well as funds that allow redemption requests subject to the liquidity limitations of the underlying investments. As of December 31, 2020 and 2019, unfunded commitments were $9 million and $8 million, respectively.

Opportunistic investments: Opportunistic investments are primarily held in partnerships with a 5-10 year life. As of December 31, 2020 and 2019, unfunded commitments were $1.9 billion and $1.3 billion, respectively.

Private equity funds: The term of each fund is typically 10 or more years and the fund's investors do not have an option to redeem their interest in the fund. As of December 31, 2020 and 2019, unfunded commitments were $2.3 billion and $1.9 billion, respectively.

Real estate funds: Consist 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. Unfunded commitments were $60 million as of December 31, 2020 and 2019.

For the years ended December 31, 2020 and 2019, 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, 2020:

$ in millions	Pension Plans	Medical and Life Plans	Total
Year Ending December 31			
2021	$ 1,884	$ 152	$ 2,036
2022	1,930	153	2,083
2023	1,973	135	2,108
2024	2,017	133	2,150
2025	2,057	130	2,187
2026 through 2030	10,599	556	11,155

In 2021, the company expects to contribute the required minimum funding of approximately $98 million to its pension plans and approximately $43 million to its medical and life benefit plans. During the year ended December 31, 2020, the company made discretionary pension contributions of $750 million.

14. STOCK COMPENSATION PLANS AND OTHER COMPENSATION ARRANGEMENTS

Stock Compensation Plans
At December 31, 2020, the company had stock-based compensation awards outstanding under the following shareholder-approved plans: the 2011 Long-Term Incentive Stock Plan (2011 Plan), applicable to employees and non-employee directors, and the 1993 Stock Plan for Non-Employee Directors (1993 SPND).

Employee Plans – In May 2015, the company's shareholders approved amendments to the 2011 Plan. These amendments provided that shares issued under the plan would be counted against the aggregate share limit on a one-for-one basis. As amended, 5.1 million shares plus 2.4 million of newly authorized shares were available for issuance under the 2011 Plan; as of December 31, 2020, 5.2 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 concurrently with the RPSR or RSR. The terms of equity awards granted under the 2011 Plan provide for accelerated vesting, and in some instances forfeiture, of all or a portion of an award upon termination of employment.

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

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

Compensation Expense
Stock-based compensation expense for the years ended December 31, 2020, 2019 and 2018 was $90 million, $127 million and $86 million, respectively. The related tax benefits for stock-based compensation for the years ended December 31, 2020, 2019 and 2018 were $14 million, $14 million and $27 million, respectively.

At December 31, 2020, there was $97 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.

Stock award activity for the years ended December 31, 2018, 2019 and 2020, 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, 2018	938	$ 192	1.0
Granted	376	321	
Vested	(455)	181	
Forfeited	(63)	250	
Outstanding at December 31, 2018	796	$ 244	0.8
Granted	339	274	
Vested	(383)	222	
Forfeited	(51)	280	
Outstanding at December 31, 2019	701	$ 278	0.9
Granted	**262**	**350**	
Vested	**(296)**	**305**	
Forfeited	**(64)**	**303**	
Outstanding at December 31, 2020	**603**	**$ 311**	**1.4**

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 $118 million, $119 million and $93 million during the years ended December 31, 2020, 2019 and 2018, 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	**2020**	2019	2018
Minimum aggregate payout amount	**$ 31**	$ 36	$ 36
Maximum aggregate payout amount	**175**	203	205

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, 2020, there was $121 million of unrecognized compensation expense related to cash awards.

15. LEASES

Total Lease Cost

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

	Year Ended December 31	
$ in millions	**2020**	2019
Operating lease cost	**$ 320**	$ 318
Variable lease cost	**28**	11
Short-term lease cost	**93**	75
Total lease cost	**$ 441**	$ 404

Rental expense for operating leases classified under ASC 840 for the year ended December 31, 2018 was $375 million. This amount is net of immaterial amounts of sublease income.

Supplemental Balance Sheet Information

Supplemental operating lease balance sheet information consists of the following:

	Year Ended December 31	
$ in millions	**2020**	2019
Operating lease right-of-use assets	**$ 1,533**	$ 1,511
Other current liabilities	**263**	261
Operating lease liabilities	**1,343**	1,308
Total operating lease liabilities	**$ 1,606**	$ 1,569

Other Supplemental Information

Other supplemental operating lease information consists of the following:

	Year Ended December 31	
$ in millions	**2020**	2019
Cash paid for amounts included in the measurement of operating lease liabilities	**$ 275**	$ 307
Right-of-use assets obtained in exchange for new lease liabilities	**345**	462
Weighted average remaining lease term	**12.1 years**	11.6 years
Weighted average discount rate	**3.5 %**	3.8 %

Maturities of Lease Liabilities

Maturities of operating lease liabilities as of December 31, 2020 are as follows:

$ in millions		
Year Ending December 31		
2021	$	298
2022		267
2023		228
2024		185
2025		142
Thereafter		902
Total lease payments		2,022
Less: imputed interest		(416)
Present value of operating lease liabilities	$	1,606

As of December 31, 2020, we have approximately $361 million in rental commitments for real estate leases that have not yet commenced. These leases are expected to commence in 2021 with lease terms of 4 to 15 years.

16. SEGMENT INFORMATION

The company is aligned in four operating sectors, which also comprise our reportable segments: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems.

As discussed in Note 1, beginning in the second quarter of 2020, the company no longer considers certain unallowable costs and environmental matters that are principally managed at the corporate office as part of management’s evaluation of segment operating performance. As a result, certain unallowable compensation and other costs, which were previously included in segment operating results, are now reported in Unallocated corporate expense within operating income. In addition, certain accrued and deferred costs, as well as unallowable costs, if any, associated with certain environmental matters that were previously reflected in segment assets and operating results are now reflected in corporate assets and Unallocated corporate expense within operating income. This change to operating income has been applied retrospectively in the amounts below. See Part II, Item 5 in the Quarterly Report on Form 10-Q for the quarter ended June 30, 2020 for further information regarding the impact of this change on the company’s prior period segment information.

The following table presents sales and operating income by segment:

	Year Ended December 31		
$ in millions	**2020**	2019	2018
Sales			
Aeronautics Systems	**$ 12,169**	$ 11,116	$ 10,293
Defense Systems	**7,543**	7,495	6,612
Mission Systems	**10,080**	9,410	8,949
Space Systems	**8,744**	7,425	5,845
Intersegment eliminations	**(1,737)**	(1,605)	(1,604)
Total sales	**36,799**	33,841	30,095
Operating income			
Aeronautics Systems	**1,206**	1,188	1,128
Defense Systems	**846**	793	697
Mission Systems	**1,459**	1,408	1,245
Space Systems	**893**	794	644
Intersegment eliminations	**(216)**	(205)	(200)
Total segment operating income	**4,188**	3,978	3,514
Net FAS (service)/CAS pension adjustment	**418**	465	613
Unallocated corporate expense	**(541)**	(474)	(347)
Total operating income	**$ 4,065**	$ 3,969	$ 3,780

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, advertising 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, as well as certain compensation and other costs.

Disaggregation of Revenue

Sales by Customer Type	Year Ended December 31					
	2020		2019		2018	
$ in millions	**$**	**%(3)**	$	%(3)	$	%(3)
Aeronautics Systems						
U.S. government (1)	**$ 10,411**	**86 %**	$ 9,258	83 %	$ 8,732	85 %
International (2)	**1,595**	**13 %**	1,688	15 %	1,402	13 %
Other customers	**41**	**— %**	67	1 %	86	1 %
Intersegment sales	**122**	**1 %**	103	1 %	73	1 %
Aeronautics Systems sales	**12,169**	**100 %**	11,116	100 %	10,293	100 %
Defense Systems						
U.S. government (1)	**5,103**	**68 %**	4,952	66 %	4,132	62 %
International (2)	**1,317**	**17 %**	1,442	19 %	1,249	19 %
Other customers	**395**	**5 %**	410	6 %	481	7 %
Intersegment sales	**728**	**10 %**	691	9 %	750	12 %
Defense Systems sales	**7,543**	**100 %**	7,495	100 %	6,612	100 %
Mission Systems						
U.S. government (1)	**7,279**	**72 %**	6,765	72 %	6,501	73 %
International (2)	**1,945**	**19 %**	1,839	19 %	1,653	18 %
Other customers	**77**	**1 %**	78	1 %	77	1 %
Intersegment sales	**779**	**8 %**	728	8 %	718	8 %
Mission Systems sales	**10,080**	**100 %**	9,410	100 %	8,949	100 %
Space Systems						
U.S. government (1)	**8,110**	**93 %**	6,959	94 %	5,431	93 %
International (2)	**331**	**4 %**	185	2 %	130	2 %
Other customers	**195**	**2 %**	198	3 %	221	4 %
Intersegment sales	**108**	**1 %**	83	1 %	63	1 %
Space Systems sales	**8,744**	**100 %**	7,425	100 %	5,845	100 %
Total						
U.S. government (1)	**30,903**	**84 %**	27,934	83 %	24,796	82 %
International (2)	**5,188**	**14 %**	5,154	15 %	4,434	15 %
Other customers	**708**	**2 %**	753	2 %	865	3 %
Total Sales	**$ 36,799**	**100 %**	$ 33,841	100 %	$ 30,095	100 %

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

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

(3) Percentages calculated based on total segment sales.

Sales by Contract Type	Year Ended December 31					
	2020		2019		2018	
$ in millions	**$**	**%[1]**	$	%[1]	$	%[1]
Aeronautics Systems						
Cost-type	**$ 6,142**	**51 %**	$ 5,299	48 %	$ 5,066	50 %
Fixed-price	**5,905**	**49 %**	5,714	52 %	5,154	50 %
Intersegment sales	**122**		103		73	
Aeronautics Systems sales	**12,169**		11,116		10,293	
Defense Systems						
Cost-type	**2,345**	**34 %**	2,509	37 %	2,386	41 %
Fixed-price	**4,470**	**66 %**	4,295	63 %	3,476	59 %
Intersegment sales	**728**		691		750	
Defense Systems sales	**7,543**		7,495		6,612	
Mission Systems						
Cost-type	**3,582**	**39 %**	3,335	38 %	3,099	38 %
Fixed-price	**5,719**	**61 %**	5,347	62 %	5,132	62 %
Intersegment sales	**779**		728		718	
Mission Systems sales	**10,080**		9,410		8,949	
Space Systems						
Cost-type	**6,369**	**74 %**	5,336	73 %	4,453	77 %
Fixed-price	**2,267**	**26 %**	2,006	27 %	1,329	23 %
Intersegment sales	**108**		83		63	
Space Systems sales	**8,744**		7,425		5,845	
Total						
Cost-type	**18,438**	**50 %**	16,479	49 %	15,004	50 %
Fixed-price	**18,361**	**50 %**	17,362	51 %	15,091	50 %
Total Sales	**$ 36,799**		$ 33,841		$ 30,095	

[1] Percentages calculated based on external customer sales.

Sales by Geographic Region	Year Ended December 31					
	2020		2019		2018	
$ in millions	**$**	**%(2)**	$	%(2)	$	%(2)
Aeronautics Systems						
United States	**$ 10,452**	**87 %**	$ 9,325	85 %	$ 8,818	86 %
Asia/Pacific	**841**	**7 %**	810	7 %	677	7 %
Europe	**574**	**5 %**	587	5 %	536	5 %
All other (1)	**180**	**1 %**	291	3 %	189	2 %
Intersegment sales	**122**		103		73	
Aeronautics Systems sales	**12,169**		11,116		10,293	
Defense Systems						
United States	**5,498**	**81 %**	5,362	79 %	4,613	79 %
Asia/Pacific	**402**	**6 %**	369	5 %	365	6 %
Europe	**315**	**4 %**	249	4 %	204	3 %
All other (1)	**600**	**9 %**	824	12 %	680	12 %
Intersegment sales	**728**		691		750	
Defense Systems sales	**7,543**		7,495		6,612	
Mission Systems						
United States	**7,356**	**79 %**	6,843	79 %	6,578	80 %
Asia/Pacific	**707**	**8 %**	637	7 %	592	7 %
Europe	**893**	**9 %**	850	10 %	682	8 %
All other (1)	**345**	**4 %**	352	4 %	379	5 %
Intersegment sales	**779**		728		718	
Mission Systems sales	**10,080**		9,410		8,949	
Space Systems						
United States	**8,305**	**96 %**	7,157	98 %	5,652	98 %
Asia/Pacific	**18**	**— %**	20	— %	32	— %
Europe	**300**	**4 %**	147	2 %	92	2 %
All other (1)	**13**	**— %**	18	— %	6	— %
Intersegment sales	**108**		83		63	
Space Systems sales	**8,744**		7,425		5,845	
Total						
United States	**31,611**	**86 %**	28,687	85 %	25,661	85 %
Asia/Pacific	**1,968**	**5 %**	1,836	6 %	1,666	6 %
Europe	**2,082**	**6 %**	1,833	5 %	1,514	5 %
All other (1)	**1,138**	**3 %**	1,485	4 %	1,254	4 %
Total Sales	**$ 36,799**		$ 33,841		$ 30,095	

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

(2) Percentages calculated based on external customer sales.

