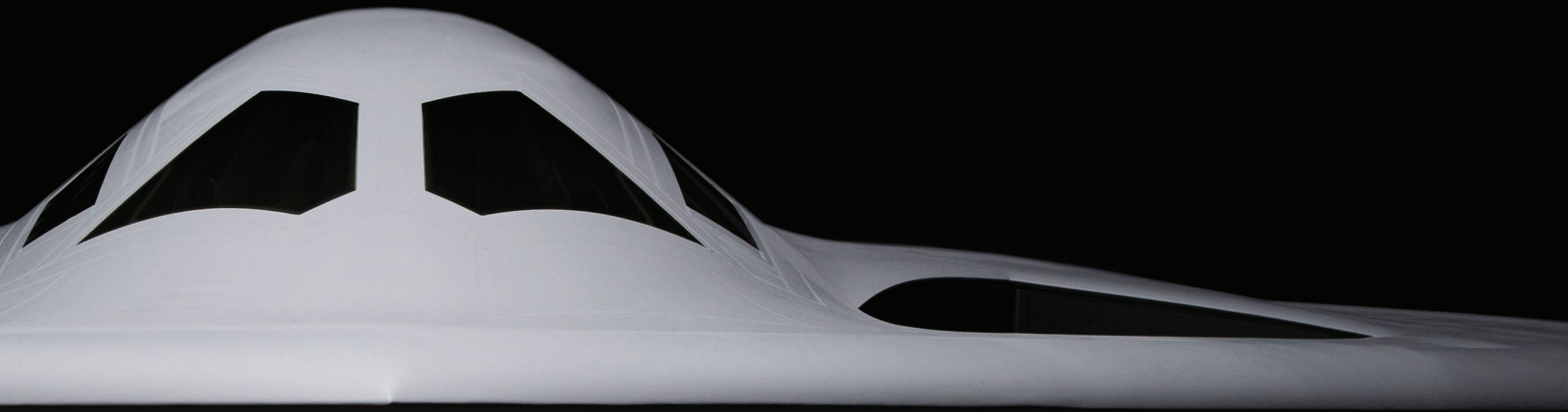


2022 Annual Report



NORTHROP
GRUMMAN



About Us

Northrop Grumman is a leading global aerospace and defense technology company. Our pioneering solutions equip our customers with the capabilities they need to connect and protect the world, and push the boundaries of human exploration across the universe. Driven by a shared purpose to solve our customers' toughest problems, our more than 95,000 employees define possible every day.



Sales
(\$ in billions)



Organic Sales*
(\$ in billions)



Backlog
(\$ in billions)



Segment Operating
Margin Rate*



Cash Dividends
Declared
(per Common share)



Transaction-Adjusted
EPS*

*Non-GAAP financial metric. For more information, including a definition, reconciliation to the most directly comparable GAAP measure and why we believe this measure may be useful to investors, please refer to "Use of Non-GAAP Financial Measures" at the back of this Annual Report.

Dear Shareholders,

At Northrop Grumman, we connect and protect the world while pushing the boundaries of human exploration. Cutting-edge technologies imagined and built by our more than 95,000 employees enable us to deliver innovative solutions to address our customers' most urgent and complex problems.

In 2022, our business strategy generated value for our customers, communities and shareholders. We saw the incredible first images from the James Webb Space Telescope, launched the United States' return to the moon with the Artemis program, and unveiled the remarkable B-21 Raider alongside countless other extraordinary milestones.

Key program wins, and an expanded product portfolio aligned with our customers' top priorities, strengthened our position as global technology leaders. We welcomed thousands of new employees to our team, and made investments to support long-term growth, while also driving cost efficiencies throughout the business. The profitable growth of our business enabled a capital deployment strategy that fuels innovation and builds capacity, while also prioritizing shareholder returns.

An evolving security environment underscores the continued need for breakthrough capabilities. Our strong backlog and advanced portfolio of products give us confidence in our position and ability to help create a more secure world.

2022 Performance

Leading-edge technology solutions, coupled with exciting new program wins drove another year of strong performance in 2022.

Strong demand for our capabilities and a laser focus on program performance drove exceptional results. We ended the year with sales growth of 3% and total sales of \$36.6 billion. Additionally, we captured \$39.3 billion in awards in 2022, ending the year with a book to bill ratio of 1.07 and \$79 billion in backlog.

Balancing our approach to capital deployment enabled continued investment in key areas of our business while simultaneously returning cash to stakeholders, including \$2.6 billion returned via dividends and share repurchases.

Thoughtful investments in our people, advanced technologies and capabilities remain key to our success, with \$2.6 billion in spending on research and development and capital expenditures.

Positioning for the Future

Alignment with our customers' highest priority areas continues to be a point of strength and differentiation for Northrop Grumman. The pioneering solutions we deliver have grown our business, generated strong cash flows and delivered value to our shareholders.

The threat environment continues to evolve and, as we saw in 2022, remains highly complex. Our portfolio and capabilities meet our customers' current and future needs – from exquisite, one-of-a-kind technologies to high-volume products alike. Further, they are key to sustainably and profitably growing our business while upholding our high quality standards, driving cost efficiencies and operating with excellence.



Our world-class capabilities are built on a mission-driven culture championing integrity and ethics. In 2022, we set bold next-generation sustainability goals, including transitioning to Net Zero in our operations by 2035. We also appointed a new Chief Diversity Officer to ensure our storied legacy of diversity, equity and inclusion (DE&I) continues to grow. The diverse, innovative and unique perspectives of our people enable all of our teams to thrive. Our inclusive culture evokes our team's best thinking as they craft solutions that solve some of the world's most complex problems.

Our commitment to environmental, social and governance (ESG) activities garnered widespread recognition in 2022, including:

- Named a Top 50 company for Diversity by DiversityInc
- Received a 100% Score from Human Rights Campaign for "Best Places to Work for LGBTQ+ Equality"
- Named a Best Place to Work for disability inclusion by Disability:IN for the eighth consecutive year
- Included in the Dow Jones Sustainability Index for North America for the seventh consecutive year
- Named one of America's Most Just Companies by JUST Capital for our work fostering a more equitable business environment

We also see the rapidly expanding technological landscape ahead; opportunities that call upon our company to build the capabilities and workforce needed to deliver future solutions in line with our high expectations. Significant investments in our teams and communities help build valuable job skills and support STEM education programs to ensure a robust pipeline of STEM talent for years to come.

I'm deeply proud of our team's accomplishments and confident that Northrop Grumman has the talent, capabilities and portfolio to deliver innovative and affordable solutions with speed. No matter the challenges we face, our mission to create a more connected and protected world for our communities, customers and shareholders remains strong.

Sincerely,

A handwritten signature in black ink that reads "Kathy Warden". The signature is written in a cursive style with a large, stylized initial "K".

Kathy Warden

Chair, Chief Executive Officer and President

Elected Officers (As of March 1, 2023)

Kathy J. Warden

Chair, Chief Executive Officer and President

Ann M. Addison

Corporate Vice President and Chief Human Resources Officer

Matthew F. Bromberg

Corporate Vice President, Global Operations

Mark A. Caylor

Corporate Vice President and President, Mission Systems

Sheila C. Cheston

Corporate Vice President and General Counsel

Todd B. Ernst

Corporate Vice President and Treasurer, Vice President Investor Relations

Michael A. Hardesty

Corporate Vice President, Controller and Chief Accounting Officer

Thomas H. Jones

Corporate Vice President and President, Aeronautics Systems

Lesley A. Kalan

Corporate Vice President and Chief Strategy and Development Officer

David F. Keffer

Corporate Vice President and Chief Financial Officer

Jennifer C. McGarey

Corporate Vice President and Secretary

Stephen F. O'Bryan

Corporate Vice President and Global Business Development Officer

David T. Perry

Corporate Vice President and Chief Global Business Officer

Roshan S. Roeder

Corporate Vice President and President, Defense Systems

Lucy C. Ryan

Corporate Vice President, Communications

Thomas L. Wilson

Corporate Vice President and President, Space Systems

Board of Directors (As of March 1, 2023)

Kathy J. Warden

Chair, Chief Executive Officer and President, Northrop Grumman Corporation

David P. Abney^{2† 3}

Former Executive Chairman and Chief Executive Officer, United Parcel Service (a package delivery and supply chain management company)

Marianne C. Brown^{1 3†}

Former Chief Operating Officer, Global Financial Solutions, Fidelity National Information Services, Inc. (financial services technology solutions provider)

Donald E. Felsing^{2 3}

Former Chairman and Chief Executive Officer, Sempra Energy (energy services company)

Ann M. Fudge^{1 4}

Former Chairman and Chief Executive Officer, Young & Rubicam Brands (marketing communications company)

Madeleine A. Kleiner^{2 3}

Lead Independent Director, Northrop Grumman Corporation; Former Executive Vice President and General Counsel, Hilton Hotels Corporation (hotel and resort company)

Karl J. Krapek^{2 3}

Former President and Chief Operating Officer, United Technologies Corporation (aerospace and building systems company)

Arvind Krishna^{2 4}

Chairman and Chief Executive Officer, International Business Machines Corporation (an information technology company)

Graham N. Robinson^{1 4}

Senior Vice President, Stanley Black & Decker, and President, STANLEY Industrial (manufacturer of tools and hardware)

Gary Roughead^{2 4†}

Admiral, United States Navy (Ret.) and Former Chief of Naval Operations

Thomas M. Schoewe^{1† 4}

Former Executive Vice President and Chief Financial Officer, Wal-Mart Stores, Inc. (operator of retail stores)

James S. Turley^{1 3}

Former Chairman and Chief Executive Officer, Ernst & Young (a professional services organization)

Mark A. Welsh^{1 4}

Dean, Bush School of Government and Public Service, Texas A&M University; General, United States Air Force (Ret.) and Former Chief of Staff, United States Air Force

- 1 Member of Audit and Risk Committee
 - 2 Member of Compensation Committee
 - 3 Member of Governance Committee
 - 4 Member of Policy Committee
- † Committee Chair

**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, 2022
or

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

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

NORTHROP GRUMMAN CORPORATION

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of
incorporation or organization)

**2980 Fairview Park Drive
Falls Church, Virginia**

(Address of principal executive offices)

80-0640649

(I.R.S. Employer
Identification Number)

22042

(Zip code)

(703) 280-2900

(Registrant's telephone number, including area code)

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

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

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

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

Yes

No

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

Yes

No

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

Yes

No

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

Yes

No

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

Large Accelerated Filer

Accelerated Filer

Smaller Reporting Company

Non-accelerated Filer

Emerging Growth Company

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

Indicate by check mark whether the registrant 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, 2022, 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 \$74.0 billion.

As of January 23, 2023, 153,053,371 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 2023 Annual Meeting of Shareholders are incorporated by reference in Part III of this Form 10-K.

NORTHROP GRUMMAN CORPORATION

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PART I

Item 1. Business

HISTORY AND ORGANIZATION

History

Northrop Grumman Corporation (herein referred to as “Northrop Grumman,” the “company,” “we,” “us,” or “our”) is a leading global aerospace and defense technology company. We deliver a broad range of products, services and solutions to U.S. and international customers, and principally to the U.S. Department of Defense (DoD) and intelligence community. Our broad portfolio is aligned to support national security priorities and our solutions equip our customers with capabilities they need to connect, protect and advance humanity.

The company is a leading provider of space systems, advanced aircraft, missile defense, advanced weapons and long-range fires capabilities, mission systems, networking and communications, strategic deterrence systems, and breakthrough technologies, such as artificial intelligence, advanced computing and cyber. We are focused on competing and winning programs that enable continued growth, performing on our commitments and affordably delivering capability our customers need. With the investments we've made in advanced technologies, combined with our talented workforce and digital transformation capabilities, Northrop Grumman is well positioned to meet our customers' needs today and in the future. For a discussion of risks associated with our operations, see “Risk Factors.”

The company originally was formed in 1939 in Hawthorne, California 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. We developed into one of the largest defense companies in the world through a series of acquisitions, as well as organic growth, including the following:

- 1994 - Acquired Grumman Corporation, a premier military aircraft systems integrator. The combined company was renamed Northrop Grumman Corporation;
- 1996 - Acquired the defense and electronics businesses of Westinghouse Electric Corporation, developer of sophisticated radar and other electronics systems;
- 2001 - Acquired Litton Industries, Inc., a global electronics and information technology company and full service shipbuilder;
- 2001 - Acquired Newport News Shipbuilding Inc., designer and builder of nuclear-powered aircraft carriers and submarines;
- 2002 - Acquired TRW Inc., developer of military and civil space systems and payloads, and integrator of complex, mission-enabling systems and services;
- 2011 - Completed the spin-off of Huntington Ingalls Industries, Inc., operator of our former shipbuilding business, comprised largely of a part of Litton Industries and Newport News Shipbuilding;
- 2018 - Acquired Orbital ATK, Inc. (OATK), developer and producer of satellites and other space systems, launch vehicles and missile products; and
- 2021 - Completed the sale of our IT and mission support services business (the “IT services divestiture”) to Veritas Capital.