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:

	Year Ended December 31					
$ in millions	**2020**		2019		2018	
	Sales	**Operating Income**	Sales	Operating Income	Sales	Operating Income
Intersegment sales and operating income						
Aeronautics Systems	**$ 122**	**$ 11**	$ 103	$ 10	$ 73	$ 8
Defense Systems	**728**	**76**	691	74	750	74
Mission Systems	**779**	**116**	728	113	718	115
Space Systems	**108**	**13**	83	8	63	3
Total	**$ 1,737**	**$ 216**	$ 1,605	$ 205	$ 1,604	$ 200

Assets

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

	December 31	
$ in millions	**2020**	2019
Assets		
Aeronautics Systems	**$ 8,997**	$ 9,104
Defense Systems	**7,352**	7,420
Mission Systems	**10,029**	9,934
Space Systems	**10,028**	10,595
Corporate assets[(1)]	**8,063**	4,036
Total assets	**$ 44,469**	$ 41,089

[(1)] Corporate assets principally consist of cash and cash equivalents, refundable taxes, deferred tax assets, property, plant and equipment, marketable securities and deferred costs associated with certain environmental matters. Beginning in 2020, certain additional environmental matters that were previously reflected in segment assets are now reflected in corporate assets.

Capital Expenditures and Depreciation and Amortization

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

	Year Ended December 31					
$ in millions	**2020**	2019	2018	**2020**	2019	2018
	Capital Expenditures			Depreciation and Amortization[(1)]		
Aeronautics Systems	**$ 540**	$ 528	$ 657	**$ 238**	$ 224	$ 190
Defense Systems	**78**	71	66	**48**	44	65
Mission Systems	**302**	229	197	**150**	133	121
Space Systems	**440**	352	226	**211**	189	130
Corporate	**60**	84	103	**358**	428	294
Total	**$ 1,420**	$ 1,264	$ 1,249	**$ 1,005**	$ 1,018	$ 800

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

17. UNAUDITED SELECTED QUARTERLY DATA

Unaudited quarterly financial results are set forth in the following tables. It is the company's long-standing practice to establish actual interim closing dates using a "fiscal" calendar in which we close our books on a Friday near each quarter-end date, in order to normalize the potentially disruptive effects of quarterly closings on business processes. This practice is only used at interim periods within a reporting year.

2020

In millions, except per share amounts	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr
Sales	**$ 8,620**	**$ 8,884**	**$ 9,083**	**$ 10,212**
Operating income	**934**	**994**	**985**	**1,152**
Net earnings	**868**	**1,005**	**986**	**330**
Basic earnings per share	**5.18**	**6.02**	**5.91**	**1.98**
Diluted earnings per share	**5.15**	**6.01**	**5.89**	**1.97**
Weighted-average common shares outstanding	**167.7**	**166.9**	**166.8**	**166.8**
Weighted-average diluted shares outstanding	**168.4**	**167.3**	**167.3**	**167.4**

2019

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

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

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

None.

Item 9A. Controls and Procedures

DISCLOSURE CONTROLS AND PROCEDURES

Our principal executive officer (Chairman, Chief Executive Officer and President) and principal financial officer (Corporate Vice President and Chief Financial Officer) have evaluated the company's disclosure controls and procedures (as defined in Rule 13a-15(e) and Rule 15d-15(e) of the Securities Exchange Act of 1934 (the Exchange Act)) as of December 31, 2020, and have concluded that these controls and procedures are effective to ensure that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. These disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in the reports that we file or submit is accumulated and communicated to management, including the principal executive officer and the principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

CHANGES IN INTERNAL CONTROL OVER FINANCIAL REPORTING

During the three months ended December 31, 2020, no change occurred in our internal control over financial reporting that materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None.

MANAGEMENT’S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING

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

To comply with the requirements of Section 404 of the Sarbanes–Oxley Act of 2002, the company designed and implemented a structured and comprehensive assessment process to evaluate its internal control over financial reporting across the enterprise. The assessment of the effectiveness of the company’s internal control over financial reporting is based on criteria established in *Internal Control—Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. Because of its inherent limitations, a system of internal control over financial reporting can provide only reasonable assurance and may not prevent or detect misstatements. Management regularly monitors its internal control over financial reporting, and actions are taken to correct deficiencies as they are identified. Based on its assessment, management has concluded that the company’s internal control over financial reporting was effective as of December 31, 2020.

Deloitte & Touche LLP issued an attestation report dated January 27, 2021, 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, 2020, have been audited by the independent registered public accounting firm of Deloitte & Touche LLP in accordance with the standards of the Public Company Accounting Oversight Board (United States).

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

/s/ David F. Keffer
Corporate Vice President and Chief Financial Officer

January 27, 2021

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, 2020, 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, 2020, 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, 2020 of the Company and our report dated January 27, 2021 expressed an unqualified opinion on those financial statements.

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 27, 2021

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 2021 Annual Meeting of Shareholders, to be filed with the Securities and Exchange Commission (SEC) within 120 days after the end of the company's fiscal year.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

Our executive officers as of January 27, 2021, 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	49	Chairman, Chief Executive Officer and President	2019	Chief Executive Officer and President (2019); President and Chief Operating Officer (2018); Corporate Vice President and President, Mission Systems Sector (2016-2017); Corporate Vice President and President, Former Information Systems Sector (2013-2015)
Ann M. Addison	59	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)
Mark A. Caylor	56	Corporate Vice President and President, Mission Systems Sector	2018	Corporate Vice President and President, Enterprise Services and Chief Strategy Officer (2014-2017)
Sheila C. Cheston	62	Corporate Vice President and General Counsel	2010	
Michael A. Hardesty	49	Corporate Vice President, Controller, and Chief Accounting Officer	2013	
Thomas H. Jones	54	Corporate Vice President and President, Aeronautics Systems Sector	2021	Vice President and General Manager, Airborne C4ISR Division, Mission Systems Sector (2017-2020); Vice President and General Manager, Advanced Concepts & Technologies Division, Mission Systems Sector (2015-2017)
Lesley A. Kalan	47	Corporate Vice President and Chief Strategy and Development Officer	2020	Corporate Vice President, Government Relations (2018-2019); Vice President, Legislative Affairs (2010-2017)
David F. Keffer	43	Corporate Vice President and Chief Financial Officer	2020	General Partner, Blue Delta Capital Partners (2018-2020); Chief Financial Officer and Executive Vice President, CSRA, Inc. (2015-2018)
Blake E. Larson	61	Corporate Vice President and President, Space Systems Sector	2020	Corporate Vice President and President, Former Innovation Systems Sector (2018-2020); Chief Operating Officer, Orbital ATK, Inc. (2015-2018); Senior Vice President and President, Aerospace Group, Alliant Techsystems, Inc. (2010-2015)

Name	Age	Office Held	Since	Recent Business Experience
David T. Perry	56	Corporate Vice President and Chief Global Business Officer	2019	Corporate Vice President and Chief Global Business Development Officer (2012-2019)
Mary D. Petryszyn	59	Corporate Vice President and President, Defense Systems Sector	2020	Vice President and General Manager, Land and Avionics C4ISR Division, Mission Systems Sector (2016-2019), Vice President, Global Strategy and Mission Solutions, Aerospace Systems Sector (2015-2016), Vice President, International, Aerospace Systems Sector (2013-2015)
Shawn N. Purvis	47	Corporate Vice President and President, Enterprise Services	2018	Vice President and Chief Information Officer (2016-2017); Vice President and General Manager, Cyber Division, Former Information Systems Sector (2014-2016)
Lucy C. Ryan	47	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 and Risk Committee and the Audit and Risk Committee Financial Expert will be incorporated herein by reference to the Proxy Statement for the 2021 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 “Investors – Corporate Governance – Standards of Business Conduct.” A copy of the Standards of Business Conduct is available to any stockholder who requests it by writing to: Northrop Grumman Corporation, c/o Office of the Secretary, 2980 Fairview Park Drive, Falls Church, VA 22042. We disclose amendments to provisions of our Standards of Business Conduct by posting amendments on our website. Waivers of the provisions of our Standards of Business Conduct that apply to our directors and executive officers are disclosed in a Current Report on Form 8-K.

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

OTHER DISCLOSURES

Other disclosures required by this Item will be incorporated herein by reference to the Proxy Statement for the 2021 Annual Meeting of Shareholders.

Item 11. Executive Compensation

Information concerning Executive Compensation, including information concerning Compensation Committee Interlocks and Insider Participation and the Compensation Committee Report, will be incorporated herein by reference to the Proxy Statement for the 2021 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 2021 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 2021 Annual Meeting of Shareholders.

Item 14. Principal Accounting Fees and Services

The information as to Principal Accounting Fees and Services will be incorporated herein by reference to the Proxy Statement for the 2021 Annual Meeting of Shareholders.

PART IV

Item 15. Exhibits, Financial Statement Schedules

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

Financial Statements

2. Financial Statement Schedules

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

3. Exhibits

2(a)	Agreement and Plan of Merger among Titan II, Inc. (formerly Northrop Grumman Corporation), Northrop Grumman Corporation (formerly New P, Inc.) and Titan Merger Sub Inc., dated March 30, 2011 (incorporated by reference to Exhibit 10.1 to Form 8-K filed April 4, 2011, File No. 001-16411)
2(b)	Separation and Distribution Agreement dated as of March 29, 2011, among Titan II, Inc. (formerly Northrop Grumman Corporation), Northrop Grumman Corporation (formerly New P, Inc.), Huntington Ingalls Industries, Inc., Northrop Grumman Shipbuilding, Inc. and Northrop Grumman Systems Corporation (incorporated by reference to Exhibit 10.2 to Form 8-K filed April 4, 2011, File No. 001-16411)
2(c)	Agreement and Plan of Merger dated as of September 17, 2017, among Northrop Grumman Corporation, Neptune Merger, Inc. and Orbital ATK, Inc. (incorporated by reference to Exhibit 2.1 to Form 8-K filed September 18, 2017, File No. 001-16411)
2(d)	Transaction Agreement dated as of April 28, 2014, among Alliant Techsystems Inc., Vista Spinco Inc., Vista Merger Sub Inc. and Orbital Sciences Corporation (incorporated by reference to Exhibit 2.1 to Alliant Techsystems Inc. (now known as Northrop Grumman Innovation Systems, Inc.) Form 8-K filed May 2, 2014, File No. 001-16411)
3(a)	Amended and Restated Certificate of Incorporation of Northrop Grumman Corporation dated May 29, 2012 (incorporated by reference to Exhibit 3.1 to Form 10-Q for the quarter ended June 30, 2012, filed July 25, 2012, File No. 001-16411)
3(b)	Amended and Restated Bylaws of Northrop Grumman Corporation dated December 4, 2018 (incorporated by reference to Exhibit 3.1 to Form 8-K filed December 10, 2018, File No. 001-16411)
4(a)	Registration Rights Agreement dated as of January 23, 2001, by and among Northrop Grumman Corporation (now Northrop Grumman Systems Corporation), NNG, Inc. (now Northrop Grumman Corporation) and Unitrin, Inc. (incorporated by reference to Exhibit(d)(6) to Amendment No. 4 to Schedule TO filed January 31, 2001, File No. 001-3229)
4(b)	Indenture dated as of October 15, 1994, between Northrop Grumman Corporation (now Northrop Grumman Systems Corporation) and The Chase Manhattan Bank (National Association), Trustee (incorporated by reference to Exhibit 4.1 to Form 8-K filed October 25, 1994, File No. 001-3229)
4(c)	First Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation, The Bank of New York Mellon (successor trustee to JPMorgan Chase Bank and The Chase Manhattan Bank, N.A.), Titan II, Inc. (formerly known as Northrop Grumman Corporation), and Titan Holdings II, L.P., to Indenture dated as of October 15, 1994, between Northrop Grumman Corporation (now Northrop Grumman Systems Corporation) and The Chase Manhattan Bank, N.A., Trustee (incorporated by reference to Exhibit 4.1 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
4(d)	Second Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation, The Bank of New York Mellon (successor trustee to JPMorgan Chase Bank and The Chase Manhattan Bank, N.A.), Titan Holdings II, L.P., and Northrop Grumman Corporation (formerly known as New P, Inc.), to Indenture dated as of October 15, 1994, between Northrop Grumman Corporation (now Northrop Grumman Systems Corporation) and The Chase Manhattan Bank, N.A., Trustee (incorporated by reference to Exhibit 4.2 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
4(e)	Form of Officers' Certificate (without exhibits) establishing the terms of Northrop Grumman Corporation's (now Northrop Grumman Systems Corporation's) 7.875% Debentures due 2026 (incorporated by reference to Exhibit 4.3 to Form S-4 Registration Statement No. 333-02653 filed April 19, 1996)
4(f)	Form of Northrop Grumman Corporation's (now Northrop Grumman Systems Corporation's) 7.875% Debentures due 2026 (incorporated by reference to Exhibit 4.6 to Form S-4 Registration Statement No. 333-02653 filed April 19, 1996)
4(g)	Form of Officers' Certificate establishing the terms of Northrop Grumman Corporation's (now Northrop Grumman Systems Corporation's) 7.75% Debentures due 2031 (incorporated by reference to Exhibit 10.9 to Form 8-K filed April 17, 2001, File No. 001-16411)
4(h)	Senior Indenture dated as of December 15, 1991, between Litton Industries, Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and The Bank of New York, as trustee, under which its 7.75% and 6.98% debentures due 2026 and 2036 were issued, and specimens of such debentures (incorporated by reference to Exhibit 4.1 to the Form 10-Q of Litton Industries, Inc. for the quarter ended April 30, 1996, filed June 11, 1996, File No. 001-3998)
4(i)	Supplemental Indenture with respect to Senior Indenture dated December 15, 1991, dated as of April 3, 2001, among Litton Industries, Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation), Northrop Grumman Corporation, Northrop Grumman Systems Corporation and The Bank of New York, as trustee (incorporated by reference to Exhibit 4.7 to Form 10-Q for the quarter ended March 31, 2001, filed May 10, 2001, File No. 001-16411)

4(j)	Supplemental Indenture with respect to Senior Indenture dated December 15, 1991, dated as of December 20, 2002, among Litton Industries, Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation), Northrop Grumman Corporation, Northrop Grumman Systems Corporation and The Bank of New York, as trustee (incorporated by reference to Exhibit 4(t) to Form 10-K for the year ended December 31, 2002, filed March 24, 2003, File No. 001-16411)
4(k)	Third Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation (successor-in-interest to Litton Industries, Inc.), The Bank of New York Mellon (formerly known as The Bank of New York), as trustee, Titan II, Inc. (formerly known as Northrop Grumman Corporation), and Titan Holdings II, L.P., to Senior Indenture dated December 15, 1991, between Litton Industries, Inc. and The Bank of New York, as trustee (incorporated by reference to Exhibit 4.5 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
4(l)	Fourth Supplemental Indenture dated as of March 30, 2011 by and among Northrop Grumman Systems Corporation (successor-in-interest to Litton Industries, Inc.), The Bank of New York Mellon (formerly known as The Bank of New York) as trustee, Titan Holdings II, L.P., and Northrop Grumman Corporation (formerly known as New P, Inc.), to Senior Indenture dated December 15, 1991, between Litton Industries, Inc. and The Bank of New York, as trustee (incorporated by reference to Exhibit 4.6 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
4(m)	Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 (incorporated by reference to Exhibit 2 to the Form 8-A Registration Statement of TRW Inc. dated July 3, 1986, File No. 001-02384)
4(n)	First Supplemental Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and Mellon Bank, N.A., as trustee, dated as of August 24, 1989 (incorporated by reference to Exhibit 4(b) to Form S-3 Registration Statement No. 33-30350 of TRW Inc.)
4(o)	Fifth Supplemental Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and The Chase Manhattan Bank, as successor trustee, dated as of June 2, 1999 (incorporated by reference to Exhibit 4(f) to Form S-4 Registration Statement No. 333-83227 of TRW Inc. filed July 20, 1999)
4(p)	Ninth Supplemental Indenture dated as of December 31, 2009 among Northrop Grumman Space & Mission Systems Corp. (predecessor–in-interest to Northrop Grumman Systems Corporation); The Bank of New York Mellon, as successor trustee; Northrop Grumman Corporation; and Northrop Grumman Systems Corporation (incorporated by reference to Exhibit 4(p) to Form 10-K for the year ended December 31, 2009, filed February 9, 2010, File No. 001-16411)
4(q)	Tenth Supplemental Indenture dated as of March 30, 2011, by and among Northrop Grumman Systems Corporation (successor-in-interest to Northrop Grumman Space & Mission Systems Corp. and TRW, Inc.), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank and to Mellon Bank, N.A., Titan II Inc. (formerly known as Northrop Grumman Corporation), and Titan Holdings II, L.P., to Indenture between TRW Inc. and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 (incorporated by reference to Exhibit 4.7 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
4(r)	Eleventh Supplemental Indenture dated as of March 30, 2011, by and among Northrop Grumman Systems Corporation (successor-in-interest to Northrop Grumman Space & Mission Systems Corp. and TRW Inc.), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank and to Mellon Bank, N.A., Titan Holdings II, L.P., and Northrop Grumman Corporation (formerly known as New P, Inc.) to Indenture between TRW Inc. and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 (incorporated by reference to Exhibit 4.8 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
4(s)	Indenture dated as of November 21, 2001, between Northrop Grumman Corporation and JPMorgan Chase Bank, as trustee (incorporated by reference to Exhibit 4.1 to Form 8-K filed November 21, 2001, File No. 001-16411)
4(t)	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(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)	Fifth Supplemental Indenture, dated as of May 31, 2013, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 (incorporated by reference to Exhibit 4(a) to Form 8-K filed May 31, 2013, File No. 001-16411)
4(aa)	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(bb)	Form of 4.750% Senior Note due 2043 (incorporated by reference to Exhibit C to Exhibit 4(a) to Form 8-K filed May 31, 2013, File No. 001-16411)
4(cc)	Sixth Supplemental Indenture, dated as of February 6, 2015, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 (incorporated by reference to Exhibit 4.1 to Form 8-K filed February 6, 2015, File No. 001-16411)
4(dd)	Form of 3.850% Senior Note due 2045 (incorporated by reference to Exhibit A to Exhibit 4.1 to Form 8-K filed February 6, 2015, File No. 001-16411)

4(ee)	Seventh Supplemental Indenture, dated as of December 1, 2016, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 (incorporated by reference to Exhibit 4.1 to Form 8-K filed December 1, 2016, File No. 001-16411)
4(ff)	Form of 3.200% Senior Note due 2027 (incorporated by reference to Exhibit A to Exhibit 4.1 to Form 8-K filed December 1, 2016, File No. 001-16411)
4(gg)	Eighth Supplemental Indenture, dated as of October 13, 2017, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase Bank, Trustee, to Indenture dated as of November 21, 2001 (incorporated by reference to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
4(hh)	Ninth Supplemental Indenture, dated as of March 23, 2020, between Northrop Grumman Corporation and The Bank of New York Mellon, as successor to JPMorgan Chase, Trustee, to Indenture dated as of November 21, 2001 (incorporated by reference to Exhibit 4.1 to Form 8-K filed March 24, 2020, File No. 001-16411)
4(ii)	Form of 2.550% Senior Note due 2022 (incorporated by reference to Exhibit B to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
4(jj)	Form of 2.930% Senior Note due 2025 (incorporated by reference to Exhibit C to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
4(kk)	Form of 3.250% Senior Note due 2028 (incorporated by reference to Exhibit D to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
4(ll)	Form of 4.030% Senior Note due 2047 (incorporated by reference to Exhibit E to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
4(mm)	Form of 4.400% Senior Note due 2030 (incorporated by reference to Exhibit 4.1 to Form 8-K filed March 24, 2020, File No. 001-16411)
4(nn)	Form of 5.150% Senior Note due 2040 (incorporated by reference to Exhibit 4.1 to Form 8-K filed March 24, 2020, File No. 001-16411)
4(oo)	Form of 5.250% Senior Note due 2050 (incorporated by reference to Exhibit 4.1 to Form 8-K filed March 24, 2020, File No. 001-16411)
4(pp)	Description of Securities (incorporated by reference to Exhibit 4(ll) to Form 10-K for the year ended December 31, 2019, filed January 30, 2020, File No. 001-16411)
10(a)	Credit Agreement, dated as of August 17, 2018, among Northrop Grumman Corporation, as Borrower; Northrop Grumman Systems Corporation, as Guarantor; the lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent (incorporated by reference to Exhibit 10.1 to Form 8-K filed August 17, 2018, File No. 001-16411)
	(i) Extension and Amendment Agreement, dated as of October 17, 2019, among Northrop Grumman Corporation, as Borrower, Northrop Grumman Systems Corporation, as Guarantor, the issuing banks party thereto, the lenders party thereto and JPMorgan Chase Bank, N.A., as Administrative Agent (incorporated by reference to Exhibit 10.1 to Form 8-K filed October 21, 2019, File No. 001-16411)
10(b)	Form of Guarantee dated as of April 3, 2001, by Northrop Grumman Corporation of the indenture indebtedness issued by Litton Industries, Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) (incorporated by reference to Exhibit 10.10 to Form 8-K filed April 17, 2001, File No. 001-16411)
10(c)	Form of Guarantee dated as of April 3, 2001, by Northrop Grumman Corporation of Northrop Grumman Systems Corporation indenture indebtedness (incorporated by reference to Exhibit 10.11 to Form 8-K and filed April 17, 2001, File No. 001-16411)
10(d)	Form of Guarantee dated as of March 27, 2003, by Northrop Grumman Corporation, as Guarantor, in favor of JP Morgan Chase Bank, as trustee, of certain debt securities issued by the former Northrop Grumman Space & Mission Systems Corp. (predecessor-in-interest to Northrop Grumman Systems Corporation) (incorporated by reference to Exhibit 4.2 to Form 10-Q for the quarter ended March 31, 2003, filed May 14, 2003, File No. 001-16411)
+10(e)	Northrop Grumman Corporation 1993 Stock Plan for Non-Employee Directors (as Amended and Restated January 1, 2010) (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2009, filed July 23, 2009, File No. 001-16411)
+10(f)	Amended and Restated 2011 Long-Term Incentive Stock Plan (as amended and restated effective as of May 20, 2015) (incorporated by reference to Appendix B to the Company's Proxy Statement on Schedule 14A for the 2015 Annual Meeting of Shareholders filed April 6, 2015, File No. 001-16411)
	(i) Northrop Grumman Corporation Equity Grant Program for Non-Employee Directors under the Northrop Grumman 2011 Long-Term Incentive Stock Plan, Amended and Restated Effective as of January 1, 2016 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended September 30, 2015, filed October 28, 2015, File No. 001-16411)
	(ii) Grant Certificate Specifying the Terms and Conditions Applicable to 2017 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2017, filed April 26, 2017, File No. 001-16411)
	(iii) Grant Certificate Specifying the Terms and Conditions Applicable to 2017 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2017, filed April 26, 2017, File No. 001-16411)
	(iv) Grant Certificate Specifying the Terms and Conditions Applicable to 2018 Restricted Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2018, filed April 25, 2018, File No. 001-16411)
	(v) Grant Certificate Specifying the Terms and Conditions Applicable to 2018 Restricted Performance Stock Rights Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2018, filed April 25, 2018, File No. 001-16411)