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. At December 31, 2022, the company was aligned in four operating sectors, which also comprise our reportable segments: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems.

AERONAUTICS SYSTEMS

Aeronautics Systems is a leader in the design, development, production, integration, sustainment and modernization of advanced aircraft systems for the U.S. Air Force, the U.S. Navy, other U.S. government agencies, and international customers. These aircraft systems support four mission areas: strike; air dominance; battle management

NORTHROP GRUMMAN CORPORATION

and control; and intelligence, surveillance and reconnaissance (ISR). Aeronautics Systems is reported in two business areas: Autonomous Systems and Manned Aircraft.

Autonomous Systems – provides unmanned autonomous aircraft systems, including high-altitude long-endurance (HALE) strategic ISR systems and vertical take-off and landing (VTOL) tactical ISR systems. Key programs include:

- MQ-4C Triton, which provides wide area strategic ISR over vast ocean and coastal regions for maritime domain awareness to the U.S. Navy and Australia;
- RQ-4 Global Hawk, which provides high resolution imagery of land masses for theater awareness and strategic ISR to the U.S. Air Force, Japan, and the Republic of Korea;
- North Atlantic Treaty Organization (NATO) Alliance Ground Surveillance (AGS), a Global Hawk variant, for strategic ISR missions conducted in multinational theater operations; and
- MQ-8B and MQ-8C Fire Scout, ship-based, VTOL tactical ISR systems that provide situational awareness and precision targeting for the U.S. Navy.

Manned Aircraft – provides strategic long-range strike aircraft, tactical fighter and air dominance aircraft, and airborne battle management and command and control systems. Key programs include:

- Development and production of the U.S. Air Force B-21 Raider long-range strike bomber, as well as modernization and sustainment services for the B-2 Spirit bomber;
- Fuselage production for the F/A-18 Super Hornet and the F-35 Lighting II Joint Strike Fighter for use by U.S. and international forces;
- E-2D Advanced Hawkeye battle management aircraft production for the U.S. Navy, Japan, and France; and
- E-8C Joint Surveillance Target Attack Radar System (JSTARS) aircraft sustainment and modernization for the U.S. Air Force.

DEFENSE SYSTEMS

Defense Systems 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 and aircraft and mission systems sustainment and modernization. The sector is reported in two business areas: Battle Management & Missile Systems, and Mission Readiness.

Battle Management & Missile Systems – designs, develops and integrates all-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 – a backbone architecture for Joint All-Domain Command and Control (JADC2) capable of integrating sensors and shooters, as well as air and missile defense C2 systems. It also develops and produces precision strike weapons; advanced propulsion, including high speed air-breathing and hypersonic 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:

- Integrated Air and Missile Defense Battle Command System (IBCS) for the U.S. Army and Poland, which is a system that integrates sensors and effectors to deliver among the most advanced C2 systems for joint and coalition forces;
- U.S. Navy's Advanced Anti-Radiation Guided Missile (AARGM), a medium-range, air-to-surface missile, and its extended range variant, AARGM-ER;
- Guided Multiple Launch Rocket System (GMLRS) propulsion and warhead subsystems for a surface-to-surface system used to defeat targets using indirect precision fires up to 70-plus kilometers;
- Precision Guidance Kit (PGK), replaces conventional fuzes for artillery and mortar munitions and transforms them into Global Positioning System enabled precision guided weapons;
- Hypersonic Attack Cruise Missile (HACM) air-breathing, scramjet propulsion subsystem for the hypersonic air-launched cruise missile to travel at speeds of Mach 5 or greater; and

NORTHROP GRUMMAN CORPORATION

- Forward Area Air Defense Command and Control (FAAD C2), the Army's long-standing program of record for short range air defense and Counter Rocket, Artillery and Mortar (C-RAM), as well as the interim C2 for Counter Unmanned Aircraft Systems (C-UAS).

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 supports critical warfighter training for complex missions in a realistic virtual environment. Competencies include aircraft, electronics and embedded software sustainment; digital engineering and extended reality training for platform logistics; and maintenance. Key programs include:

- Global system sustainment and operations support for the F-35, B-2, P-3 Orion, E-6B Mercury, KC-30A multi-role tanker, C-27J transport, Global Hawk and Triton programs;
- Special Electronics Mission Aircraft (SEMA) intelligence, surveillance and reconnaissance support;
- AAQ-24 sensor sustainment and repair for U.S. military customers; and
- APN-241 radar sustainment, repair and production for U.S. military and foreign military sales (FMS) customers.

MISSION SYSTEMS

Mission Systems 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 cyber; command, control, communications and computers, intelligence, surveillance and reconnaissance (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: Airborne Multifunction Sensors; Maritime/Land Systems & Sensors; Navigation, Targeting & Survivability; and Networked Information Solutions.

Airborne Multifunction Sensors – delivers products, systems and services that support airborne platforms with 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; and multi-sensor processing. Key unrestricted programs include:

- Airborne Early Warning & Control (AEW&C). The center piece of the E-7 AEW&C aircraft is the Multi-role Electronically Scanned Array (MESA) radar which enables 360 degree long range advanced air moving target indicator (AMTI) capabilities for Battle Management, Command and Control, and Maritime Surveillance;
- F-35 fire control radar and Distributed Aperture System (DAS), which provides 360 degree field of view tracking, identifying, missile warning and night vision capabilities;
- LONGBOW Fire Control Radar (FCR), which provides fire control radar capabilities for the global AH-64 helicopter fleet; and
- Scalable Agile Beam Radar (SABR), an active electronically scanned array fire control radar system for F-16 aircraft.

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 unrestricted programs include:

- Surface Electronic Warfare Improvement Program (SEWIP) Block III, which protects surface ships from anti-ship missiles, provides early detection, signal analysis and threat warning;
- Ground/Air Task Oriented Radar (G/ATOR), a mobile multi-mode active electronically scanned array;
- Littoral Combat Ship Mission Module Integration, which provides engineering design, support and production of mission modules for U.S. Navy littoral combat ships; and

NORTHROP GRUMMAN CORPORATION

- DDG Modernization, which is comprised of several subsystems to support modernization of Arleigh Burke-class guided missile destroyers including Integrated Bridge and Navigation Systems (IBNS) and ship control systems.

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 unrestricted programs include:

- LITENING Advanced Targeting Pod, an electro-optical infrared sensor system for targeting and surveillance that enables aircrews to detect, acquire, identify and track targets at long ranges;
- Large Aircraft and Common Infrared Countermeasures (LAIRCM, DoN LAIRCM, CIRCM) systems, which protect large aircraft as well as rotary wing and medium fixed wing aircraft from infrared missiles using advanced laser technology;
- APR-39 DV(2) and EV(2) Radar Warning Receiver programs, which produce a digital radar warning receiver for the U.S. Army, Navy and Marines;
- AC/MC 130J Radio Frequency Countermeasures system, which provides superior situational awareness and better enables aircraft survivability in operationally relevant environments;
- Embedded Global Positioning System (GPS) / Inertial Navigation Systems-Modernization (EGI-M) program, which provides state-of-the-art airborne navigation capabilities with an open architecture that enables rapid responses to future threats; and
- UH-60V Black Hawk integrated mission equipment package, which modernizes the U.S. Army's Black Hawk helicopters with a glass cockpit, including an integrated computational system, visual display system and control display units, extending the life and mission capabilities of the UH-60 platform.

Networked Information Solutions – delivers products, systems and services in the areas of advanced communications and network systems, full spectrum cyber solutions, secure processing, transformational computing, advanced technology development, and Signals Intelligence (SIGINT) mission systems. Competencies include software defined radios and network gateways, communications and counter-communications systems; cyber mission management; large scale cyber solutions for national security applications; cyber survivability; ground software systems; and SIGINT sensors and processing. Key unrestricted programs include:

- F-35 Communications, Navigation and Identification (CNI) integrated avionics system, which provides secure communications and interoperability capabilities;
- Battlefield Airborne Communications Node (BACN), one of the first airborne gateway systems that allows platforms to communicate and securely share data;
- Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW), a software-programmable jammer that provides protection from improvised explosive devices (IEDs);
- Exploitation and cyber programs, which provide cyber and intelligence domain support through unique intelligence and cyber capabilities; and
- Airborne Signals Intelligence Payload (ASIP), which delivers key signals intelligence capabilities to the warfighter by detecting, identifying, and locating radar and other types of electronic and modern communication signals.

SPACE SYSTEMS

Space Systems 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: Space and Launch & Strategic Missiles.

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:

NORTHROP GRUMMAN CORPORATION

- Cygnus spacecraft, used in the execution of our CRS contracts with NASA;
- Habitation and Logistics Outpost (HALO) module in support of NASA's Gateway;
- Evolved Strategic SATCOM (ESS) and Protected Tactical SATCOM (PTS) satellites and payloads providing survivable, protected communications to U.S. forces;
- Next-Generation Overhead Persistent Infrared (Next Gen OPIR) program satellites and payloads providing data for missile defense;
- Space Development Agency Tracking and Transport layers providing missile warning/tracking and resilient, low-latency, high-volume data transport communication systems; and
- James Webb Space Telescope (JWST) operations and sustainment contract.

Launch & Strategic Missiles – designs, develops, manufactures and integrates small- and medium-class space launch vehicles to place satellites into earth orbit; suborbital launch vehicles that place payloads into a variety of high-altitude trajectories; large strategic missile systems; and missile defense systems. 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:

- Ground Based Strategic Deterrent (GBSD) Engineering & Manufacturing Development (EMD) program;
- Missile defense systems, interceptors, targets, mission processing and boosters for the Missile Defense Agency's (MDA) Next-Generation Interceptor (NGI), Ground-based Midcourse Defense Weapon Systems (GWS);
- Development and production of solid rocket motors for NASA's Space Launch System (SLS) heavy lift vehicle;
- Antares rocket, used in the execution of our Commercial Resupply Services (CRS) contracts with the National Aeronautics and Space Administration (NASA);
- 63-inch diameter Graphite Epoxy Motor (GEM 63) and the extended length variation (GEM 63XL) solid rocket boosters used to provide lift capability for the ATLAS V and Vulcan launch vehicles;
- Medium-class solid rocket motors for the U.S. Navy's Trident II Fleet Ballistic Missile program; and
- Intercontinental Ballistic Missile (ICBM) Ground Subsystem Support Contract (GSSC).

CUSTOMER CONCENTRATION

Our largest customer is the U.S. government. Sales to the U.S. government accounted for 86 percent, 85 percent and 84 percent of sales during the years ended December 31, 2022, 2021 and 2020, respectively. For further information on sales by customer type, contract type and geographic region, see Note 16 to the consolidated financial statements. 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. The 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, serve as 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, 2022, total backlog, which is equivalent to the company's remaining performance obligations, was \$78.7 billion as compared with \$76.0 billion at December 31, 2021. 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 experienced challenges with access to certain raw materials due to macroeconomic factors and several global events such as microelectronics shortages, COVID-19 and geopolitical conflicts. In some cases, these challenges have significantly increased the cost and/or lead time required to obtain certain raw materials. Nonetheless, these challenges have not to date materially impacted our ability to perform on our contracts. See "Risk Factors" for further discussion regarding risks related to raw materials.

HUMAN CAPITAL

Fostering a culture that offers employees opportunities to live our values, deliver for our customers, and act responsibly and sustainably is central to our diverse and talented workforce. Our culture and values enable us to continue attracting qualified talent, particularly those with security clearances and requisite skills in multiple areas, including science, technology, engineering and math. During 2022, despite facing a tight labor market, this focus on our culture and workforce was a factor in our ability to hire approximately 16,000 new employees, and as of December 31, 2022, we have approximately 95,000 employees.

Additional information regarding our human capital strategy is available in our Environmental, Social, and Governance (ESG) Report and Proxy Statement, which can be found on our company website. Information on our website, including our ESG Report (formerly 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 culture and values are vital to the ongoing success of the company, including our ability to attract and retain a talented and diverse workforce. Our values are also integral to our commitment to long-term sustainability, with robust ESG practices across our company. The company has a Standards of Business Conduct program. Our employees are empowered to raise concerns without fear of reprisal. In addition to full-time ethics professionals, we also have over 140 business conduct advisors who promote values and an ethical culture within the company.

Our annual engagement survey gives employees a voice and a mechanism to provide feedback on our culture. This survey is managed by a third-party vendor to encourage employee candor on key engagement drivers, including company leadership, culture, inclusion and career development. In 2022, 79 percent of employees responded to the survey, an indication that our employees believe their feedback matters, and we were named a "High Performing

Company” by the third party vendor based on our survey results. Our leaders review the survey responses and work collaboratively with their teams to take meaningful actions based on survey results.

Diversity, Equity and Inclusion

Diversity, equity and inclusion (DE&I) is vital to our culture and our company’s success. Our ability to leverage the power of our diverse workforce enhances employee engagement and enables us to innovate, perform and deliver on quality, which results in value 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 U.S. employee population, as of December 31, 2022, 25 percent are female, 37 percent are people of color, 18 percent are veterans and 8 percent are persons with disabilities. At the vice president level, 34 percent are female and 19 percent are people of color.

Talent Management

Northrop Grumman’s talent strategy is designed to maximize the full potential of our people and our business. We are focused on providing an end-to-end experience from pre-hire to retirement. This includes creating inclusive, employee-centric experiences, cultivating leadership, offering multiple development pathways and expanding the talent pipeline into and through the company.

We hold regular talent review discussions to ensure line of sight to talent at various levels of the organization. Succession plans are refreshed and reviewed to ensure a robust, diverse pipeline of talent and business continuity with a tight linkage to development.

We focus on accelerating learning and development of our leaders by providing a combination of experiences and education. Our Leading for Impact Program offers developmental paths for new and experienced managers seeking to refresh or build their leadership capabilities. Nearly 3,000 leaders have honed their skills leveraging various learning modalities, including virtual and in-person instructor-led, web-based training and micro-courses to support our managers.

Our employee development programs are designed to strengthen employee skills that align to our current and future business needs, encourage knowledge sharing and support career progression and growth. We utilize My Learning Experience, a machine learning enabled content aggregator designed to create a unique and personalized learning experience for each employee. We offer our employees online career-specific tools and resources and we also support development opportunities through educational institutions with our Education Assistance Program. Our early-in-career rotation program, Pathways, develops talent pipelines with both depth of skills and breadth of experiences that are critical to the company’s future talent needs. Our technical cohort programs are uniquely designed to cultivate technical, domain expertise and collaborative thought leadership for early through advanced career levels.

As our company continues to grow, we rely on an integrated talent acquisition approach. The company strategically attracts, identifies, and onboards candidates in support of business needs and priorities. In order to accomplish our goals, we seek talent with unique perspectives, skills and experiences; maintain strategic relationships with colleges; offer a robust employee referral program; and partner with numerous diversity organizations, military organizations and trusted external partners, with a commitment to growing and supporting a diverse talent pipeline. Amidst the evolving and, at times, challenging hiring environment, we apply agile recruiting methods as we work to adapt to the changing labor marketplace and to ensure employees and candidates have an exceptional experience.

Employee Health and Safety

People are our most valuable resource, and we work diligently to protect the health, safety and well-being of our employees, customers, visitors and others at our facilities. During 2022, we have taken, and continue to take, robust actions in response to the COVID-19 pandemic to help protect the health, safety and well-being of our employees and others. See “COVID-19” in MD&A for further discussion.

Health and safety are a core focus in everything we do. Risk and hazard identification, abatement and prevention are key components of Northrop Grumman’s safety program. Everyone has a responsibility to identify workplace hazards and we empower employees to report these hazards without fear of repercussion. We evaluate the effectiveness of our health and safety programs externally, through benchmarking with industry peers and the U.S. Bureau of Labor Statistics. Internally, we determine program effectiveness by conducting trend analyses of our past performance.

Collective Agreements

Approximately 4,000 employees are covered by 15 collective agreements in the U.S., of which we negotiated four renewals in 2022 and expect to negotiate one renewal in 2023.

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), which are regulations that govern cost accounting requirements for government contracts. Examples of costs incurred by us and not billed to the U.S. government in accordance with applicable FAR and CAS requirements include, but are not limited to, unallowable employee compensation, charitable donations, interest expense, advertising, and certain legal and travel 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 typically subject to adjustment regardless of costs incurred by the contractor, absent changes by the customer. As a result, fixed-price contracts typically have more financial risk associated with unanticipated cost growth, but provide the opportunity for higher profit margins. 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, unexpected macroeconomic factors or other circumstances, 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.

NORTHROP GRUMMAN CORPORATION

The following table summarizes sales for the year ended December 31, 2022, recognized by contract type and customer category:

<i>\$ in millions</i>	U.S. Government ⁽¹⁾	International ⁽²⁾	Other Customers	Total	Percentage of Total Sales
Cost-type contracts	\$ 18,110	\$ 594	\$ 7	\$ 18,711	51 %
Fixed-price contracts	13,213	4,254	424	17,891	49 %
Total sales	\$ 31,323	\$ 4,848	\$ 431	\$ 36,602	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. 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.

In 2022, we announced our next generation environmental sustainability goals. These goals focus on Northrop Grumman's facilities in addition to supply chain partners and customers:

- Net zero greenhouse gas emissions in operations by 2035;
- Source 50 percent of total electricity from renewable sources by 2030;
- Strengthen leadership in operational footprint reduction through setting and achieving pioneering targets in environmental stewardship by 2025, including potable water use and solid waste to landfill;
- In collaboration with key customers, work to develop a pioneering product stewardship program focused on material efficiency, product design and life cycle assessment;
- Update the company's "Standards of Business Conduct for Suppliers and Other Trading Partners" to incorporate industry-leading sustainability practices by 2023;
- Expand Technology for Conservation initiatives in proximity to Northrop Grumman's U.S. locations by 2030, in collaboration with external partners.

Additional information regarding our environmental sustainability goals is available in our ESG Report, which can be found on our company website.

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 86 percent of our sales in 2022; we have a number of large programs with the U.S. Department of the Air Force, in particular. The U.S. government has the ability to delay, modify or cancel ongoing competitions, procurements and programs, as well as to change its future acquisition strategy. 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 practices and strategy, inflation and other macroeconomic trends, military strategy; or broader changes in social, economic or political demands and priorities.

The U.S. government 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 convenience, contractors are generally protected by provisions covering reimbursement for costs incurred and profit on those costs up to the amount authorized under the contract, but not the anticipated profit that would have been earned. In the event of termination due to default, contractors may be required 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 due to our default (or that of a teammate) 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. The U.S. government has invoked and 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 to date and for costs associated with the temporary stoppage of work plus a reasonable fee. However, such temporary stoppages often introduce inefficiencies and result in financial and other damages for which contractors may not be able to negotiate full recovery. In some cases, they have also ultimately resulted and could result in termination of a contract for convenience or reduced future orders.

A significant shift in government priorities, programs or 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, including a prolonged continuing resolution or breach of the debt ceiling, can 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 annually even though the program performance period may extend over several years. Programs are often partially funded initially, with additional funds committed only as Congress makes further appropriations. When we or our subcontractors incur costs in excess of funds obligated on a contract, we are generally at risk for reimbursement unless and until additional funds are obligated to the contract. We cannot predict what funding will ultimately be approved for individual programs. In addition, pressures on, as well as laws and plans relating to the federal budget, potential changes in priorities and defense spending, the timing and substance of the appropriations process, use of continuing resolutions (with restrictions, e.g., on new starts) and the federal debt limit (including a breach), have adversely affected and could adversely affect the amount and timing of funding for individual programs and delay purchasing or payments by our customers. In the event government

funding for our significant programs is reduced, delayed or unavailable, or orders are reduced, our contracts or subcontracts, or competitions for such programs have at times been, and in the future may be, terminated or changed.

The U.S. continues to face an uncertain and changing political environment, along with substantial fiscal and economic challenges, which affect funding. The budget and macroeconomic environment, political instability, and uncertainty surrounding the appropriations processes and the debt ceiling, remain significant short and long-term risks. See “Overview” in MD&A. Considerable uncertainty exists regarding how future budget and program decisions will unfold. 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 budgets, and we may face a prolonged government shutdown that could lead to program cancellations, disruptions and/or stop work orders and could limit the U.S. government’s ability to progress programs and make timely payments. A prolonged shutdown could limit our ability to perform on our contracts and successfully compete for new work. If the statutory debt limit is not increased adequately, we could be obligated to work without receiving timely payments. A prolonged breach could have far-reaching adverse consequences. If current macroeconomic pressures (especially from inflation and labor and supply chain challenges) are prolonged or worsen, and increased costs continue, then existing or anticipated appropriated and contracted funds may not be sufficient to cover costs incurred on existing or future programs. The National Defense Authorization Act for FY 2023 grants DoD discretionary authority under limited circumstances to provide extraordinary relief to contractors to address certain inflationary impacts under the current macroeconomic environment for FY 2023. This or other relief may not be available or adequate to address the significant impacts of the broader macroeconomic environment.

Future funding for certain programs in which we participate may be reduced, delayed or cancelled. Budget cuts globally could adversely affect the viability of our subcontractors and suppliers. While we believe that our business is well-positioned in areas for future defense spending, changing priorities, budget pressures, defense spending cuts, challenges in the appropriations process, the possibility of a year-long continuing resolution and breach of the debt ceiling, ongoing fiscal debates and the global economic environment increase uncertainties and risk.

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 can affect our profitability and our overall financial position.***

Contract accounting requires judgment, including in assessing risks, estimating contract revenues and costs, and predicting future performance. Given the size and nature of our many contracts, estimating total revenues and costs at completion is complex and subject to many variables. When there is sufficient information to assess expected future performance, we consider performance related incentives, awards and penalties in estimating revenue and profit rates. Suppliers’ expected performance, and the availability and costs of labor, materials and components, are also considered.

Our operating income can be adversely affected when estimated contract costs increase, especially without comparable increases in revenue. There are many reasons estimated contract costs can increase. They include: macroeconomic trends (including inflation, labor shortages and supply chain challenges); delays or limitations in customer funding; design or other development challenges; production challenges (including from technical or quality issues and other performance concerns); inability to realize learning curves or other cost savings; changes in laws or regulations; actions necessary for long-term customer satisfaction; global pandemics, such as COVID-19; and natural disasters or environmental matters. For example, as discussed in greater detail in Note 12 to the consolidated financial statements, our latest estimated cost to complete the low-rate initial production (LRIP) phase of the B-21 program reflects updated estimates for adverse impacts from these macroeconomic factors, as well as potential opportunities to address them.

We aim to mitigate this risk through contract terms, and we have filed and may file requests for equitable adjustment or claims to seek recovery in whole or in part for our increased costs. We have also sought, and will seek, other avenues, as appropriate, to compensate the company for certain unexpected cost increases. However, our contracts may not enable full recovery, and/or the government may disagree with our requests and may not have funding to cover them.

Our risk varies with the type of contract. Fixed-price contracts inherently tend to have more financial risk than cost-type contracts, including as a result of inflationary pressures, labor rates and shortages, and supplier challenges. In 2022, approximately half of our sales were derived from fixed-price contracts. We have more often entered into fixed-price contracts where costs can be more reasonably estimated based on actual experience, such as for mature production programs. However, our customers may also seek fixed-price contracts for development programs, combined development and production programs, or low-rate initial production programs, where the risks are greater. In addition, our contracts contain provisions relating to cost controls and audit rights. If we do not achieve our estimates or meet terms in our contracts, our profitability has at times been and may be reduced, and we have incurred and may incur losses.

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

Under cost-type contracts, allowable costs 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 uncertain and may be earned over extended periods or towards the end of the contract. In these cases, the financial risks are typically in recognizing profit, which ultimately may not be earned, or program cancellation if cost, schedule, or technical performance issues arise. We also face additional financial risk when solicitations require us to bid on cost-type development work and fixed-price production lots and/or options in one submission, or cost-type development work requiring us to provide certain items at our expense or with little or no fee. Ongoing macroeconomic challenges increase these risks.

Because of the significance of management’s judgments and the estimation processes, and the difficulties inherent in estimating future costs, particularly in a challenging macroeconomic environment, it is possible that we could see materially different results. Changes in underlying assumptions, circumstances or estimates, and the failure to prevail on claims could have a material adverse effect on the profitability of one or more of our contracts and on our overall financial position, results of operations and/or cash flows. See “Critical Accounting Policies, Estimates and Judgments” in MD&A and Note 12 to the consolidated financial statements.

- ***The global macroeconomic environment could negatively impact our business and our financial position, results of operations and/or cash flows could be materially adversely affected.***

Our business, financial position, results of operations and/or cash flows have been and may continue to be adversely impacted by the global macroeconomic environment. The global macroeconomic environment has experienced, and continues to experience, extraordinary challenges, including high rates of inflation; widespread disruptions in supply chains; workforce challenges, including labor shortages; and market volatility. These challenges have, among other things, led to increased costs, labor and supply shortages, and delays and disruption in performance, as well as competing demands for scarce resources. Those challenges have adversely impacted our customers, our industry, our company, our suppliers and others with whom we do business. While some aspects of the macroeconomic environment appear to be improving, and we have been able to mitigate some of the challenges (especially with respect to labor shortages), other challenges persist. We cannot predict the future trajectory of this risk, including how the macroeconomic environment will evolve or how it will continue to impact us.