(vi) Grant Certificate Specifying the Terms and Conditions Applicable to Special 2018 Restricted Stock Rights Granted to Blake Larson Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended June 30, 2018, filed July 25, 2018, File No. 001-16411)

(vii) Grant Certificate Specifying the Terms and Conditions Applicable to 2018 Restricted Stock Rights Granted to Mark Caylor Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10(g)(xvii) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)

(viii) 2019 Restricted Stock Rights Grant Agreement Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411)

(ix) 2019 Restricted Performance Stock Rights Grant Agreement Granted Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411)

(x) 2020 Restricted Stock Rights Grant Agreement 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, 2020, filed April 29, 2020, File No. 001-16411)

(xi) 2020 Restricted Performance Stock Rights Grant Agreement 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, 2020, filed April 29, 2020, File No. 001-16411)

(xii) Special 2020 Restricted Stock Rights Grant Agreement Granted to Blake Larson and Janis Pamiljans Under the 2011 Long-Term Incentive Stock Plan (incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2020, filed April 29, 2020, File No. 001-16411)

+10(g) Northrop Grumman 2011 Long-Term Incentive Stock Plan (As Amended Through December 4, 2014) (incorporated by reference to Exhibit 10(h) to Form 10-K for the year ended December 31, 2014, filed February 2, 2015, File No. 001-16411)

(i) Summary of Non-Employee Director Award Terms Under the 2011 Long-Term Incentive Stock Plan effective December 21, 2011 (incorporated by reference to Exhibit 10(j)(ii) to Form 10-K for the year ended December 31, 2011, filed February 8, 2012, File No. 001-16411)

(ii) Northrop Grumman Corporation Equity Grant Program for Non-Employee Directors under the Northrop Grumman 2011 Long-Term Incentive Stock Plan, Amended and Restated Effective January 1, 2015 (incorporated by reference to Exhibit 10(h)(ii) to Form 10-K for the year ended December 31, 2014, filed February 2, 2015, File No. 001-16411)

+10(h) Northrop Grumman Supplemental Plan 2 (Amended and Restated Effective as of January 1, 2014) (incorporated by reference to Exhibit 10(l) to Form 10-K for the year ended December 31, 2013, Filed February 3, 2014, File No. 001-16411)

(i) Appendix B to the Northrop Grumman Supplemental Plan 2: ERISA Supplemental Program 2 (Amended and Restated Effective as of January 1, 2014) (incorporated by reference to Exhibit 10(l)(i) to Form 10-K for the year ended December 31, 2013, filed February 3, 2014, File No. 001-16411)

(ii) Appendix G to the Northrop Grumman Supplemental Plan 2: Officers Supplemental Executive Retirement Program (Amended and Restated Effective as of January 1, 2012) (incorporated by reference to Exhibit 10(k)(iv) to Form 10-K for the year ended December 31, 2011, filed February 8, 2012, File No. 001-16411)

(iii) Appendix I to the Northrop Grumman Supplemental Plan 2: Officers Supplemental Executive Retirement Program II (Amended and Restated January 1, 2014) (incorporated by reference to Exhibit 10(k)(iv) to Form 10-K for the year ended December 31, 2015, filed February 1, 2016, File No. 001-16411)

(iv) First Amendment to the Northrop Grumman Supplemental Plan 2, dated December 20, 2017 (Effective as of December 31, 2017) (incorporated by reference to Exhibit 10(j)(v) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018, File No. 001-16411)

(v) First Amendment to Appendix F to the Northrop Grumman Supplemental Plan 2, CPC Supplemental Executive Retirement Program, effective December 30, 2019 (incorporated by reference to Exhibit 10(h)(v) to Form 10-K for the year ended December 31, 2019, filed January 30, 2020, File No. 001-16411)

+10(i) Northrop Grumman Supplementary Retirement Income Plan (formerly TRW Supplementary Retirement Income Plan) (Amended and Restated Effective January 1, 2014) (incorporated by reference to Exhibit 10(m) to Form 10-K for the year ended December 31, 2013, filed February 3, 2014, File No. 001-16411)

+10(j) Severance Plan for Elected and Appointed Officers of Northrop Grumman Corporation (Amended and Restated Effective December 31, 2019) (incorporated by reference to Exhibit 10(j) to Form 10-K for the year ended December 31, 2019, filed January 30, 2020, File No. 001-16411)

+10(k) Non-Employee Director Compensation Term Sheet, effective May 15, 2019 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2019, filed July 24, 2019, File No. 001-16411)

+10(l) Non-Employee Director Compensation Term Sheet, effective May 20, 2020 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2020, filed July 30, 2020, File No. 001-16411)

+10(m) Form of Indemnification Agreement between Northrop Grumman Corporation and its directors and executive officers (incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2012, filed April 25, 2012, File No. 001-16411)

+10(n) Northrop Grumman Deferred Compensation Plan (Amended and Restated Effective as of April 1, 2016) (incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2016, filed April 27, 2016, File No. 001-16411)

+10(o) The 2002 Incentive Compensation Plan of Northrop Grumman Corporation, As Amended and Restated effective January 1, 2009 (incorporated by reference to Exhibit 10.6 to Form 10-Q for the quarter ended March 31, 2009, filed April 22, 2009, File No. 001-16411)

+10(p) Northrop Grumman 2006 Annual Incentive Plan and Incentive Compensation Plan (for Non-Section 162(m) Officers), as amended and restated effective January 1, 2009 (incorporated by reference to Exhibit 10.7 to Form 10-Q for the quarter ended March 31, 2009, filed April 22, 2009, File No. 001-16411)

+10(q) Northrop Grumman Innovation Systems Nonqualified Deferred Compensation Plan, as amended and restated January 1, 2019 (incorporated by reference to Exhibit 10(r) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)

+10(r) Northrop Grumman Savings Excess Plan (Amended and Restated Effective as of January 1, 2020) (incorporated by reference to Exhibit 10(s) to Form 10-K for the year ended December 31, 2019, filed January 30, 2020, File No. 001-16411)

+10(s) Northrop Grumman Officers Retirement Account Contribution Plan (Amended and Restated Effective as of January 1, 2019) (incorporated by reference to Exhibit 10(v) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)

+10(t) Northrop Grumman Corporation Special Officer Retiree Medical Plan (Amended and Restated Effective October 1, 2018) (incorporated by reference to Exhibit 10(w) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)

+10(u) Northrop Grumman Innovation Systems Defined Benefit Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2019 (incorporated by reference to Exhibit 10(x) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)

(i) First Amendment to Northrop Grumman Innovation Systems Defined Benefit Supplemental Executive Retirement Plan, effective December 31, 2019 (incorporated by reference to Exhibit 10(v)(i) to Form 10-K for the year ended December 31, 2019, filed January 30, 2020, File No. 001-16411)

+10(v) Northrop Grumman Innovation Systems Defined Contribution Supplemental Executive Retirement Plan, as amended and restated effective January 1, 2019 (incorporated by reference to Exhibit 10(y) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)

+10(w)	Executive Basic Life Insurance and Accidental Death and Dismemberment Insurance Policy dated January 1, 2019 (incorporated by reference to Exhibit 10.4 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411)
+10(x)	Executive Long-Term Disability Insurance Policy dated January 1, 2019 (incorporated by reference to Exhibit 10.5 to Form 10-Q for the quarter ended March 31, 2019, filed April 24, 2019, File No. 001-16411)
+10(y)	Executive Supplemental Individual Disability Insurance Plan dated June 30, 2014 (incorporated by reference to Exhibit 10(z) to Form 10-K for the year ended December 31, 2017, filed January 29, 2018, File No. 001-16411)
*+10(z)	Group Personal Excess Liability Policy dated January 28, 2020 and effective as of January 1, 2020
+10(aa)	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, File No. 001-16411)
+10(bb)	Letter dated February 3, 2020 from Northrop Grumman Corporation to David Keffer regarding compensation effective February 17, 2020 (incorporated by reference to Exhibit 10.4 to Form 10-Q for the quarter ended March 31, 2020, filed April 29, 2020, File No. 001-16411)
+10(cc)	Separation Agreement and General Release dated February 5, 2020 from Northrop Grumman Corporation to Kenneth Bedingfield (incorporated by reference to Exhibit 10.1 to Form 8-K filed February 6, 2020, File No. 001-16411)
*21	Subsidiaries
*23	Consent of Independent Registered Public Accounting Firm
*24	Power of Attorney
*31.1	Certification of Kathy J. Warden pursuant to Section 302 of the Sarbanes-Oxley Act of 2002
*31.2	Certification of David F. Keffer 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 David F. Keffer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002
*101	Northrop Grumman Corporation Annual Report on Form 10-K for the fiscal year ended December 31, 2020, formatted in XBRL (Extensible Business Reporting Language); (i) the Cover Page, (ii) the Consolidated Statements of Earnings and Comprehensive Income, (iii) Consolidated Statements of Financial Position, (iv) Consolidated Statements of Cash Flows, (v) Consolidated Statements of Changes in Shareholders' Equity, and (vi) Notes to Consolidated Financial Statements. The instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
*104	Cover Page Interactive Data File (formatted as Inline XBRL and contained in Exhibit 101)
+	Management contract or compensatory plan or arrangement
*	Filed with this Report
**	Furnished with this Report

Item 16. Form 10-K Summary

None.

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 27th day of January 2021.

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 27th day of January 2021, by the following persons and in the capacities indicated.

Signature	Title
Kathy J. Warden*	Chairman, Chief Executive Officer and President (Principal Executive Officer), and Director
David F. Keffer*	Corporate Vice President and Chief Financial Officer (Principal Financial Officer)
Michael A. Hardesty	Corporate Vice President, Controller and Chief Accounting Officer
David P. Abney*	Director
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

Group Personal Excess Liability Policy

CHUBB®

Coverage Summary

Chubb Group of Insurance Companies ***PO BOX 1600,***
Whitehouse Station, NJ 08889-1600

Name and address of Insured

NORTHROP GRUMMAN CORPORATION
Group Personal Excess Program
2980 FAIRVIEW PARK DRIVE
FALLS CHURCH, VIRGINIA 22042

Policy Number: (21) 7993-14-03

Issued by the stock insurance company indicated below, herein called the company.

FEDERAL INSURANCE COMPANY

Producer No.: 0017806 *Incorporated under the laws of INDIANA*

Sponsoring Organization and Address

Northrop Grumman Corporation
2980 Fairview Park Drive
Falls Church, VA 22042

Policy Period

From: JANUARY 01, 2020 To: JANUARY 01, 2021
12:01 A.M. Standard Time at the Named insured's mailing address.

Premium

Amount
$

Limit Of Liability

SEE ENDT Each Occurrence
SEE ENDT Excess Uninsured / Underinsured Motorists Protection Each Occurrence

Required Primary Underlying Insurance

Personal Liability (Homeowners) for personal injury and property damage in the minimum amount of $100,000 each occurrence.

Registered vehicles in the minimum amount of $250,000 / $500,000 bodily injury and $100,000 property damage; or $300,000 single limit each occurrence.

Required Primary Underlying Insurance
(continued)

Unregistered vehicles in the minimum amount of $300,000 bodily injury and property damage each occurrence.

Registered vehicles with less than four wheels and motorhomes in the minimum amount $250,000 / $500,000 bodily injury and $100,000 property damage; or $300,000 single limit each occurrence.

Watercraft less than 26 feet and 50 engine rated horsepower or less for bodily and property damage in the minimum amount of $100,000 each occurrence.

Watercraft 26 feet or longer or more than 50 engine rated horsepower for bodily injury and property damage in the minimum amount of $500,000 each occurrence.

Uninsured motorists/underinsured motorists protection in the minimum amount of $250,000 / $500,000 bodily injury and $100,000 property damage; or $300,000 single limit occurrence.

FAILURE TO COMPLY WITH THE REQUIRED PRIMARY UNDERLYING INSURANCE WILL RESULT IN A GAP IN COVERAGE.

CHUBB®

Group Personal Excess Liability Policy

Coverage Summary

Effective Date JANUARY 01, 2020

Policy Number 7993-14-03

Authorization

In Witness Whereof, the company issuing this policy has caused this policy to be signed by its authorized officers and signed by a duly authorized representative of the company.