We (including our suppliers and other partners) have and may continue to experience inflationary pressures, supply chain disruption and labor and material cost increases at a rate higher than anticipated. Given the nature of our business and our contracts (many of which are fixed price and of long duration), we may be unable to recover some of these increased costs or to offset such costs with greater than expected efficiencies. Our government customers are likely to continue to face competing priorities and increased demands for their limited resources. We cannot predict how long these challenges will persist or how they will change over time. We continue to work proactively to mitigate these challenges. However, if we are unable to do so successfully, our financial position, results of operations and/or cash flows could be materially adversely affected.

- ***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 or more extensive or specialized engineering, manufacturing, or marketing capabilities. They may 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 our customers' budget pressures, their 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. We are also facing increasing competition for, and more limited access to various critical products, services and other supplies. In some instances, foreign companies may receive loans, 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. Some customers, including the DoD, are turning to commercial contractors, rather than traditional defense contractors, for some products and services, and continue to utilize small business contractors or determine to source work internally. In addition, our success in competing and remaining cost-competitive depends, in part, on our ability successfully to effect our digital transformation strategy and to adopt and integrate new digital manufacturing and operating technologies into our products and services.

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 such a loss, it can delay execution and 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, and other legal proceedings that could ultimately be resolved against us.***

The size, nature and complexity of our business make us particularly susceptible to investigations, claims, disputes, enforcement actions, prosecutions, litigation and other legal proceedings (collectively "legal proceedings"), particularly those involving governments, which have at times been, and may continue to be, increasingly aggressive. We are and may become subject to legal proceedings globally (including criminal, civil and administrative) and across a broad array of matters, including, but not limited to, government contracts, cost accounting, financial accounting or reporting, commercial transactions, false statements or claims, pension accounting, antitrust, compliance with government orders, mischarging, security (cyber and physical), performance, fraud, procurement integrity, securities laws and requirements, products liability, warranties, hazardous materials, personal injury claims, environmental (including remediation and toxic torts), shareholder derivative actions, M&A, intellectual property, tax, corporate law, employees, export/import, anti-corruption, debt and equity, labor, health and safety, the COVID-19 pandemic and the company's response to it, accidents, launch failures, employee benefits and plans, including pension plans and plan administration, improper payments, and privacy, as well as matters relating to the Orbital ATK Federal Trade Commission (FTC) decision and order. These matters can divert resources; result in administrative, civil or criminal fines, penalties or other sanctions (including judgments, convictions, consent or other voluntary decrees or agreements), compensatory, treble or other damages, non-monetary relief, or other liabilities; and otherwise harm our business and our ability to obtain and retain awards. Certain allegations 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 pending or not ultimately substantiated or if fully indemnified or insured, can 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, ensure adequate funding for our programs 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. See Note 11 to the consolidated financial statements for information regarding investigations, claims and litigation.

- ***The improper conduct of employees, agents, subcontractors, suppliers, business partners or joint ventures in which we participate can impact our reputation, our ability to do business and our financial position, results of operations and/or cash flows.***

We have implemented policies, training and other compliance controls, and have negotiated terms designed to prevent misconduct by employees, agents or others working with us or on our behalf 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, intellectual property and

contract terms. However, we cannot ensure that we will prevent all such misconduct committed by our employees, agents, suppliers, partners or others working with us or on our behalf. We have in the past experienced and may in the future experience such misconduct, despite a vigorous compliance program, our values and strong culture. 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, and in new environments. At the same time, law enforcement agencies are continuing to focus collaboratively on combating global corruption and other misconduct. In the ordinary course 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 processes, we are unable to prevent any and all misconduct or violations of applicable laws by these joint ventures (including their officers, directors and employees) or our partners. Improper actions by our employees or those with whom or through whom we do business subjects us to risk of 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, as well as those more broadly applicable to industry, and we could be adversely affected by changes in such laws, regulations or 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 various specific procurement laws, regulations, rules and other legal requirements, as well as ones more broadly applicable. These various legal requirements, although sometimes customary in government contracting, increase costs and risks. They have been and are evolving at a significant pace. The costs are not always fully recoverable. New laws or other requirements, or changes to existing ones (including, for example, related to cyber, information protection, cost accounting, climate, environment, COVID-19, securities, competition, compensation costs, taxes, counterfeit parts, pensions, and use of certain non-US equipment) or changes in how government agencies interpret existing ones, 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 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, and the adequacy of our systems in meeting government requirements. Costs ultimately found to be unallowable or improperly allocated may not be reimbursed or may be refunded. When an audit uncovers improper or illegal activities, we are subject to possible civil and criminal penalties, sanctions, 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 to be inadequate, with significant financial impact, regardless of the ultimate outcome. In addition, we risk serious reputational harm in situations involving allegations of impropriety 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, in part as a result of changes in the global security and threat environment and an increased focus on affordability, efficiencies, business systems, recovery of costs and a reprioritization of available defense funds. We have experienced and may continue to experience an increased number of audits and challenges to our claims and our business systems for current and past years, as well as longer periods to close audits, broader requests for information and an increased risk of withholdings of payments. For example, the thresholds for certain allowable costs have been reduced; and the allowability of other costs and how the company treated them, including certain costs related to pensions, and certain assumptions used by the company to determine pension expense, are being challenged and investigated, all with risks and 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, including those favoring incentive-based fee arrangements; fixed price development or long-term production programs; different award criteria; non-traditional contract provisions; and contract negotiation offers that indicate what our costs should be, have affected and may in the future 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, as well as those more broadly applicable to industry, such as securities laws and regulations. These laws and regulations include, but are not

limited to, the Truthful Cost or Pricing Data Act, False Claims Act, Procurement Integrity Act, CAS, FAR/DFAR, export controls and international sanctions, FCPA (and similar anti-corruption provisions) and SEC rules and regulations, as well as those related to pandemics. These requirements, whether specific to our industry or broadly applicable, may limit our ability to achieve our goals. If we are found to have violated any such requirements, or are found not to have acted responsibly, we may be subject to a wide array of actions, including contract modifications or termination; payment withholds; the loss of export/import privileges; administrative, civil or criminal judgments or penalties (including convictions, agreements, fines, damages and non-monetary relief); or suspension or debarment.

If we or those with whom we do business do not comply with the laws, regulations, rules, contract terms and processes to which we are subject or if customer business practices or requirements change significantly, including with respect to 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 expanded, otherwise changed or enforced differently over time. Compliance with these existing and evolving 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 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 remediation standards or enforcement of existing laws and regulations; new requirements, including regulation of new substances; discovery of previously unknown or more extensive contamination or new contaminants; imposition of fines, penalties, or damages (including natural resource damages); a determination that certain remediation or other costs are unallowable; rulings on allocation or insurance coverage; and/or the insolvency, inability or unwillingness of other parties to pay their share, could require us to incur material additional costs in excess of those anticipated.

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

The company is 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, as included in Note 12, substantial remediation costs related to the legacy Bethpage environmental conditions. It is also possible that applicable remediation standards and other requirements to which we are subject may continue to change, and our costs may increase materially. In 2022, the company entered into a consent decree with the State of New York and reached agreements with the Department of Defense and Bethpage and South Farmingdale Water Districts to resolve claims involving these parties. In addition, we are a party to, and may become a party to, various legal proceedings with individual and class action plaintiffs alleging personal injury and property damage, as well as with insurance carriers and other parties.

Government and private parties also seek to hold us responsible for liabilities or obligations related to former operations that have been divested or spun-off and/or for which we believe other parties have agreed to be responsible and/or to indemnify us. These rights may not be sufficient to protect us.

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 tax laws and regulations, or their interpretation and application, including the possibility of retroactive effect, have affected and

could affect our tax expense. In addition, the final determination of any tax audits or related litigation, in particular with regard to our positions on research credits and timing of revenue recognition under IRC Section 451(b), could be materially different from our historical income tax provisions and accruals.

As a result of our acquisition of OATK in 2018, we may be subject to future tax audits and legal challenges involving OATK (including its subsidiaries and their successors) or the spinoff of its then subsidiary Vista Outdoor, and we may be unable to obtain indemnification or we may be required to indemnify Vista.

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, especially of infectious diseases, including 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 and deaths, business slowdowns or shutdowns, labor shortages, supply chain challenges, changes in government spending and requirements, regulatory challenges, inflationary pressures and market volatility. As discussed in our prior and current Form 10-K and 10-Q filings, our operations have been and we expect will continue to be impacted by the COVID-19 pandemic and its related economic challenges. However, the company has worked hard to address and mitigate adverse impacts from COVID-19, and we do not currently anticipate significant additional direct impacts from the pandemic itself on our operations. Nonetheless, we cannot predict the future course of events.

If, for example, the COVID-19 pandemic worsens, due to spread, new or additional variants, or if a new health epidemic or outbreak were to occur, we likely would experience broad and varied impacts, including potentially to our workforce and supply chain, with inflationary pressures and increased costs (which may or may not be fully recoverable or insured), schedule or production delays, market volatility and other financial impacts. If any or all of these items were to occur, we could experience adverse impacts on our overall performance, operations and financial results. Given the tremendous uncertainties and variables, we cannot at this time predict the impact of the global COVID-19 pandemic, or any future health epidemics, pandemics or similar outbreaks, but any one could have a material adverse effect on our business, 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. They include, among other things, attempts to gain unauthorized access to sensitive information or otherwise compromise the integrity, confidentiality and/or availability of our systems, hardware and networks, and the information on them; insider threats; ransomware; threats to the safety of our directors, officers and employees; threats to our facilities, infrastructure, products (we produce and use), and subcontractors or other suppliers (referred to inclusively as suppliers); and threats from terrorist acts, espionage, civil unrest and other acts of aggression. We are also subject to increasing government, customer and other cyber and security requirements, including disclosure obligations.

We have robust measures in place to address and mitigate cyber-related risks. However, we have experienced cyber attacks and expect we will continue to experience additional attacks in the future, including from nation states and criminal actors. We continue to invest in the cybersecurity and resiliency of our networks and products and to enhance our internal controls and processes, which are designed to help protect our systems and infrastructure, and the information they contain. These include timely detection of incidents through monitoring, training, incident response capabilities, and mitigating cyber and security risks to our data, systems, products and services. We also partner with the government and others in our industry to help protect national security. However, given the complex and evolving nature of cyber and other security threats, including threats from targeting by more advanced and persistent adversaries, including nation states, these efforts may not be fully effective, particularly against previously unknown vulnerabilities that could go undetected for an extended period.

Our customers and partners (including our suppliers and joint ventures) to whom we entrust confidential data, and on whom we rely to provide products and services, face similar threats and growing requirements, including ones for which others may seek to hold us responsible. We depend on our customers, suppliers, and other business partners to implement adequate controls and safeguards to protect against and report cyber incidents. If they fail to deter, detect

or report cyber incidents in a timely manner, we may suffer financial and other harm, including to our information, operations, performance, employees and reputation.

Although we implement various measures and controls to monitor and mitigate risks associated with these threats and to increase the cyber resiliency of our infrastructure and products, there can be no assurance that these processes will be sufficient. Successful attacks could lead to losses or misuse of sensitive information or capabilities; theft or corruption of data; harm to personnel, infrastructure or products; financial costs and liabilities; protracted disruptions in our operations and performance; and the misuse of our products, as well as damage to our reputation as a provider of cyber-related or cyber-protected goods and services. We have not always been able to and may in the future not always be able to obtain adequate insurance to cover our losses.

Cyber threats, both on premises and in the cloud, are evolving and include, but are not limited to: malicious software, destructive malware, ransomware, attempts to gain unauthorized access to systems or data, disruption to operations, critical systems or denial of service attacks; unauthorized release of confidential, personal or other protected information (ours or that of our employees, customers or partners); corruption of data, networks or systems; harm to individuals; and loss of assets. We have been and could be impacted by cyber threats or other disruptions or vulnerabilities found in products or services we use or in our internal, partners' or customers' systems that are used in connection with our business. Some of these threats are zero-day attacks associated with previously unknown vulnerabilities in third party software or products we utilize in our business. Cyber events, if not prevented or effectively mitigated, have caused and could cause harm and require remedial actions. They could also damage our reputation, disrupt performance, impact our ability to obtain future insurance coverage, and lead to loss of business, regulatory actions, liabilities or other financial losses, for which we do not have adequate sources of recovery.

We also face threats to our physical security, including to our facilities and the safety and well-being of our people. These threats could involve terrorism, insider threats, workplace violence, civil unrest, natural disasters, damaging weather, or fires, which could adversely affect our company. Our customers and suppliers face similar risks that, if realized, could also adversely impact our operations. Such acts could cause delays, manufacturing downtime, or other impacts that could detrimentally impact our ability to perform our operations. We could also incur unanticipated costs to remediate impacts and lost business.

We provide systems, products and services to various customers who also face cyber threats. Our systems, products and services 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.

We also face increasing and evolving disclosure obligations related to cyber and other security events. Despite rigorous processes, we risk failing to meet all of our existing or future disclosure obligations and/or having our disclosures misinterpreted.

The occurrence and impact of these various risks are 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 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 qualified and diverse personnel who are or can reasonably be cleared (and obtain program access), who have the 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 continue to face increased competition for talent, both with traditional defense companies and commercial companies, globally, and with increasing wage rates. In addition, during the COVID-19 pandemic, we have faced labor shortages, as a result of both absenteeism among our workforce and a tight labor market more broadly, among other factors. While we continue to have labor challenges, they seem to be lessening, as we are realizing benefits from extensive hiring and retention programs. Of course the risk of insufficient personnel may again increase, either broadly or with respect to select critical staffing requirements. If necessary qualified personnel are more scarce or more difficult to attract or retain under reasonable terms, or if we experience a high level of attrition, generally or in particular areas, or if such personnel are increasingly unable to obtain security clearances or program access on a timely basis or are unable to be timely and effectively trained, we would expect higher labor-related costs and we could face challenges performing on various of our programs and meeting financial expectations. In addition, the macroeconomic environment, including continued challenges in the global labor market, may further affect our ability to hire,

develop and retain the necessary talented and diverse workforce, and to maintain performance levels and our corporate culture. These challenges may be further compounded by a significant element of remote work. 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, the government 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. However, the environment appears to be shifting, and if, for example, 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 or other labor-related disruptions. Any such expenses or delays could adversely affect our performance and results.

If we are unable to attract and retain a qualified workforce, we may be unable to maintain our competitive position or achieve our results, and it 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, 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 need for our operations or provide to our customers, and to do so in compliance with all applicable laws, regulations and contract terms, while maintaining strong values and cultures. Disruptions or performance problems with our subcontractors or other suppliers (referred to inclusively as suppliers), unanticipated cost growth for the products and services they provide, failure to meet regulatory or contractual requirements, unethical behavior, or a misalignment between our contractual obligations to our customers and our agreement with our suppliers, have had and may continue to have various adverse impacts on the company, including on our ability to meet our commitments to customers and financial expectations. This risk of delays and disruptions in the supply chain, and supply chain challenges more broadly, has been and continues to be significantly heightened globally, in the current macroeconomic environment.

Our ability to perform our obligations on time is adversely affected if one or more of our suppliers is unable to provide the agreed-upon products, materials or information, or perform the agreed-upon services in a timely, compliant and cost-effective manner. Changes in political or economic conditions, including changes in demand, changes in the macroeconomic environment (including inflation and labor and supply chain challenges), changes in defense budgets and/or priorities, changes in export/import restrictions, evolving requirements, or changes in access to critical technology and materials (including metals and components), among others, have adversely affected and could in the future adversely affect the financial stability of our suppliers and/or their ability to perform effectively. The inability of our suppliers to perform effectively has required and may require us to provide them additional support and/or to transition to alternate suppliers, if available, with additional costs and delays. We expect we will need to continue to provide additional resources to support certain of our suppliers in performing under our contracts. In addition, if we are unable to do that, we may face additional losses and liabilities under our current contracts and adversely impact the prospects for certain new ones.

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. For example, we require assured access to certain microelectronics. Our ability to produce and/or deliver products will be significantly impacted if the microelectronics manufacturing supply chain is cut off or significantly delayed. We and our suppliers are also facing increased regulatory requirements globally. We may be held responsible not only for our compliance, but that of our suppliers. For some components, there has been or may be only one supplier, or one domestic supplier. If that supplier cannot meet our needs, we may be unable to find a suitable alternative and to meet our obligations.

Our procurement practices are intended to reduce the risk we procure counterfeit, unauthorized or otherwise non-compliant parts or materials. We rely on our suppliers also to comply with applicable laws and contract terms, to ensure the quality of their components and effectively to mitigate the risk of cyber and security threats or other disruptions to their performance.

If our suppliers are not financially viable, incur increased costs of delays, fail to comply with legal requirements, or otherwise fail to address these risks and meet their obligations to us, it could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Risks associated with environmental, social and governance matters (ESG), including especially climate change and other environmental impacts, and increased focus and evolving views of our customers, shareholders and other stakeholders on these issues, could negatively affect our business and operations.***

Environmental, social and governance matters significantly impact our business and operations and present evolving risks and challenges. Environmental impacts, including climate change specifically, create short and long-term financial risks to our business globally. We have significant operations located in regions that have been, and may in the future be, exposed to significant weather events and other natural disasters. Climate related changes can impact natural disasters, including weather patterns, with the increased frequency and severity of significant weather events (e.g., flooding, hurricanes and tropical storms), natural hazards (e.g., increased wildfire risk), rising mean temperature and sea levels, and long-term changes in precipitation patterns (e.g., drought, desertification, and/or poor water quality).

Increased worldwide focus on climate change has led to legislative and regulatory efforts to combat both potential causes and adverse impacts of climate change, including regulation of greenhouse gas emissions. New or more stringent laws and regulations related to greenhouse gas emissions and other climate change related concerns have affected and will likely continue to affect us, our suppliers and our customers. Some of our facilities are, for example, engaged in manufacturing processes that produce greenhouse gas emissions, including carbon dioxide, or rely on products from others that do so. We are working to identify opportunities to utilize alternatives to fossil-based energy sources, to decrease our greenhouse gas emissions, to reduce our consumption of water and generation of waste, and to ensure our compliance with environmental regulations where we operate, enhancing our record of environmental sustainability. However, new and evolving laws, regulations and rule makings globally are expected to impose different and more restrictive standards, and require greater disclosures. They could also require capital investments, including to transition to low emission technologies, could adversely impact our ongoing operations, and could require changes on a more accelerated time frame. In the U.S., both the SEC and DoD are actively engaged in climate-related rule-makings. Our suppliers are expected to face similar challenges and incur additional compliance costs that may be passed on to us. These direct and indirect costs may adversely impact our results of operations and financial condition. And non-compliance with legislative and regulatory requirements could also negatively impact our reputation and ability to do business.

In 2022, the SEC and FAR council issued proposed rule-makings on climate change. The new proposed rules, depending on how they are finally adopted, as well as other changes the government might implement, could impose significant new burdens on the company and our suppliers, with significant costs and operational impacts, and adversely impact our ability to win business and operate successfully.

Changes in our customers' requirements, priorities, and ways of doing business are also likely to have an impact on our business, operations, and financial success. These changes create opportunities and risks. If, for example, our customers develop requirements and adopt policies that place further emphasis on social and environmental objectives, and we are unable to meet those evolving demands, we will be less successful in selling our products, winning new business, and growing our revenues.

The company is building on its strong environmental record, with a particular focus on the reduction of greenhouse gas emissions from our operations, and has set a goal to achieve net zero greenhouse gas emissions in our operations by 2035. The company is committed to working to achieve its climate change related objectives. However, the costs of doing so may be greater than expected, and there can be no assurance the company will achieve its objectives, or meet the evolving sustainability expectations and standards of our investors and other external stakeholders. Any failure to achieve our goals, a perception that we are not responsible stewards, or failure effectively to respond to new or evolving legal and regulatory requirements or other sustainability concerns could adversely affect our business, reputation or financial position.

The company also has a strong record and is deeply committed to maintaining robust social and governance practices consistent with our values. As with environmental sustainability matters, shareholders and other stakeholders are increasingly interested in these social and governance practices, including, for example, with respect to values, risk management oversight, responsible business practices, and diversity, equity and inclusion.

Shareholders and others have increasingly looked to a company's ESG practices, disclosures and performance when making investment or other financial decisions. Customers, regulators and oversight agencies have been increasing requirements and enforcement activities. And employees increasingly look to ESG practices in considering where to work. We believe our ESG practices, disclosures and performance are strong and growing. However, if they do not meet the evolving expectations of our stakeholders, we can expect to experience adverse impacts on our reputation and our ability to win programs, to employ and retain talent, to remain in compliance, and to continue to enjoy

access to capital. A failure to meet expectations may materially negatively affect our results of operations, ability to manage our liquidity, or implement our strategies.

The effects and costs of environmental, social and governance concerns or any failure to meet related requirements or expectations could have a material adverse effect on our 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, 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 is expected to increase if and as our international business continues to grow.

Our international business is generally subject to both U.S. and foreign laws, regulations and practices, including, without limitation, ones relating to export/import controls, sanctions, technology transfers, government contracts and procurement, local participation, data privacy and protection, exchange rates and controls, the FCPA and other anti-corruption laws, anti-boycott provisions, securities laws, labor and employment, works councils and other labor groups, taxes, environment, security restrictions and intellectual property. Failure by us, our employees, 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 export/import privileges. Failure to comply with local practices can adversely impact our ability to win and perform business. Our customers outside of the U.S. also often have the ability to terminate contracts for convenience as well as for default based on performance. Suspension or debarment, or termination of a contract due to 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.

New regulations and requirements, or changes to existing ones in 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 and resources.

Changes in laws, political leadership and environment, and/or security risks may dramatically affect our ability to conduct or continue to conduct profitable business in international markets. Our international business is impacted by changes in U.S. and non-U.S. national policies and priorities, and geopolitical relationships, any of which may be influenced by changes in the threat environment, political leadership, geopolitical and economic uncertainties, world events, government budgets, inflationary pressures and economic and political factors more generally. 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, including major global powers, as well as terrorist organizations, emerging nuclear tensions, and diverse regional security concerns. Any of these factors may impact demand for our products and services, funding for programs, our ability to perform, our supply chain, export authorizations, purchasing decisions or customer payments. Global macroeconomic conditions, as well as fluctuations in foreign currency exchange rates and credit are also likely to further impact our business.

Our contracts with non-U.S. customers in some cases include terms and reflect legal requirements that create additional risks. They may include requirements to hire, invest, manufacture or purchase locally, or specific financial obligations, including offset obligations, and they may provide for significant penalties if we fail to meet such requirements. They may also require us to enter into letters of credit, performance bonds, bank guarantees or other financial arrangements. If we are dependent on in-country suppliers, we face risks related to their failure to perform in accordance with legal requirements, particularly where we rely on a sole source supplier. Our ability to sell products globally could be adversely affected if we are unable to design our products on a cost effective basis or to obtain and retain all necessary export authorizations, which the U.S. government can deny, change or revoke. Our 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. We may need to partner successfully with non-U.S. companies, including through joint ventures, teaming agreements, co-production or other arrangements. This risk includes the ability to identify and negotiate appropriate arrangements with qualified and acceptable local partners, potential exposure for their actions, and the ability effectively to terminate these arrangements. This risk is complicated further when we partner with government-affiliated entities.

The products and services we provide, including those provided by suppliers and joint ventures, are sometimes in countries with unstable governments, economic or fiscal challenges, military or political conflicts, different business practices and/or developing legal systems. This may increase the risk to our employees, suppliers or other third parties, including for their safety, and increase our risk to a wide range of financial consequences and other 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.

- ***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 highly demanding operating conditions, to accomplish challenging missions. Problems and delays in the successful development and delivery of our solutions, including as a result of issues with our design, technology or operations, digital transformation, inability to achieve learning curve assumptions, artificial intelligence, manufacturing materials or components, or subcontractor (or other supplier) performance can prevent us from meeting requirements and create significant risk and liabilities. Similarly, failures to perform on schedule or otherwise to fulfill our contractual obligations can 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 that can negatively affect revenue, schedule and profitability, and result in loss of life or property. They 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, problems with design, quality and workmanship, country of origin of procured materials, inadequate supplier components and degradation of product performance. Factors that may affect revenue and profitability also include: inaccurate cost estimates, design issues, human factors, unforeseen costs and expenses, diversion of management focus, loss of follow-on work, replacement obligations, and repayment to the government customer of certain contract cost and fee payments previously received.

Certain contracts, primarily involving space satellite systems, contain provisions that 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 are generally 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 have been, and may in the future be, exposed to hurricanes, earthquakes, water levels, wildfires, windstorms, and other natural disasters. For example, in recent years, our facilities in Lake Charles, LA, and Melbourne, FL, were damaged by hurricanes, which temporarily interrupted site operations and had significant adverse impacts on our employees, their families and the local communities, as well as our costs and performance. We expect our facilities, operations, employees and communities in the future, particularly at facilities in coastal areas and areas prone to extreme weather events and water scarcity to continue to be at risk for future natural disasters or other weather events (which may be exacerbated by climate change). Our subcontractors and other suppliers have also been, and may in the future be, subject to natural disasters that could cause disruption and affect their ability to deliver or perform. Disruptions also impact the availability and cost of materials needed for manufacturing and could increase insurance and other operating costs, or result in a lack of available coverage. Although we take steps to mitigate these risks, including considering them in determining where to put new businesses, the damage and disruption resulting from natural disasters, which may increase, as well as delays in recovery, may be significant.