FEDERAL INSURANCE COMPANY

President Secretary

Date

JANUARY 28, 2020 Authorized Representative

Producer's Name & Address

MARSH USA INC (PHILADELPHIA)
1717 ARCH STREET 1100
PHILADELPHIA, PA 19103-0000

Chubb. Insured.

Schedule of Forms

CHUBB®

Policy Number: (21) 7993-14-03
Insured: NORTHROP GRUMMAN CORPORATION
Group Personal Excess Program

Policy Period From: JANUARY 01, 2020 to JANUARY 01, 2021

The following is a schedule of forms issued with the policy at inception:

Form Name	Form Number
PRIVACY NOTICE - GROUP MASTER POL	10-02-1058 (10/16)
IMPORTANT NOTICE - OFA	99-10-0796 (09/04)
AOD POLICYHOLDER NOTICE	99-10-0872 (06/07)
COVERAGE SUMMARY/DECLARATIONS	10-02-0690 (08/07)
GROUP PERSONAL EXCESS - CONTRACT/POLICY TERMS	10-02-0691 (07 /16)
NAMED INSURED ENDORSEMEN	10-02-0692 (08/96)
UNDERLYING LIMITS ENDORSEMEN	10-02-0692 (08/96)
ANNUAL PREMIUM ADJUSTMENT CLAUSE	10-02-0692 (08/96)

GROUP PERSONAL EXCESS LIABILITY *POLICY*

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CHUBB

GROUP PERSONAL EXCESS LIABILITY POLICY

INTRODUCTION

This is your Chubb Group Personal Excess Liability Policy. Together with your Coverage Summary, it explains your coverages and other conditions of your insurance in detail.

This policy is a contract between you and us. READ YOUR POLICY CAREFULLY and keep it in a safe place.

Agreement

We agree to provide the insurance described in this policy in return for the premium paid by you or the Sponsoring Organization and your compliance with the policy conditions.

Definitions

In this policy, we use words in their plain English meaning. Words with special meanings are defined in the part of the policy where they are used. The few defined terms used throughout the policy are defined here:

You means the individual who is a member of the Defined Group shown as the Insured named in the Coverage Summary.

Spouse means a partner in marriage or a partner in a civil union recognized under state law and who lives with you.

We and **us** mean the insurance company named in the Coverage Summary.

Family member means your spouse or domestic partner or other relative who lives with you, or any other person under 25 in your care or your relative's care who lives with you.

Domestic partner means a person in a legal or personal relationship with you, who lives with you and shares a common domestic life with you, and meeting all of the benefits eligibility criteria as defined by the Sponsoring Organization.

Sponsoring Organization means the entity, corporation, partnership or sole proprietorship sponsoring and defining the criteria for qualification as an Insured.

Policy means your entire Group Personal Excess Liability Policy, including the Coverage Summary.

Coverage Summary means the most recent Coverage Summary we issued to you, including any endorsements.

Occurrence means an accident or offense to which this insurance applies and which begins within the policy period. Continuous or repeated exposure to substantially the same general conditions unless excluded is considered to be one occurrence.

Business means any employment, trade, occupation, profession, or farm operation including the raising or care of animals or any activities intended to realize a benefit or financial gain engaged in on a full-time, part-time or occasional basis.

Defined Group means those individuals meeting the criteria for qualification as an Insured as defined by the Sponsoring Organization and accepted by us.

Follow form means we cover damages to the extent they are both covered under the Required Primary Underlying Insurance and, not excluded under this policy. Also, the amount of coverage, defense coverages, cancellation and "other insurance" provisions of this policy supersede and replace the similar provisions contained in such other policies. When this policy is called upon to pay losses in excess of required primary underlying policies exhausted by payment of claims, we do not provide broader coverage than provided by such policies. When no primary underlying coverage exists, the extent of coverage provided on a follow form basis will be determined as if the required primary underlying insurance had been purchased from us.

Covered person means:

- you or a family member;
- any person using a vehicle or watercraft covered under this policy with permission from you or a family member with respect to their legal responsibility arising out of its use;
- any other person who is a covered person under your Required Primary Underlying Insurance;
- any person or organization with respect to their legal responsibility for covered acts or omissions of you or a family member; or
- any combination of the above.

Definitions

(continued)

Damages mean the sum that is paid or is payable to satisfy a claim settled by us or resolved by judicial procedure or by a compromise we agree to in writing.

Personal injury means the following injuries, and resulting death:

- bodily injury;
- shock, mental anguish, or mental injury;
- false arrest, false imprisonment, or wrongful detention;
- wrongful entry or eviction;
- malicious prosecution or humiliation; and
- libel, slander, defamation of character, or invasion of privacy.

Bodily injury means physical bodily harm, including sickness or disease that results from it, and required care, loss of services and resulting death.

Property damage means physical injury to or destruction of tangible property and the resulting loss of its use. Tangible property includes the cost of recreating or replacing stocks, bonds, deeds, mortgages, bank deposits, and similar instruments , but does not include the value represented by such instruments. Tangible property does not include the cost of recreating or replacing any software, data or other information that is in electronic form.

Registered vehicle means any motorized land vehicle not described in "unregistered vehicle."

Unregistered vehicle means:

- any motorized land vehicle not designed for or required to be registered for use on public roads;
- any motorized land vehicle which is in dead storage at your residence;
- any motorized land vehicle used solely on and to service your residence premises;
- any motorized land vehicle used to assist the disabled that is not designed for or required to be registered for use on public roads; or
- golf carts.

GROUP PERSONAL EXCESS COVERAGE

This part of your Group Personal Excess Liability Policy provides you or a family member with liability coverage in excess of your underlying insurance anywhere in the world unless stated otherwise or an exclusion applies.

Payment for a Loss

Amount of coverage

The amount of coverage for liability is shown in the Coverage Summary. We will pay on your behalf up to that amount for covered damages from any one occurrence, regardless of how many claims, homes, vehicles, watercraft, or people are involved in the occurrence.

Any costs we pay for legal expenses (see **Defense coverages)** are in addition to the amount of coverage.

Underlying Insurance

We will pay only for covered damages in excess of all underlying insurance covering those damages, even if the underlying coverage is for more than the minimum amount.

"Underlying insurance" includes all liability coverage that applies to the covered damages, except for other insurance purchased in excess of this policy.

Required primary underlying insurance

Regardless of whatever other primary underlying insurance may be available in the event of a claim or loss, it is a condition of your policy that you and your family members must maintain in full effect primary underlying liability insurance of the types and in at least the amounts set forth below unless a different amount is shown in your Coverage Summary, covering your personal liability and to the extent you or a family member have such liability exposures, all vehicles and watercraft you or your family members own, or rent for longer than 60 days, or have furnished for longer than 60 days, as follows:

Personal liability (homeowners) for personal injury and property damage in the minimum amount of $300,000 each occurrence.

Payment for a Loss
(continued)

Registered vehicles in the minimum amount of:

- $250,000/$500,000 bodily injury and $100,000 property damage;
- $300,000/$300,000 bodily injury and $100,000 property damage; or
- $300,000 single limit each occurrence.

Unregistered vehicles in the minimum amount of $300,000 bodily injury and property damage each occurrence.

Registered vehicles with less than four wheels and motorhomes in the minimum amount of:

- $250,000/$500,000 bodily injury and $100,000 property damage;
- $300,000/$300,000 bodily injury and $100,000 property damage; or
- $300,000 single limit each occurrence.

Watercraft less than 26 feet and 50 engine rated horsepower or less for bodily injury and property damage in the minimum amount of $300,000 each occurrence.

Watercraft 26 feet or longer or more than 50 engine rated horsepower for bodily injury and property damage in the minimum amount of $500,000 each occurrence.

Uninsured motorists/underinsured motorist protection in the minimum amounts of:

- $250,000/$500,000 bodily injury and $100,000 property damage;
- $300,000/$300,000 bodily injury and $100,000 property damage; or
- $300,000 single limit each occurrence.

With respect to you and your family members residing outside of the United States, the required primary underlying insurance limits of liability shall be the same limits of liability as shown above, unless you and your family members reside in a country where the minimum required primary underlying insurance limits of liability are not available. In these countries, you and your family members must maintain in full effect primary underlying liability insurance limits equal to the maximum limits of liability available in that country for all coverages up to the minimum required primary underlying limits shown in the Coverage Summary under Required Primary Underlying Insurance.

Failure by you or your family members to comply with this condition, or failure of any of your primary underlying insurers due to insolvency or bankruptcy, shall not invalidate this policy. In the event of any such failure, we shall only be liable in excess of the foregoing minimum amounts and to no greater extent with respect to coverages, amounts and defense costs than we would have been had this failure not occurred.

You must also give notice of losses and otherwise cooperate and comply with the terms and conditions of such primary underlying insurance.

Group Personal Excess Liability Coverage

We cover damages a covered person is legally obligated to pay for personal injury or property damage, caused by an occurrence:

- in excess of damages covered by the underlying insurance; or
- from the first dollar of damage where no underlying insurance is required under this policy and no underlying insurance exists; or
- from the first dollar of damage where underlying insurance is required under this policy but no coverage is provided by the underlying insurance for a particular occurrence;

unless stated otherwise or an exclusion applies. Exclusions to this coverage are described in **Exclusions.**

Excess uninsured motorists/underinsured motorist protection

This coverage is in effect only if excess uninsured motorists/underinsured motorists protection is shown in the Coverage Summary.

We cover damages for bodily injury and property damage a covered person is legally entitled to receive from the owner or operator of an uninsured motorized/underinsured motorized land vehicle. We cover these damages in excess of the underlying insurance or the Required Primary Underlying Insurance, whichever is greater, if they are caused by an occurrence during the policy period, unless otherwise stated.

Amount of coverage. The maximum amount of excess uninsured motorists/underinsured motorists protection available for any one occurrence is the excess uninsured motorists/underinsure d motorists protection amount shown in the Coverage Summary regardless of the number of vehicles covered by the Required Primary Underlying Insurance. We will not pay more than this amount in any one occurrence for covered damages regardless of how many claims, vehicles or people are involved in the occurrence. This coverage will follow form.

Uninsured motorists/underinsured motorists protection arbitration

If we and a covered person disagree whether that person is legally entitled to recover damages from the owner or operator of an uninsured motor vehicle/underinsured motor vehicle, or do not agree as to the amount of damages, either party may make a written demand for arbitration. In this event, each party will select an arbitrator. The two arbitrators will select a third. If they cannot agree on a third arbitrator within 45 days, either may request that the arbitration be submitted to the American Arbitration Association. When the covered person's recovery exceeds the minimum limit specified in the applicable jurisdiction's financial responsibility law, each party will pay the expenses it incurs, and bear the expenses of the third arbitrator equally. Otherwise, we will bear all the expenses of the arbitration.

Unless both parties agree otherwise, arbitration will take place in the county and state in which the covered person lives. Local rules of law as to procedure and evidence will apply. A decision agreed to by two arbitrators will be binding unless the recovery amount for bodily injury exceeds the minimum limit specified by the applicable jurisdiction's financial responsibility law. If the amount exceeds that limit, either party may demand the right to a trial. This demand must be made within 60 days of the arbitrator's decision. If this demand is not made, the amount of damages agreed to by the arbitrators will be binding.

Uninsured/underinsured liability coverage

This coverage is in effect only if excess uninsured motorists/underinsured motorists protection is shown in the Coverage Summary.

We cover up to a maximum of $1 million for bodily injury and personal injury you or a family member are legally entitled to receive from an uninsured or underinsured negligent person caused by an occurrence, unless stated otherwise or an exclusion applies. We will not pay more than this amount for covered damages from any one occurrence, regardless of how many claims or people are involved in the occurrence. This coverage is excess over the total of any other collectible insurance that covers damages from the occurrence.

All the exclusions under the Group Personal Excess Liability Coverage are applicable to this Uninsured/underinsured liability coverage, and where used, the definition of you or a family member is extended to include negligent person. This coverage also does not apply to damages from an occurrence arising out of any business activities; any activities involving business property or the sale or transfer of property; or the ownership, maintenance, use, loading, unloading, or towing of any motor vehicle, watercraft, or aircraft. In addition, this coverage does not apply to damages from an occurrence arising from any employment related harassment, termination, demotion, breach of an oral or written employment contract or agreement or violation of any state or federal wrongful employment practices act or similar law.

We also do not cover any fines, penalties, taxes, punitive, exemplary or multiplied damages, or any claim or suit seeking non monetary relief, including but not limited to, injunctive relief, declaratory relief or other equitable remedies.

"Negligent person" means an identifiable natural person by legal name who is not a family member, and who is legally responsible for damages sustained by you or a family member caused by an occurrence.

Duplication of coverage. We will not make a duplicate payment for any portion of damages for which payment has been made by or on behalf of persons who may be legally responsible, or otherwise covered by any other collectible insurance. Nor will we pay for any portion of damages if you or a family member is entitled to receive payment for the same portion of damages under any workers' compensation law, disability benefits law or similar law.

Group Personal Excess Liability Coverage
(continued)

Defense coverages

We will defend a covered person against any suit seeking covered damages for personal injury or property damage that is either:

- not covered by any underlying insurance; or
- covered by an underlying policy. This will apply to each Defense Coverage as it has been exhausted by payment of claims.

We provide this defense at our expense, with counsel of our choice, even if the suit is groundless, false, or fraudulent. We may investigate, negotiate, and settle any such claim or suit at our discretion.

As part of our investigation, defense, negotiation, or settlement, we will pay:

- all premiums on appeal bonds required in any suit we defend;
- all premiums on bonds to release attachments for any amount up to the amount of coverage (but we are not obligated to apply for or furnish any bond);
- all expenses incurred by us;
- all costs taxed against a covered person;
- all interest accruing after a judgment is entered in a suit we defend on only that part of the judgment we are responsible for paying. We will not pay interest accruing after we have paid the judgment up to the amount of coverage;
- all prejudgment interest awarded against a covered person on that part of the judgment we pay or offer to pay.

We will not pay any prejudgment interest based on that period of time after we make an offer to pay the amount of coverage;

- all earnings lost by each covered person at our request, up to $25,000;
- other reasonable expenses incurred by a covered person at our request; and
- the cost of bail bonds required of a covered person because of a covered loss.

In jurisdictions where we may be prevented by local law from carrying out these Defense Coverages, we will pay only those defense expenses that we agree in writing to pay and that are incurred by you.

Extra Coverages

In addition to covering damages and defense costs, we also provide other related coverages. These coverages are in addition to the amount of coverage for damages and defense costs unless stated otherwise.

Shadow defense coverage

If we are defending you or a family member in a suit seeking covered damages, we will pay reasonable expenses you or a family member incur up to $10,000 or the amount shown in the Coverage Summary for a law firm of your choice to review and monitor the defense. However any recommendation by your person l attorney is not binding on us. We will pay these costs provided that you obtain prior approval from us before incurring any fees or expenses.

Identity fraud

We will pay for your or a family member's identity fraud expenses, up to a maximum of $25,000, for each identity fraud occurrence.

"Identity fraud" means the act of knowingly transferring or using, without lawful authority, your or a family member's means of identity which constitutes a violation of federal law or a crime under any applicable state or local law.

"Identity fraud occurrence" means any act or series of acts of identity fraud by a person or group commencing in the policy period.

"Identity fraud expenses" means:

- the costs for notarizing affidavits or similar documents for law enforcement agencies, financial institutions or similar credit grantors, and credit agencies;
- the costs for sending certified mail to law enforcement agencies, financial institutions or similar credit grantors, and credit agencies;

Extra Coverages

(continued)

- the loan application fees for reapplying for loan(s) due to the rejection of the original application because the lender received incorrect credit information;
- the telephone expenses for calls to businesses, law enforcement agencies, financial institutions or similar credit grantors, and credit agencies;
- earnings lost by you or a family member as a result of time off from work to complete fraud affidavits, meet with law enforcement agencies, credit agencies, merchants, or legal counsel;
- the reasonable attorney fees incurred with prior notice to us for:
- the defense of you or a family member against any suit(s) by businesses or their collection agencies;
- the removal of any criminal or civil judgements wrongly entered against you or a family member;
- any challenge to the information in your or a family member's consumer credit report; and
- the reasonable fees incurred with prior notice to us by an identity fraud mitigation entity to:
- provide services for the activities described above;
- restore accounts or credit standing with financial institutions or similar credit grantors and credit agencies; and
- monitor for up to one year the effectiveness of the fraud mitigation and to detect additional identity fraud activity after the first identify fraud occurrence.

However, such monitoring must begin no later than one year after you or a family member first report an identity fraud occurrence to us.

However, "identity fraud expenses" does not include expenses incurred due to any fraudulent, dishonest or criminal act by a covered person or any person acting with a covered person, or by any authorized representative of a covered person, whether acting alone or in collusion with others.

"Identity fraud mitigation entity" means a company that principally provides professional, specialized services to counter identity fraud for individuals or groups of individuals, or a financial institution that provides similar services.

In addition to the duties described in Policy Terms, Liability Conditions, Your duties after a loss, you shall notify an applicable law enforcement agency.

Kidnap expenses

We will pay up to a maximum of $100,000 for kidnap expenses you or a family member incurs solely and directly as a result of a kidnap and ransom occurrence. In addition, we also will pay up to $25,000 to any person for information not otherwise available leading to the arrest and conviction of any person(s) who kidnaps you, a family member or a covered relative. The following are not eligible to receive this reward payment:

- you or a family member; or
- a covered relative who witnessed the occurrence.

"Kidnap and ransom occurrence" means the actual or alleged wrongful taking of:

- you;
- one or more family members; or
- one or more covered relatives while visiting or legally traveling with you or a family member;
- from anywhere in the world except those places listed on the United States State Department Bureau of Consular Affairs Travel Warnings list at the time of the occurrence. The occurrence must include a demand for ransom payment which would be paid by you or a family member in exchange for the release of the kidnapped person(s).

"Kidnap expenses" means the reasonable costs for:

- a professional negotiator;
- a professional security consultant;
- professional security guard services;
- a professional public relations consultant;
- travel, meals, lodging and phone expenses incurred by you or a family member;
- advertising, communications and recording equipment;
- related medical, cosmetic, psychiatric and dental expenses incurred by a kidnapped person within 12 months from that person's release;
- attorneys fees;
- a professional forensic analyst;
- earnings lost by you or a family member, up to $25,000.

However, "kidnap expenses" does not include expenses incurred due to any kidnap and ransom occurrence caused by:

- you or a family member;
- a covered relative;
- any guardian, or former guardian of you, a family member or covered relative;
- any estranged spouse or domestic partner, or former spouse or domestic partner of you or a family member;
- any person unrelated to you or a family member who lives with you or a family member or has ever lived with you or a family member for 6 or more months, other than a domestic employee, residential staff, or a person employed by you or a family member for farm work; or
- a civil authority,

or any person acting on behalf of any of the above, whether acting alone or in collusion with others.

"Covered relative" means the following relatives of you, or a spouse or domestic partner who lives with you, or any family member:

- children, their children or other descendents of theirs;
- parents, grandparents or other ancestors of theirs; or
- siblings, their children or other descendents of theirs;

who do not live with you, including spouses or domestic partners of all of the above. Parents, grandparents and other ancestors include adoptive parents, stepparents and stepgrandparents.

Reputational injury. If we are defending you or a family member in a suit seeking covered damages, we will pay reasonable and necessary fees or expenses that you or a family member incur for services provided by a reputation management firm to minimize potential injury to the reputation of you or a family member solely as a result of personal injury or property damage, caused by an occurrence if:

- the reputational injury is reported to us as soon as reasonably possible but not later than 30 days after the personal injury or property damage occurrence; and
- you obtain approval of the reputation management firm from us before incurring any fees or expenses, unless stated otherwise or an exclusion applies. There is no deductible for this coverage.

A Reputation management firm means a professional public relations consulting firm, a professional security consulting firm or a professional media management consulting firm.

The maximum amount of coverage for Reputational injury available for any one occurrence is $25,000 or the amount shown in the Coverage Summary. We will not pay more than this amount in any one occurrence for covered damages regardless of how many claims or people are involved in the occurrence.

The maximum annual amount of coverage for Reputational injury shown in the Coverage Summary is the most we will pay for the sum of all covered damages you or a family member incur during the policy period regardless of the number of claims, people, or occurrences.

This coverage does not apply to loss caused by a wrongful employment act covered by Employment Practices Liability Insurance.

Exclusions

These exclusions apply to your Group Personal Excess Liability Coverage, unless stated otherwise.

Aircraft. We do not cover any damages arising out of the ownership, maintenance, use, loading, unloading, or towing of any aircraft, except aircraft chartered with crew by you. We do not cover any property damages to aircraft rented to, owned by, or in the care, custody or control of a covered person.

Hovercraft. We do not cover any damages arising out of the ownership, maintenance, use, loading, unloading or towing of any hovercraft. We do not cover any property damages to hovercraft rented to, owned by, or in the care, custody or control of a covered person.

Exclusions
(continued)

Motorized land vehicle racing or track usage. We do not cover any damages arising out of the ownership, maintenance or use of any motorized land vehicle:
- during any instruction, practice, preparation for, or participation in, any competitive, prearranged or organized racing, speed contest, rally, gymkhana, sports event. stunting activity, or timed event of any kind; or
- on a racetrack, test track or other course of any kind.

Watercraft and aircraft racing or track usage. We do not cover any damages arising out of the ownership, maintenance or use of any watercraft or aircraft during any instruction, practice, preparation for or participation in, any competitive prearranged or organized racing speed contest, rally, sports event, stunting activity or timed event of any kind. This exclusion does not apply to you or a family member for sailboat racing even if the sailboat is equipped with an auxiliary motor.

Motorized land vehicle-related jobs. We do not cover any damages arising out of the ownership, maintenance, or use of a motorized land vehicle by any person who is employed or otherwise engaged in the business of selling, repairing, servicing, storing, parking, testing, or delivering motorized land vehicles. This exclusion does not apply to you, a family member, or your employee or an employee of a family member for damages arising out of the ownership, maintenance or use of a motorized land vehicle owned by, rented to, or furnished to you or a family member.

Watercraft related jobs. We do not cover any damages arising out of the ownership, maintenance, or use of a watercraft by any person who is engaged by or employed by, or is operating a marina, boat repair yard, shipyard, yacht club, boat sales agency, boat service station, or other similar organization. This exclusion does not apply to damages arising out of the ownership, maintenance, or use of a watercraft by you, a family member, or your or a family member's captain or full time paid crew member maintaining or using this watercraft with permission from you or a family member.

Motorized land vehicle and watercraft loading. We do not cover any person or organization, other than you or a family member or your or a family member's employees, with respect to the loading or unloading of motorized land vehicles or watercraft.

Workers' compensation or disability, We do not cover any damages a covered person is legally:
- required to provide; or
- voluntarily provides

under any:
- workers' compensation;
- disability benefits;
- unemployment compensation; or
- other similar laws.

But we do provide coverage in excess over any other insurance for damages you or a family member is legally required to pay for bodily injury to a domestic employee of a residence covered under the Required Primary Underlying Insurance which are not compensable under workers' compensation, unless another exclusion applies.

Director's liability, We do not cover any damages for any covered person's actions or failure to act as an officer or member of a board of directors of any corporation or organization. However, we do cover such damages if you are or a family member is an officer or member of a board of directors of a:
- homeowner, condominium or cooperative association; or
- not for profit corporation or organization for which he or she is not compensated; unless another exclusion applies.

Damage to covered person's property. We do not cover any person for property damage to property owned by any covered person.

Damage to property in **your care.** We do not cover any person for property damage to property rented to, occupied by, used by, or in the care of any covered person, to the extent that the covered person is required by contract to provide insurance. But we do cover such damages for loss caused by fire, smoke, or explosion unless another exclusion applies.

Wrongful employment act. We do not cover any damages arising out of a wrongful employment act. A wrongful employment act means any employment discrimination, sexual harassment, or wrongful termination of any residential staff actually or allegedly committed or attempted by a covered person while acting in the capacity as an employer, that violates applicable employment law of any federal, state, or local statute, regulation, ordinance, or common law of the United States of America, its territories or possessions, or Puerto Rico.