If insurance or other sources 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, including 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 and missile launches. We use and provide energetic materials, including in propulsion systems, which include products that involve highly explosive or flammable elements. We develop missile systems, and counter systems, including strategic deterrents, as well as subsystems and components. These and other activities subject us to various extraordinary risks, including (1) potential liabilities relating to nuclear or non-nuclear launch-related incidents, unintended initiation of energetic materials and explosions, including risk of personal injury, property damage and environmental harm; (2) harmful effects on the environment and human health that may result from nuclear-related activities, operations or incidents; the storage, handling and disposal of radioactive materials; and the development, testing and use of energetics, including in propulsion systems, and unintended explosions or releases and (3) to failed launches. We may be subject to reputational harm and potential liabilities arising out of such incidents or hazardous operations, whether or not the cause was within our control, and insurance may not be reasonably available. Under some circumstances, the U.S. government and prime contractors may provide for certain indemnification and other protection, including pursuant to, or in connection with, Public Law 85-804, 10 U.S.C. 2354, the Price-Anderson Nuclear Industries Indemnity Act, the NASA Space Act, the Commercial Space Launch Act and the Terrorism Risk Insurance Reauthorization Act, for certain risks, but those protections may not be available or adequate.

Certain of our products, such as medium and large caliber ammunition and propulsion systems, involve the use, manufacture and/or handling of a variety of explosive and flammable materials. These activities have resulted and may result in incidents that cause workplace injuries and fatalities, the temporary shut down or other disruption of manufacturing, production delays, environmental harm and expense, fines and liabilities to third parties. We have safety and loss prevention programs, which provide for pre-construction reviews, along with safety audits of operations involving explosive materials, to attempt to mitigate some such incidents, as well as potentially insurance coverage and indemnification, but they may not be successful.

In addition, our customers may use or misuse our products and services in ways that can be unusually hazardous or risky, or in ways that are not intended, which may create potential liabilities for our company, as well as reputational harm.

If any of these risks were to materialize (e.g. if there was a nuclear incident, or an incident related to launch activities or the use of energetics or propulsion systems), and if insurance coverage or indemnification or other protection was not fully available, 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. Increasing demands from our customers to access and obtain rights in our intellectual property, and positions taken by our suppliers and competitors challenge our ability to exploit, protect and access intellectual property.

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 at times seek to use or authorize others to use such intellectual property, including in competition with us and including where we do not believe they are entitled 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 intellectual property 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 win or perform contracts requires us to use third party intellectual property. This may require the government or our customer to provide rights to such third party intellectual property, or that we are able to negotiate directly with third parties to obtain necessary rights on reasonable terms. That may not be practicable.

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. 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 favorable.

If we are unable adequately to exploit our intellectual property rights, to protect our intellectual property rights, 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, progress and benefit from digital transformation 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 evolve regularly. Our success depends upon our ability to develop technologically advanced, innovative and cost-effective products and services and market these products and services to our customers globally. Our ability to develop innovative and technologically advanced products depends on the talent of our workforce, continued funding for, and investment in, research and development projects, 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 develop and deliver those products and services with maximum efficiency.

To perform on our contracts and to win new business, we also depend increasingly on our ability to progress successfully on our digital transformation. It is increasingly necessary to meet evolving customer requirements, to differentiate our offerings, and to achieve efficiencies that we and our suppliers/partners successfully develop digital based solutions and transform our operations. While we are committing significant resources to these efforts, and are making good progress, our company and our suppliers/partners face various substantial challenges and we may not be fully successful with digital transformation.

Our customers increasingly require us to be agile and efficient, digitally enabled and able to harness integrated digital technologies and capabilities to deliver solutions with agility and affordability. If we are unable to continue to develop new products and technologies in a timely fashion, and progress successfully to effect digital solutions and transformation, 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 also could have a material adverse effect on our ability to generate favorable financial results and maintain market share and on our financial position, results of operations and/or cash flows.

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, which could adversely affect our profitability and overall financial position.***

We endeavor to obtain insurance from financially solid, responsible, highly rated counterparties in established markets to cover significant risks and liabilities (including, for example, natural disasters, space launches and on-orbit operations, cyber security, hazardous operations, energetics and products liability). Not every risk or liability can be insured, and insurance coverage is not always reasonably available. The policy limits and terms of coverage reasonably obtainable may not be sufficient to cover actual losses or liabilities. Even if insurance coverage is available, we are not always able to obtain it at a price or on terms acceptable to us or without increasing exclusions. Disputes with insurance carriers over the availability of coverage, and the insolvency of one or more of our insurers has affected and may continue to affect the availability or timing of recovery, as well as 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 or otherwise. However, these protections are not always available, are difficult to negotiate and obtain, are typically subject to certain terms or limitations, including the availability of funds, and may not be sufficient to cover our losses or liabilities. If insurance coverage, customer indemnifications and/or other legal protections are not available or are not sufficient to cover 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 and funding requirements may fluctuate significantly depending upon investment performance of plan assets, changes in actuarial assumptions, and legislative or other regulatory actions.***

The company's pension and OPB obligations and related expenses are dependent upon the investment performance of plan assets and various assumptions, including discount rates, mortality and the estimated long-term rates of return on plan assets. Changes in assumptions associated with our pension and OPB plans, investment performance of plan assets, and gains or losses associated with changes in valuation of marketable securities related to our non-qualified plans and other non-operating assets could have a material adverse effect on our financial position, results of operations and/or cash flows.

Funding requirements for our pension plans, including Pension Benefit Guaranty Corporation premiums, 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 they are recognized for financial statement purposes or when pension funding is made. These timing differences, as well as government challenges to pension and OPB cost recovery, could have a material adverse effect on our financial position, results of operations and/or cash flows.

- ***Business investments and/or recorded goodwill and other long-lived assets may become impaired, resulting in substantial losses and write-downs that would reduce our operating income.***

Goodwill accounts for approximately 40 percent of our total assets as of December 31, 2022. Although we currently have excess fair value of our reporting units over their respective carrying values, changes in business conditions or in the market-based inputs used in our goodwill impairment test, could result in significant write-offs of goodwill or other long-lived assets, which 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," "guidance," "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 macroeconomic, health, security and political environments, including inflationary pressures, labor and supply chain challenges and the COVID-19 pandemic, which have caused and will continue to cause significant challenges, instability and uncertainty. They include:

Industry and Economic Risks

- our dependence on the U.S. government for a substantial portion of our business

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- significant delays or reductions in appropriations and/or for our programs, and U.S. government funding and program support more broadly, including as a result of a prolonged continuing resolution and/or government shutdown, and/or related to hostilities and other global events
- significant delays or reductions in payments as a result of or related to a breach of the debt ceiling
- the use of estimates when accounting for our contracts and the effect of contract cost growth and our efforts to recover or offset such costs and/or changes in estimated contract costs and revenues, including as a result of inflationary pressures, labor shortages, supply chain challenges and/or other macroeconomic factors, and risks related to management's judgments and assumptions in estimating and/or projecting contract revenue and performance which may be inaccurate
- continued pressures from macroeconomic trends, including inflation, supply chain delays and disruptions, and labor challenges, including on costs, schedules, performance and ability to meet expectations
- increased competition within our markets and bid protests

Legal and Regulatory Risks

- investigations, claims, disputes, enforcement actions, litigation (including criminal, civil and administrative) and/or other legal proceedings
- the improper conduct of employees, agents, subcontractors, suppliers, business partners or joint ventures in which we participate, including the impact on our reputation and our ability to do business
- changes in procurement and other laws, SEC, DoD and other rules and regulations, contract terms and practices applicable to our industry, findings by the U.S. government as to our compliance with such requirements, more aggressive enforcement of such requirements and changes in our customers' business practices globally
- environmental matters, including unforeseen environmental costs and government and third party claims
- unanticipated changes in our tax provisions or exposure to additional tax liabilities

Business and Operational Risks

- impacts related to health epidemics, pandemics, including the COVID-19 pandemic, such as labor, supply chain or financial, schedule or cost impacts (without corresponding recovery), among other impacts
- cyber and other security threats or disruptions faced by us, our customers or our suppliers and other partners, and changes in related regulations
- our ability to attract and retain a qualified, talented and diverse workforce with the necessary security clearances to meet our performance obligations
- the performance and viability of our subcontractors and suppliers and the availability and pricing of raw materials and components, particularly with inflationary pressures, increased costs, shortages in labor and financial resources, supply chain disruptions, and extended material lead times
- environmental, social and governance matters, including especially climate change, their impacts on our company, our operations and our stakeholders (employees, suppliers, customers, shareholders and regulators), and changes in laws, regulations and priorities related to these issues
- our exposure to additional risks as a result of our international business, including risks related to global security, geopolitical and economic factors, misconduct, suppliers, laws and regulations
- 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
- natural disasters
- 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
- our ability appropriately to exploit and/or protect intellectual property rights
- our ability to develop new products and technologies, progress digital transformation, and maintain technologies, facilities, and equipment to win new competitions and meet the needs of our customers

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General and Other Risk Factors

- the adequacy and availability of, and ability to obtain, insurance coverage, customer indemnifications or other liability protections
- the future investment performance of plan assets, gains or losses associated with changes in valuation of marketable securities related to our non-qualified benefit plans, 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
- changes in business conditions that could impact business investments and/or recorded goodwill or the value of other long-lived assets, and other potential future liabilities

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, 2022, we had approximately 52 million square feet of floor space at 473 separate locations, primarily in the U.S., for manufacturing, warehousing, research and testing, administration and various other uses. We leased to third parties approximately 255,000 square feet of our owned and leased facilities. The company's major operations are 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; Elkton, MD; Elk River and Plymouth, MN; Dulles, McLean and Radford, 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 and Gilbert, AZ; Azusa, Carson, Los Angeles, Manhattan Beach, Oxnard, Redondo Beach and San Diego, CA; Aurora and Colorado Springs, CO; Beltsville, MD; Devens, MA; Brigham City, Clearfield, Magna, Ogden, Roy and Tremonton, UT; and Dulles and Sterling, VA.

Corporate

Falls Church, VA

The following is a summary of our floor space at December 31, 2022:

<i>Square feet (in thousands)</i>	Owned	Leased	U.S. Government Owned/Leased	Total
Aeronautics Systems	3,170	6,427	3,302	12,899
Defense Systems	1,367	3,397	2,285	7,049
Mission Systems	7,995	4,331	—	12,326
Space Systems	9,350	8,659	548	18,557
Corporate	372	305	—	677
Total	22,254	23,119	6,135	51,508

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 153,157,924 shares and 156,284,423 shares were issued and outstanding as of December 31, 2022 and 2021, 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, 2022 and 2021.

MARKET INFORMATION

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

HOLDERS

As of January 23, 2023, there were 19,192 common shareholders of record.

PURCHASES OF EQUITY SECURITIES BY THE ISSUER AND AFFILIATED PURCHASERS

The table below summarizes our repurchases of common stock during the three months ended December 31, 2022:

Period	Total Number of Shares Purchased	Average Price Paid per Share⁽¹⁾	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs	Approximate Dollar Value of Shares that May Yet Be Purchased under the Plans or Programs (\$ in millions)
October 1, 2022 - October 28, 2022	235,900	\$ 503.31	235,900	\$ 3,000
October 29, 2022 - November 25, 2022	485,309	519.87	485,309	2,748
November 26, 2022 - December 31, 2022	215,725	532.61	215,725	2,633
Total	936,934	\$ 518.63	936,934	\$ 2,633

⁽¹⁾ Includes commissions paid.