Employment discrimination as it relates solely to a wrongful employment act means a violation of applicable employment discrimination law protecting any residential staff based on his or her race, color, religion, creed, age, sex, disability, national origin or other status according to any federal, state, or local statute, regulation, ordinance, or common law of the United States of America, its territories or possessions, or Puerto Rico.

Sexual harassment as it relates solely to a wrongful employment act means unwelcome sexual advances, requests for sexual favors, or other conduct of a sexual nature that:

- is made a condition of employment of any residential staff;
- is used as a basis for employment decisions;
- interferes with performance of any residential staffs duties; or
- creates an intimidating, hostile, or offensive working environment.

Wrongful termination as it relates solely to a wrongful employment act means:

- the actual or constructive termination of employment of any residential staff by you or a family member in violation of applicable employment law; or
- breach of duty and care when you or a family member terminates an employment relationship with any residential staff.

Residential staff as it relates solely to a wrongful employment act means your or a family member's employee who is:

- employed by you or a family member, or through a firm under an agreement with you or a family member, to perform duties related only to a covered person's domestic, personal, or business pursuits covered under this part of your policy;
- compensated for labor or services directed by you or a family member; and
- employed regularly to work 15 or more hours per week.

Residential staff includes a temporary worker. Residential staff does not include an independent contractor or any covered person.

Temporary worker as it relates solely to a wrongful employment act means your or a family member's employee who is:

- employed by you or a family member, or through a firm under an agreement with you or a family member, to perform duties related only to a covered person's domestic, personal, or business pursuits covered under this part of your policy;
- compensated for labor or services directed by you or a family member; and
- employed to work 15 or more hours per week to substitute for any residential staff on leave or to meet seasonal or short- term workload demands for 30 consecutive days or longer during a 6 month period.

Temporary worker does not include an independent contractor or any covered person.

Discrimination. We do not cover any damages arising out of discrimination due to age, race, color, sex, creed, national origin, or any other discrimination.

Intentional acts. We do not cover any damages arising out of a willful, malicious, fraudulent or dishonest act or any act intended by any covered person to cause personal injury or property damage, even if the injury or damage is of a different degree or type than actually intended or expected. But we do cover such damages if the act was intended to protect people or property unless another exclusion applies. An intentional act is one whose consequences could have been foreseen by a reasonable person.

Molestation, misconduct or abuse. We do not cover any damages arising out of any actual, alleged or threatened:

- sexual molestation;
- sexual misconduct or harassment; or
- abuse.

Nonpermissive use. We do not cover any person who uses a motorized land vehicle or watercraft without permission from you or a family member.

Exclusions
(continued)

Business pursuits. We do not cover any damages arising out of a covered person's business pursuits, investment or other for-profit activities, for the account of a covered person or others, or business property except on a follow form basis.

But we do cover damages arising out of volunteer work for an organized charitable, religious or community group, an incidental business away from home, incidental business at home, incidental business property, incidental farming, or residence premises conditional business liability unless another exclusion applies. We also cover damages arising out of your or a family member's ownership, maintenance, or use of a private passenger motor vehicle in business activities other than selling, repairing, servicing, storing, parking, testing, or delivering motorized land vehicles.

Unless stated otherwise in your Coverage Summary:

"Incidental business away from home" is a self-employed sales activity, or a self-employed business activity normally undertaken by person under the age of 18 such as newspaper delivery, babysitting, caddying, and lawn care. Either of these activities must:

- not yield gross revenues in excess of $15,000 in any year;
- have no employees subject to worker's compensation or other similar disability laws;
- conform to local, state, and federal laws.

"Incidental business at home" is a business activity, other than farming, conducted on your residence premises which must:

- not yield gross revenues in excess of $15,000, in any year, except for the business activity of managing one's own personal investments;
- have no employees subject to worker's compensation or other similar disability laws;
- conform to local, state, and federal laws.

"Incidental business property" is limited to the rental or holding for rental, to be used as a residence, of a condominium or cooperative unit owned by you or a family member, an apartment unit rented to you or a family member, a one or two family dwelling owned by you or a family member, or a three or four family dwelling owned and occupied by you or a family member. We provide this coverage only for premises covered under the Required Primary Underlying Insurance unless the rental or holding for rental is for:

- a residence of yours or a family member's that is occasionally rented and that is used exclusively as a residence; or
- part of a residence of yours or a family member's by one or two roomers or boarders; or
- part of a residence of yours or a family member's as an office, school, studio, or private garage.

"Incidental farming" is a farming activity which meets all of the following requirements:

- is incidental to your or a family member's use of the premises as a residence;
- does not involve employment of others for more than 1,500 hours of farm work during the policy period;
- does not produce more than $25,000 in gross annual revenue from agricultural operations;
- and with respect to the raising or care of animals:
- does not produce more than $50,000 in gross annual revenues;
- does not involve more than 25 sales transactions during the policy period;
- does not involve the sale of more than 50 animals during the policy period.

"Residence premises conditional business liability" is limited to business or professional activities when legally conducted by you or a family member at your residence. We provide coverage only for personal injury or property damage arising out of the physical condition of that residence if:

- you or a family member do not have any employees involved in your business or professional activities who are subject to workers' compensation or other similar disability laws; or, if you or a family member are a doctor or dentist, you do not have more than two employees subject to such laws;
- you or a family member do not earn annual gross revenues in excess of $5,000, if you or a family member are a home day care provider.

We do not cover damages or consequences resulting from business or professional care or services performed or not performed.

Exclusions
(continued)

The following additional exclusion applies only to "incidental farming" as described under the exclusion, Business pursuits.

Contamination. We do not cover any actual or alleged damages arising out of the discharge, dispersal, seepage, migration or release or escape of pollutants. Nor do we cover any cost or expense arising out of any request, demand or order to:

- extract pollutants from land or water;
- remove, restore or replace polluted or contaminated land or water; or
- test for, monitor, clean up, remove, contain, treat, detoxify or neutralize pollutants, or in any way respond to or assess the effects of pollutants.

However, this exclusion does not apply if the discharge, dispersal, seepage, migration, release or escape is sudden and accidental. A "pollutant" is any solid, liquid, gaseous or thermal irritant or contaminant, including smoke (except smoke from a hostile fire), vapor, soot, fumes, acids, alkalis, chemicals and waste. A "contaminant" is an impurity resulting from the mixture of or contact of a substance with a foreign substance. "Waste" includes materials to be disposed of, recycled, reconditioned or reclaimed.

Financial guarantees. We do not cover any damages for any covered person's financial guarantee of the financial performance of any covered person, other individual or organization.

Professional services. We do not cover any damages for any covered person's performing or failure to perform professional services, or for professional services for which any covered person is legally responsible or licensed.

Acts of war. We do not cover any damages caused directly or indirectly by war, undeclared war, civil war, insurrection, rebellion, revolution, warlike acts by military forces or personnel, the destruction or seizure of property for a military purpose, or the consequences of any of these actions.

Contractual liability. We do not cover any assessments charged against a covered person as a member of a homeowners, condominium or cooperative association. We also do not cover any damages arising from contracts or agreements made in connection with any covered person's business. Nor do we cover any liability for unwritten contracts, or contracts in which the liability of others is assumed after a covered loss.

Covered person's or dependent's personal injury. We do not cover any damages for personal injury for any covered person or their dependents where the ultimate beneficiary is the offending party or defendant. We also do not cover any damages for personal injury for which you can be held legally liable, in any way, to a family member, your spouse or domestic partner or for which a family member, your spouse or domestic partner can be held legally liable, in any way, to you.

However, we do cover damages for bodily injury arising out of the use of a motorized land vehicle for which you can be held legally liable to a family member, your spouse or domestic partner or for which a family member, your spouse or domestic partner can be held legally liable to you to the extent that coverage is provided under this policy. This coverage applies only to the extent such damages are covered by primary underlying insurance and exceed the limits of insurance required for that motorized land vehicle under the Required Primary Underlying Insurance provisions of this policy.

Liability for dependent care. We do not cover any damages for personal injury for which a covered person's only legal liability is by virtue of a contract or other responsibility for a dependent's care.

Illness. We do not cover personal injury or property damage resulting from any illness, sickness or disease transmitted intentionally or unintentionally by a covered person to anyone, or any consequence resulting from that illness, sickness or disease. We also do not cover any damages for personal injury resulting from the fear of contracting any illness, sickness or disease, or any consequence resulting from the fear of contracting any illness, sickness or disease.

Fungi and mold. We do not cover any actual or alleged damages or medical expenses arising out of mold, the fear of mold, or any consequences resulting from mold or the fear of mold. "Mold" means fungi, mold, mold spores, mycotoxins, and the scents and other byproducts of any of these.

Exclusions
(continued)

Nuclear or radiation hazard. We do not cover any damages caused directly or indirectly by nuclear reaction, radiation, or radioactive contamination, regardless of how it was caused.

POLICY TERMS

This part of your Group Personal Excess Liability Policy explains the conditions that apply to your policy.

General Conditions

These conditions apply to your policy in general, and to each coverage provided in the policy.

Policy period

The effective dates of your policy are shown in the Coverage Summary. Those dates begin at 12:01 a.m. standard time at the mailing address shown.

All coverages on this policy apply only to occurrences that take place while this policy is in effect.

Transfer of rights

If we make a payment under this policy, we will assume any recovery rights a covered person has in connection with that loss, to the extent we have paid for the loss.

All of your rights of recovery will become our rights to the extent of any payment we make under this policy. A covered person will do everything necessary to secure such rights; and do nothing after a loss to prejudice such rights. However, you may waive any rights of recovery from another person or organization for a covered loss in writing before the loss occurs.

Concealment or fraud

We do not provide coverage if you or any covered person has intentionally concealed or misrepresented any material fact relating to this policy before or after a loss.

Application of coverage

Coverage applies separately to each covered person. However, this provision does not increase the amount of coverage for any one occurrence.

Assignment

You cannot transfer your interest in this policy to anyone else unless we agree in writing to the transfer.

Policy changes

This policy can be changed only by a written amendment we issue.

Bankruptcy or insolvency

We will meet all our obligations under this policy regardless of whether you, your estate, or anyone else or their estate becomes bankrupt or insolvent.

In case of death

In the event of your death, coverage will be provided until the end of the policy period or policy anniversary date, whichever occurs first, for any surviving member of your household who is a covered person at the time of death. We will also cover your legal representative or any person having proper temporary custody of your property.

Liberalization

We may extend or broaden the coverage provided by this policy. If we do this during the policy period or within 60 days before it begins, without increasing the premium, then the extended or broadened coverage will apply to occurrences after the effective date of the extended or broadened coverage.

Conforming to state law

If any provision of this policy conflicts with any applicable laws of the state you live in, this policy is amended to conform to those laws.

Conforming to trade sanction laws

This policy does not apply to the extent that trade or economic sanctions or other laws or regulations prohibit us from providing insurance.

Liability Conditions

These conditions apply to all liability coverages in this policy.

Other Insurance

This insurance is excess over any other insurance except for those policies that

- are written specifically to cover excess over the amount of coverage that applies in this policy; and
- schedule this policy as underlying insurance.

Your duties after a loss

In case of an accident or occurrence, the covered person shall perform the following duties that apply:

Notification. You must notify us or your agent or broker as soon as possible.

Assistance. You must provide us with all available information. This includes any suit papers or other documents which help us in the event that we defend you.

Cooperation. You must cooperate with us fully in any legal defense. This may include any association by us with the covered person in defense of a claim reasonably likely to involve us.

Examination. A person making a claim under this policy must submit as often as we reasonably require:

- to physical exams by physicians we select, which we will pay for; and
- to examination under oath and subscribe the same; and authorize us to obtain:
- medical reports; and
- other pertinent records.

Appeals

If a covered person, or any primary insurer, does not appeal a judgment for covered damages, we may choose to do so. We will then become responsible for all expenses, taxable costs, and interest arising out of the appeal. However, the amount of coverage for damages will not be increased.

Special Conditions

In the event of conflict with any other conditions of your policy, these conditions supersede.

Legal action against us

You agree not to bring action against us unless you have first complied with all conditions of this policy.

You also agree not to bring any action against us until the amount of damages you are legally obligated to pay has been finally determined after an actual trial or appeal, if any, or by a written agreement between you, us and the claimant. No person or organization has any right under this policy to bring us into any action to determine the liability of a covered person.

Notice of cancellation and coverage termination conditions

The Sponsoring Organization may cancel this policy by returning it to us or notifying us in writing at any time subject to the following:

- the Sponsoring Organization must notify us in advance of the requested cancellation date; and
- the Sponsoring Organization must provide proof of notification to each member of the Defined Group covered under this policy.

We may cancel this policy or any part of it subject to the following conditions. Our right to cancel applies to each coverage or limit in this policy. In the event we cancel this policy, we are under no obligation to provide you with an opportunity to purchase equivalent coverage.

Special Conditions
(continued)

Within 60 days. When this policy or any part of it has been in effect for less than 60 days, we may cancel with 30 days notice for any reason.

Non payment of premium. We may cancel this policy or any part of it with 10 days notice if the Sponsoring Organization or you fail to pay the premium by the due date, regardless of whether the premium is payable to us, to our agent, or under any financial credit.

Misrepresentation. We may cancel this policy or any part of it with 30 days notice if the coverage was obtained through misrepresentation, fraudulent statements, or omissions or concealment of a fact that is relevant to the acceptance of the risk or to the hazard we assumed.

Increase in hazard. We may cancel this policy or any part of it with 30 days notice if there has been a substantial change in the risk which increases the chance of loss after insurance coverage has been issued or renewed, including but not limited to an increase in exposure due to rules, legislation, or court decision.

Procedure. To cancel this policy or any part of it, we must notify you in writing. This notice will be mailed to the Sponsoring Organization at the mailing address shown in the Coverage Summary and we will obtain a certificate of mailing. This notice will include the date the cancellation is to take effect.

Termination. Should an individual for any reason no longer qualify as a member of the Defined Group, coverage will cease sixty (60) days from the date that individual no longer qualifies as a member of the Defined Group, or the policy expiration or cancellation date, whichever comes first.

Refund. In the event of cancellation by the Sponsoring Organization or us, we will refund any unearned premium on the effective date of cancellation, or as soon as possible afterwards to the Sponsoring Organization. The unearned premium will be computed short rate for the unexpired term of the policy.

CHUBB®

GROUP EXCESS LIABILITY POLICY

ENDORSEMENT

Policy Period JANUARY 01, 2020 to JANUARY 01, 2021

Effective Date JANUARY 01, 2020

Policy Number (21) 7993-14-03

Insured NORTHROP GRUMMAN CORPORATION
Group Personal Excess Program

Name of Company FEDERAL INSURANCE COMPANY

Date Issued JANUARY 28, 2020

All Vice Presidents Non Officers designated by the company
of Northrop Grumman Corporation

$20,000,000 Limit of Liability
$ 5,000,000 UM/UIM Protection Limit

$15,000,000 Limit of Liability
$ 5,000,000 UM/UIM Protection Limit

$15,000,000 Limit of Liability
$ 3,000,000 UM/UIM Protection Limit

$15,000,000 Limit of Liability
$ 2,000,000 UM/UIM Protection Limit

$10,000,000 Limit of Liability
$ 5,000,000 UM/UIM Protection Limit

$10,000,000 Limit of Liability
$ 3,000,000 UM/UIM Protection Limit

$10,000,000 Limit of Liability
$ 2,000,000 UM/UIM Protection Limit

$ 5,000,000 Limit of Liability
$ 2,000,000 UM/UIM Protection Limit

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

Authorized Representative

CHUBB®

GROUP EXCESS LIABILITY POLICY

ENDORSEMENT

Policy Period JANUARY 01, 2020 to JANUARY 01, 2021

Effective Date JANUARY 01, 2020

Policy Number (21) 7993-14-03

Insured NORTHROP GRUMMAN CORPORATION
Group Personal Excess Program

Name of Company FEDERAL INSURANCE COMPANY

Date Issued JANUARY 28, 2020

UNDERLYING LIMITS ENDORSEMENT

IT IS HEREBY UNDERSTOOD AND AGREED THAT THE REQUIRED PRIMARY UNDERLYING LIABILITY INSURANCE LIMITS ARE AMENDED TO:

Personal Liability (Homeowners) for personal injury and property damage in the minimum amount of $100,000 each occurrence.

Registered vehicles in the minimum amount of:

$250,000/$500,000 bodily injury and $100,000 property damage;
$300,000/$300,000 bodily injury and $100,000 property damage; or
$300,000 single limit each occurrence.

Unregistered vehicles in the minimum amount of $300,000 bodily injury and property damage each occurrence.

Registered vehicles with less than four wheels and motorhomes in the minimum amount of:

$250,000/$500,000 bodily injury and $100,000 property damage;
$300,000/$300,000 bodily injury and $100,000 property damage; or
$300,000 single limit each occurrence.

Watercraft less than 26 feet and 50 engine rated horsepower or less for bodily injury and property damage in the minimum amount of $300,000 each occurrence.

Watercraft 26 feet or longer or more than 50 engine rated horsepower for bodily injury and property damage in the minimum amount of $500,000 each occurrence.

Uninsured motorists /underinsured motorist protection in the minimum amount of:

$250,000/$500,000 bodily injury and $100,000 property damage;
$300,000/$300,000 bodily injury and $100,000 property damage; or
$300,000 single limit each occurrence.

FAILURE TO COMPLY WITH THE REQUIRED PRIMARY UNDERLYING INSURANCE WILL RESULT IN A GAP IN COVERAGE.---

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

Authorized Representative

CHUBB®

GROUP EXCESS LIABILITY POLICY

ENDORSEMENT

Policy Period JANUARY 01, 2020 to JANUARY 01, 2021

Effective Date JANUARY 01, 2020

Policy Number (21) 7993-14-03

Insured NORTHROP GRUMMAN CORPORATION
Group Personal Excess Program

Name of Company FEDERAL INSURANCE COMPANY

Date Issued JANUARY 28, 2020

ANNUAL PREMIUM ADJUSTMENT CLAUSE

It is agreed that this policy is written with a deposit premium to be adjusted on either each policy anniversary or at policy expiration. The premium will be adjusted on the basis of the difference between the total number of participants at inception and the actual number of participants at each policy anniversary. This difference is to be multiplied by fifty percent (50%) of the annual rate per participant, resulting in either an additional or return premium.

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

Authorized Representative

Exhibit 21

NORTHROP GRUMMAN CORPORATION SUBSIDIARIES
Address for all subsidiaries is:
c/o NORTHROP GRUMMAN CORPORATION
Office of the Secretary
2980 Fairview Park Drive
Falls Church, Virginia 22042

Name of Subsidiary	Jurisdiction of Incorporation	Ownership Percentage
Northrop Grumman Systems Corporation	Delaware	100%
Northrop Grumman Overseas Holdings, Inc.	Delaware	100%

The company has additional subsidiaries, which do not constitute significant subsidiaries.

All the above listed subsidiaries have been consolidated in the company's consolidated financial statements.

EXHIBIT 23

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Northrop Grumman Corporation
2980 Fairview Park Drive
Falls Church, Virginia 22042

We consent to the incorporation by reference in Registration Statement Nos. 033-59815, 033-59853, 333-67266, 333-100179, 333-107734, 333-121104, 333-125120, 333-127317, and 333-175798 on Form S-8; and Registration Statement No. 333-237504 on Form S-3; of our reports dated January 27, 2021, relating to the financial statements of Northrop Grumman Corporation and subsidiaries, and the effectiveness of Northrop Grumman Corporation and subsidiaries' internal control over financial reporting, appearing in this Annual Report on Form 10-K for the year ended December 31, 2020.

/s/ Deloitte & Touche LLP
McLean, Virginia
January 27, 2021

Exhibit 24

POWER OF ATTORNEY IN CONNECTION WITH THE
2020 ANNUAL REPORT ON FORM 10-K

KNOW ALL MEN BY THESE PRESENTS, that each of the undersigned directors and officers of NORTHROP GRUMMAN CORPORATION, a Delaware corporation, does hereby appoint SHEILA C. CHESTON and JENNIFER C. MCGAREY, and each of them as his or her agents and attorneys-in-fact (the “Agents”), in his or her respective name and in the capacity or capacities indicated below, to execute and/or file the Annual Report on Form 10-K for the fiscal year ended December 31, 2020 (the “Report”) under the Securities Exchange Act of 1934, as amended (the “Act”), and any one or more amendments to any part of the Report that may be required to be filed under the Act (including the financial statements, schedules and all exhibits and other documents filed therewith or constituting a part thereof) and to any part or all of any amendment(s) to the Report, whether executed and filed by the undersigned or by any of the Agents. Further, each of the undersigned does hereby authorize and direct the Agents to take any and all actions and execute and file any and all documents with the Securities and Exchange Commission (the “Commission”), which they deem necessary or advisable to comply with the Act and the rules and regulations or orders of the Commission adopted or issued pursuant thereto, to the end that the Report shall be properly filed under the Act. Finally, each of the undersigned does hereby ratify each and every act and documents which the Agents may take, execute or file pursuant thereto with the same force and effect as though such action had been taken or such document had been executed or filed by the undersigned, respectively.

This Power of Attorney shall remain in full force and effect until revoked or superseded by written notice filed with the Commission.

IN WITNESS WHEREOF, each of the undersigned has caused this Power of Attorney to be executed as of this 27th day of January 2021.

/s/ David P. Abney **David P. Abney**	Director
/s/ Marianne C. Brown **Marianne C. Brown**	Director
/s/ Donald E. Felsinger **Donald E. Felsinger**	Director
/s/ Ann M. Fudge **Ann M. Fudge**	Director
/s/ Bruce S. Gordon **Bruce S. Gordon**	Director
/s/ William H. Hernandez **William H. Hernandez**	Director
/s/ Madeleine A. Kleiner **Madeleine A. Kleiner**	Director
/s/ Karl J. Krapek **Karl J. Krapek**	Director
/s/ Gary Roughead **Gary Roughead**	Director
/s/ Thomas M. Schoewe **Thomas M. Schoewe**	Director
/s/ James S. Turley **James S. Turley**	Director
/s/ Mark A. Welsh, III **Mark A. Welsh, III**	Director
/s/ Kathy J. Warden **Kathy J. Warden**	Chairman, Chief Executive Officer and President (Principal Executive Officer)
/s/ David F. Keffer **David F. Keffer**	Corporate Vice President and Chief Financial Officer (Principal Financial Officer)

NORTHROP GRUMMAN CORPORATION

EXHIBIT 31.1

**CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002**

I, Kathy J. Warden, certify that:

1. I have reviewed this report on Form 10-K of Northrop Grumman Corporation ("company");
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
    c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the company's most recent fiscal quarter (the company's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: January 27, 2021

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

NORTHROP GRUMMAN CORPORATION

EXHIBIT 31.2

CERTIFICATION PURSUANT TO
SECTION 302 OF THE SARBANES-OXLEY ACT OF 2002

I, David F. Keffer, certify that:

1. I have reviewed this report on Form 10-K of Northrop Grumman Corporation ("company");
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the company as of, and for, the periods presented in this report;
4. The company's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the company and have:
    a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the company, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
    b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
    c) Evaluated the effectiveness of the company's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
    d) Disclosed in this report any change in the company's internal control over financial reporting that occurred during the company's most recent fiscal quarter (the company's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the company's internal control over financial reporting; and
5. The company's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the company's auditors and the audit committee of the company's board of directors (or persons performing the equivalent functions):
    a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the company's ability to record, process, summarize and report financial information; and
    b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the company's internal control over financial reporting.

Date: January 27, 2021

/s/ David F. Keffer

David F. Keffer
Corporate Vice President and Chief Financial Officer

NORTHROP GRUMMAN CORPORATION

EXHIBIT 32.1

CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report of Northrop Grumman Corporation (the "company") on Form 10-K for the period ended December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Kathy J. Warden, Chairman, Chief Executive Officer and President of the company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the company.

Date: January 27, 2021

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

NORTHROP GRUMMAN CORPORATION

EXHIBIT 32.2

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of Northrop Grumman Corporation (the "company") on Form 10-K for the period ended December 31, 2020, as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, David F. Keffer, Corporate Vice President and Chief Financial Officer of the company, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that:

(1) The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

(2) The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the company.

Date: January 27, 2021

/s/ David F. Keffer
David F. Keffer
Corporate Vice President and Chief Financial Officer