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

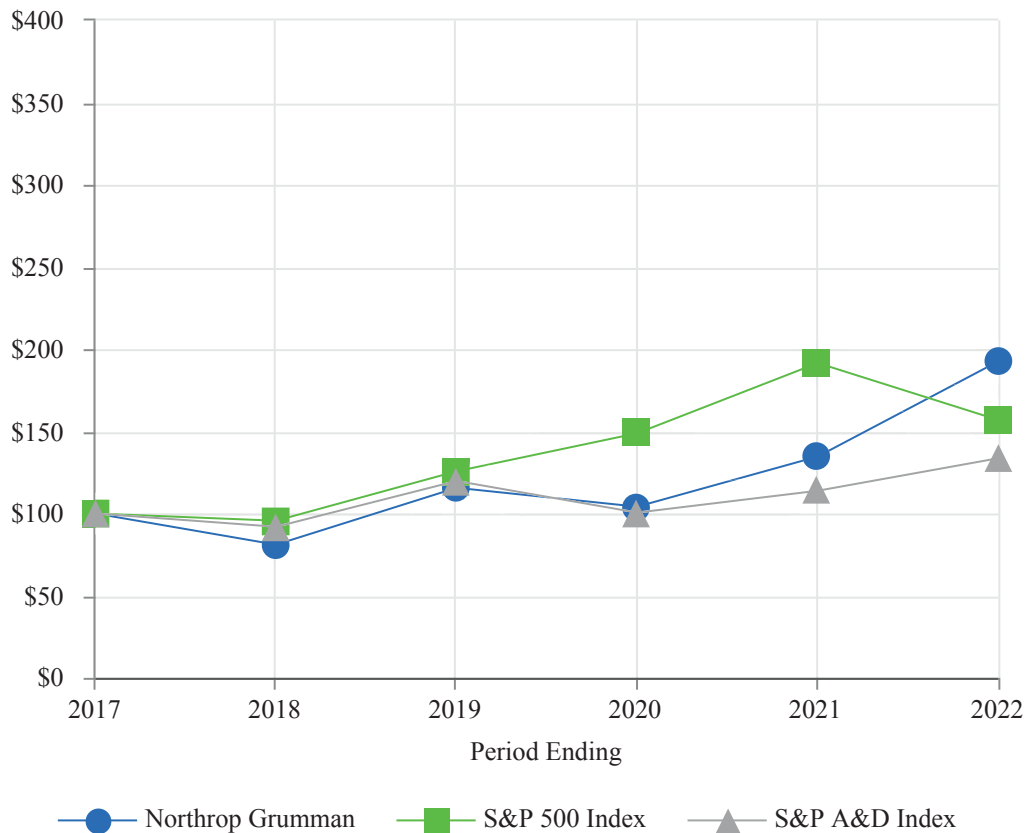
See Note 3 to the consolidated financial statements for further information on our share repurchase programs.

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STOCK PERFORMANCE GRAPH

Comparison of Cumulative Five Year Total Return

Among Northrop Grumman, the Standard & Poor's (S&P) 500 Index and the S&P Aerospace & Defense (A&D) Index



- Assumes \$100 invested at the close of business on December 31, 2017, in Northrop Grumman Corporation common stock, the S&P 500 Index and the S&P A&D Index.
- The cumulative total return assumes reinvestment of dividends.
- The S&P A&D 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, 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 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. [Reserved]

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, 2021 (“2021 Annual Report on Form 10-K”).

Global Security 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, including in particular major global powers, as well as terrorist organizations, increasing nuclear tensions, diverse regional security concerns and political instability. 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 circumstances and priorities. Our operations and financial performance, as well as demand for our products and services, are impacted by global events, including violence and unrest. The same is true for our suppliers and other business partners.

The conflict in Ukraine has increased global tensions and instability, highlighted threats and increased global demand, as well as further disrupted global supply chains and added costs. We have experienced a modest increase in demand for certain of our goods and services directly and indirectly related to the conflict in the Ukraine. We also have experienced a slight disruption to some of our programs and supply chain, including unanticipated cost growth, as a result of the conflict in Ukraine and economic sanctions. However, we do not have sizable business dealings in Russia or Ukraine, and do not anticipate significant adverse impacts from the ongoing conflict.

More broadly, the conflict in Ukraine and threats elsewhere have heightened tensions and highlighted security requirements globally, especially in Europe and the Pacific region, as well as the U.S. We have started to see, and expect to continue to see, increased demand for defense products and services from allies and partner nations, particularly in those areas. We are actively exploring both opportunities and risks.

For further information on the global security environment, including the risks related thereto, see “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” “Liquidity and Capital Resources,” “Quantitative and Qualitative Disclosures About Market Risks” and “Risk Factors.”

Global Health and Economic Environment

COVID-19

Since at least March 2020, when it was first characterized as a global pandemic, COVID-19 has dramatically impacted and continues to impact the global health and economic environments, including millions of confirmed cases and deaths, business slowdowns or shutdowns, labor shortfalls, supply chain challenges, regulatory challenges, inflationary pressures and market volatility. We discussed in some detail in our Annual Reports on Form 10-K for the fiscal years ended December 31, 2020 and 2021, and subsequent SEC filings, the pandemic, its impacts and risks, and actions taken up to the time of each filing. In this Form 10-K, we provide a further update.

In 2022, the pandemic continued to have significant adverse impacts on the global health and macroeconomic environments, particularly with the spread of new variants and other viruses and illnesses, ongoing disruption of the labor force and supply chains, continued inflation, and market volatility and uncertainties. We expect such adverse impacts to continue. However, with extraordinary efforts by our employees, our governments and customers, our partners and our company, direct COVID-19-related impacts on our business generally declined in 2022. While we cannot predict the future course of the pandemic or its consequences, we are not currently assuming significant additional direct COVID-19 related impacts on our business.

The company continues to work to monitor and address the pandemic, including its impact on our company, our employees, our customers, our suppliers and our communities. Our goals have been, and continue to be, to keep our employees safe, to lessen the potential adverse impacts, both health and economic, and to continue to position the company for long-term success. Like the communities in which we operate, our actions have varied, and will continue to vary, depending on the spread of COVID-19 and other illnesses, applicable government requirements, and the needs of our stakeholders.

Global Economic Environment

In part as a result of the COVID-19 pandemic, the global economic environment has experienced, and continues to experience, extraordinary challenges, including high rates of inflation and inflationary pressures; widespread delays and disruptions in supply chains; workforce challenges, including labor shortages (especially in critical skill areas); and market volatility. These macroeconomic factors have contributed, and we expect will continue to contribute, to increased costs, delays and other performance challenges, as well as increased competing demands for limited

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resources to address such increased costs and other challenges, for our company, our suppliers and partners, and our customers. For example, as discussed in greater detail in Note 12 to the consolidated financial statements, our latest estimated cost to complete the low-rate initial production (LRIP) phase of the B-21 program reflects updated estimates for adverse impacts from these macroeconomic factors, as well as potential opportunities to address them.

We continue to work hard to mitigate some of the challenges caused by the current macroeconomic environment on our business, including by taking steps to support our suppliers and small businesses and enhancing our workforce through extensive hiring, development and retention efforts. However, the broader macroeconomic environment, including inflationary pressures and supply chain challenges, continued adversely to affect the company's results for the year ended December 31, 2022. We cannot clearly predict how long these macroeconomic challenges will continue, or how they will change over time, or what additional resources will be available, but we expect to see this challenging macroeconomic environment continue adversely to impact the global economy, our customers, our industry and our company in 2023.

In addition, increased interest rates, raising the cost of borrowing for governments, could further impact government spending priorities (in the U.S. and allied countries, in particular), including their demand for defense products. Economic tensions and changes in international trade policies, including higher tariffs on imported goods and materials and renegotiation of free trade agreements, could also further impact the global market for defense products, services and solutions.

U.S. Political, Budget and Regulatory Environment

On March 15, 2022, the President signed into law the Consolidated Appropriations Act for FY 2022, which provided full-year funding for federal agencies, including \$782 billion for national defense. This represented an approximately \$42 billion or 6 percent increase above the budget for FY 2021, approximately \$30 billion more than the Administration had initially requested. The Pentagon's portion of the overall national defense budget for FY 2022 was \$743 billion.

On March 28, 2022, the President proposed his budget for FY 2023, which included \$813 billion for national defense programs, approximately \$31 billion or 4 percent higher than what was appropriated in FY 2022. The Pentagon's portion of the overall requested national defense budget was \$773 billion.

On December 23, 2022, the President signed the National Defense Authorization Act (NDAA) for FY 2023, which supports approximately \$858 billion in FY 2023 funding for national defense, \$817 billion of which is for the DoD. In addition, the FY 2023 NDAA grants DoD discretionary authority under limited circumstances to provide extraordinary relief to contractors to address certain inflationary impacts. Although discussions have occurred, DoD has not yet issued written guidance for how it intends to exercise this authority.

On December 29, 2022, the President signed an Omnibus appropriations act for FY 2023 that provided \$858 billion for national defense programs, approximately \$45 billion more than the Administration initially requested for FY 2023 and approximately \$76 billion or 10 percent higher than what was appropriated in FY 2022. The Pentagon's portion of the overall national defense budget for FY 2023 is \$817 billion. It includes up to \$1 billion for extraordinary relief in FY 2023.

In addition to the U.S. national security spending detailed above, the U.S. has pledged over \$100 billion in security assistance to address the ongoing conflict in Ukraine across FY 2022 and FY 2023, including approximately \$50 billion in DoD spending. Assistance includes transfers of weapons systems from U.S. inventories, orders for production of additional weapons systems, both to backfill U.S. stockpiles and for Ukraine directly, and assistance from U.S. capabilities.

It is difficult to predict the specific course of future defense budgets. Current and future requirements related to the conflict in Ukraine, threats in the Pacific regions and other security priorities, as well as global inflation, the national debt, the costs of the pandemic and other domestic priorities, among other things, in the U.S. and globally, will continue to impact our customers' budgets and priorities, and our industry. Current tensions within Congress and the wider U.S. political environment may also impact defense budgets and government spending more broadly.

We believe the current global security environment highlights the significant national security threats to our nation and our allies, and the need for strong deterrence and a robust defense capability. We believe that our capabilities, particularly in space, C4ISR, missile defense, battle management, advanced weapons, survivable aircraft and mission systems should help our customers in the U.S. and globally defend against current and future threats and, as a result, continue to allow for long-term profitable business growth.

The Bipartisan Budget Act of 2019 suspended the debt ceiling through July 31, 2021. In October 2021, the statutory debt limit was increased by \$480 billion and, in December 2021, it was further increased by \$2.5 trillion, which is

currently expected to allow the Treasury Department to finance the government into 2023. In January 2023, the debt ceiling was reached and the Treasury Department began taking “extraordinary measures” to finance the government and avoid a breach of the debt ceiling. We expect statutory action will be needed in 2023 to increase or suspend the debt ceiling.

During the third quarter of 2022, the Creating Helpful Incentives to Produce Semiconductors (CHIPS) Act of 2022, which includes an advanced manufacturing investment tax credit, among other provisions, and the Inflation Reduction Act of 2022, which includes implementation of a new alternative minimum tax and a one percent excise tax on share repurchases, among other provisions, were signed into law. We expect the excise tax on share repurchases to impact us beginning in 2023; however, we do not expect this tax or any other provision of this legislation to have a material impact on our results of operations or cash flows.

More broadly, we have seen, and expect to continue to see, an accelerated pace of new rulemakings, new and expanded uses of existing authorities, changing legal rulings and landscapes, and aggressive enforcement actions. These changes and the accelerated pace of change, not only impose additional obligations and risk, but also create further uncertainty regarding our operating environment.

The political environment, federal budget, debt ceiling and regulatory environment are expected to continue to be the subject of considerable debate, especially in light of the ongoing conflict in Ukraine, the inflationary environment and political tensions. The results of those debates could have material impacts on defense spending broadly and the company’s programs in particular. We anticipate that the broader macroeconomic environment, with ongoing inflationary pressures, labor challenges, and supply chain disruption, among other considerations, will continue to play a significant role in the outcome of these debates and, in turn, on our industry and company.

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

Disposition of IT and Mission Support Services Business

Effective January 30, 2021 (the “Divestiture date”), we completed the sale of our IT and mission support services business (the “IT services divestiture”) for \$3.4 billion in cash and recorded a pre-tax gain of \$2.0 billion. The IT and mission support services business was comprised of the majority of the former IS&S division of Defense Systems (excluding the Vinnell Arabia business); select cyber, intelligence and missions support programs, which were part of the former CIMS division of Mission Systems; and the former Space Technical Services business unit of Space Systems. Operating results include sales and operating income for the IT and mission support services business prior to the Divestiture date; therefore, no sales and operating income were recognized for this business during the year ended December 31, 2022.

The company recorded pre-tax profit of the IT and mission support services business of \$20 million and \$247 million for the years ended December 31, 2021 and 2020, respectively.

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 the applicable FAR and CAS requirements that govern our U.S. government business, 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 primarily focus on changes in sales and operating margin rates. 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 operating 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, which are typically described in terms of changes in net EAC adjustments. 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 accounting principles generally accepted in the United States of America (“GAAP” or “FAS”). Organic sales is defined as total sales excluding sales attributable to the company’s IT services divestiture. This measure may be useful to investors and other users of our financial statements as a supplemental measure in evaluating the company’s underlying sales growth as well as in providing an understanding of our ongoing business and future sales trends by presenting the company’s sales before the impact of divestiture activity.

Transaction-adjusted net earnings and transaction-adjusted earnings per share (transaction-adjusted EPS) exclude impacts related to the IT services divestiture, including the gain on sale of the business, associated federal and state income tax expenses, transaction costs, and the make-whole premium for early debt redemption. They also exclude the impact of mark-to-market pension and OPB (“MTM”) benefit/(expense) and related tax impacts, which are generally only recognized during the fourth quarter. 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 divestiture activity and 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 the IT services divestiture and MTM accounting are not considered in management’s assessment of the company’s operating performance or in its determination of incentive compensation awards.

We reconcile these non-GAAP financial measures to their most directly comparable GAAP financial measures below. These non-GAAP measures may not be defined and calculated by other companies in the same manner and should not be considered in isolation or as an alternative to operating results presented in accordance with GAAP.

Selected financial highlights are presented in the table below:

<i>\$ in millions, except per share amounts</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Sales	\$ 36,602	\$ 35,667	\$ 36,799	3 %	(3)%
Operating costs and expenses	33,001	31,996	32,734	3 %	(2)%
<i>Operating costs and expenses as a % of sales</i>	90.2 %	89.7 %	89.0 %		
Gain on sale of business	—	1,980	—	NM	NM
Operating income	3,601	5,651	4,065	(36)%	39 %
<i>Operating margin rate</i>	9.8 %	15.8 %	11.0 %		
Mark-to-market pension and OPB benefit (expense)	1,232	2,355	(1,034)	(48)%	(328)%
Federal and foreign income tax expense	940	1,933	539	(51)%	259 %
<i>Effective income tax rate</i>	16.1 %	21.6 %	14.5 %		
Net earnings	4,896	7,005	3,189	(30)%	120 %
Diluted earnings per share	\$ 31.47	\$ 43.54	\$ 19.03	(28)%	129 %

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Sales

The tables below reconcile sales to organic sales:

<i>\$ in millions</i>	Year Ended December 31						Organic sales % change
	2022			2021			
	Sales	IT services sales	Organic sales	Sales	IT services sales	Organic sales	
Aeronautics Systems	\$ 10,531	\$ —	\$ 10,531	\$ 11,259	\$ —	\$ 11,259	(6)%
Defense Systems	5,579	—	5,579	5,776	(106)	5,670	(2)%
Mission Systems	10,396	—	10,396	10,134	(42)	10,092	3%
Space Systems	12,275	—	12,275	10,608	(16)	10,592	16%
Intersegment eliminations	(2,179)	—	(2,179)	(2,110)	2	(2,108)	
Total	\$ 36,602	\$ —	\$ 36,602	\$ 35,667	\$ (162)	\$ 35,505	3%

<i>\$ in millions</i>	Year Ended December 31						Organic sales % change
	2021			2020			
	Sales	IT services sales	Organic sales	Sales	IT services sales	Organic sales	
Aeronautics Systems	\$ 11,259	\$ —	\$ 11,259	\$ 12,169	\$ —	\$ 12,169	(7)%
Defense Systems	5,776	(106)	5,670	7,543	(1,637)	5,906	(4)%
Mission Systems	10,134	(42)	10,092	10,080	(527)	9,553	6%
Space Systems	10,608	(16)	10,592	8,744	(182)	8,562	24%
Intersegment eliminations	(2,110)	2	(2,108)	(1,737)	17	(1,720)	
Total	\$ 35,667	\$ (162)	\$ 35,505	\$ 36,799	\$ (2,329)	\$ 34,470	3%

2022 sales increased \$935 million and 2022 organic sales increased \$1.1 billion, or 3 percent, due to higher sales at Space Systems and Mission Systems, partially offset by lower sales at Aeronautics Systems and Defense Systems. 2022 sales reflect strong demand, the timing of material receipts and improving trends in labor availability during the second half of the year.

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

2022 operating income decreased \$2.1 billion, or 36 percent, primarily due to a \$2.0 billion pre-tax gain on sale and \$192 million of unallocated corporate expenses recognized in the prior year associated with the IT services divestiture. Operating income also decreased due to a \$330 million reduction in the FAS/CAS operating adjustment, which more than offset higher segment operating income and lower non-divestiture-related unallocated corporate expense. 2022 operating margin rate declined to 9.8 percent from 15.8 percent reflecting the items above.

2022 G&A costs as a percentage of sales increased to 10.6 percent from 10.1 percent, primarily due to an increase in investments for future business opportunities.

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

NORTHROP GRUMMAN CORPORATION

Mark-to-Market Pension and OPB Benefit/Expense

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

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Actuarial gains (losses) on projected benefit obligation	\$ 9,662	\$ 1,163	\$ (3,570)
Actuarial (losses) gains on plan assets	(8,430)	1,192	2,536
MTM benefit (expense)	\$ 1,232	\$ 2,355	\$ (1,034)

2022 MTM benefit (expense) of \$1.2 billion was primarily driven by a 256 basis point increase in the discount rate from year end 2021, partially offset by losses of 15.4 percent on plan assets compared to our 7.5 percent asset return assumption.

Federal and Foreign Income Taxes

The 2022 effective tax rate (ETR) decreased to 16.1 percent from 21.6 percent primarily due to an \$86 million benefit resulting from the resolution of the IRS examination of certain legacy OATK tax returns, as well as additional federal income taxes in the prior year resulting from the IT services divestiture. The company's 2022 MTM benefit increased the 2022 ETR by 1.2 percentage points; however, the 2021 MTM benefit did not significantly impact the 2021 ETR. See Note 7 to the consolidated financial statements for additional information.

Net Earnings

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

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Net earnings	\$ 4,896	\$ 7,005	\$ 3,189	(30)%	120 %
MTM (benefit) expense	(1,232)	(2,355)	1,034	(48)%	(328)%
MTM-related deferred state tax expense (benefit) ⁽¹⁾	65	124	(54)	(48)%	(330)%
Federal tax expense (benefit) of items above ⁽²⁾	245	469	(206)	(48)%	(328)%
MTM adjustment, net of tax	(922)	(1,762)	774	(48)%	(328)%
Gain on sale of business	—	(1,980)	—	NM	NM
State tax impact ⁽³⁾	—	160	—	NM	NM
Transaction costs	—	32	—	NM	NM
Make-whole premium	—	54	—	NM	NM
Federal tax impact of items above ⁽⁴⁾	—	614	—	NM	NM
Transaction adjustment, net of tax	—	(1,120)	—	NM	NM
Transaction-adjusted net earnings	\$ 3,974	\$ 4,123	\$ 3,963	(4)%	4 %

⁽¹⁾ The deferred state tax impact in each period was calculated using the company's blended state tax rate of 5.25 percent and is included in Unallocated corporate expense within operating income.

⁽²⁾ The federal tax impact in each period was calculated by subtracting the deferred state tax impact from MTM benefit (expense) and applying the 21 percent federal statutory rate.

⁽³⁾ The state tax impact includes \$62 million of incremental tax expense related to \$1.2 billion of nondeductible goodwill in the divested business.

⁽⁴⁾ The federal tax impact was calculated by applying the 21 percent federal statutory rate to the adjustment items and also includes \$250 million of incremental tax expense related to \$1.2 billion of nondeductible goodwill in the divested business.

2022 net earnings decreased \$2.1 billion, or 30 percent, principally due to a \$1.1 billion decrease associated with the IT services divestiture, net of tax, and an \$840 million decrease in our MTM benefit (expense), net of tax.

Transaction-adjusted net earnings decreased \$149 million, or 4 percent, primarily due to a \$330 million reduction in the FAS/CAS operating adjustment and \$97 million of lower returns on marketable securities, partially offset by lower income tax and interest expense and higher segment operating income.

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Diluted Earnings Per Share

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

	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Diluted earnings per share	\$ 31.47	\$ 43.54	\$ 19.03	(28)%	129 %
MTM (benefit) expense per share	(7.92)	(14.64)	6.17	(46)%	(337)%
MTM-related deferred state tax expense (benefit) per share ⁽¹⁾	0.42	0.77	(0.32)	(45)%	(341)%
Federal tax expense (benefit) of items above per share ⁽²⁾	1.57	2.92	(1.23)	(46)%	(337)%
MTM adjustment per share, net of tax	(5.93)	(10.95)	4.62	(46)%	(337)%
Gain on sale of business per share	—	(12.31)	—	NM	NM
State tax impact ⁽³⁾ per share	—	0.99	—	NM	NM
Transaction costs per share	—	0.20	—	NM	NM
Make-whole premium per share	—	0.34	—	NM	NM
Federal tax impact of items above ⁽⁴⁾ per share	—	3.82	—	NM	NM
Transaction adjustment per share, net of tax	—	(6.96)	—	NM	NM
Transaction-adjusted EPS	\$ 25.54	\$ 25.63	\$ 23.65	— %	8 %

⁽¹⁾ The deferred state tax impact in each period was calculated using the company's blended state tax rate of 5.25 percent and is included in Unallocated corporate expense within operating income.

⁽²⁾ The federal tax impact in each period was calculated by subtracting the deferred state tax impact from MTM benefit (expense) and applying the 21 percent federal statutory rate.

⁽³⁾ The state tax impact includes \$62 million of incremental tax expense related to \$1.2 billion of nondeductible goodwill in the divested business.

⁽⁴⁾ The federal tax impact was calculated by applying the 21 percent federal statutory rate to the adjustment items and also includes \$250 million of incremental tax expense related to \$1.2 billion of nondeductible goodwill in the divested business.

2022 diluted earnings per share decreased \$12.07, or 28 percent, principally due to a \$6.96 decrease associated with the IT services divestiture, net of tax, and a \$5.02 decrease in our 2022 MTM benefit, net of tax. Transaction-adjusted EPS was comparable with the prior year and reflects a 4 percent reduction in transaction-adjusted net earnings and a 3 percent decrease in weighted-average diluted shares outstanding.

SEGMENT OPERATING RESULTS

Basis of Presentation

The company is aligned in four operating sectors, which also comprise our reportable segments: Aeronautics Systems, Defense Systems, Mission Systems and Space Systems. For a more complete description of each segment's products and services, see "Business."

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

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

This section discusses segment sales, operating income and operating margin rate. 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 measures that reflect the combined operating income of our four segments less the operating income associated with intersegment sales. Segment operating income includes pension expense allocated to our sectors under FAR and CAS and excludes FAS pension service expense and unallocated corporate items (certain corporate-level expenses, which are not considered allowable or allocable under applicable FAR and CAS requirements, and costs not considered part of management’s evaluation of segment operating performance). These non-GAAP measures may be useful to investors and other users of our financial statements as supplemental measures in evaluating the financial performance and operational trends of our sectors. These measures may not be defined and calculated by other companies in the same manner and should not be considered in isolation or as alternatives to operating results presented in accordance with GAAP.

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Operating income	\$ 3,601	\$ 5,651	\$ 4,065	(36)%	39 %
<i>Operating margin rate</i>	9.8 %	15.8 %	11.0 %		
Reconciliation to segment operating income:					
CAS pension expense	(167)	(544)	(827)	(69)%	(34)%
FAS pension service expense	367	414	409	(11)%	1 %
FAS/CAS operating adjustment	200	(130)	(418)	(254)%	(69)%
Gain on sale of business	—	(1,980)	—	NM	NM
IT services divestiture – unallowable state taxes and transaction costs	—	192	—	NM	NM
Intangible asset amortization and PP&E step-up depreciation	242	254	322	(5)%	(21)%
MTM-related deferred state tax expense (benefit) ⁽¹⁾	65	124	(54)	(48)%	(330)%
Other unallocated corporate expense	145	106	273	37 %	(61)%
Unallocated corporate expense (income)	452	(1,304)	541	(135)%	(341)%
Segment operating income	\$ 4,253	\$ 4,217	\$ 4,188	1 %	1 %
<i>Segment operating margin rate</i>	11.6 %	11.8 %	11.4 %		

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

Segment Operating Income and Margin Rate

2022 segment operating income increased \$36 million, or 1 percent, due to higher operating income at Mission Systems, Space Systems and Aeronautics Systems, partially offset by lower operating income at Defense Systems due, in part, to the impact of the IT services divestiture. 2021 segment operating income included \$20 million from the IT services business, as well as a benefit of approximately \$100 million due to the impact of lower overhead rates on the company’s fixed price contracts. Segment operating margin rate decreased to 11.6 percent from 11.8 percent principally due to lower net EAC adjustments due, in part, to macroeconomic impacts, including inflationary pressures and supply chain challenges.

FAS/CAS Operating Adjustment

The decrease in our 2022 FAS/CAS operating adjustment is due to lower CAS pension expense resulting from favorable plan asset returns in 2021 and changes in certain CAS actuarial assumptions as of December 31, 2021.

Unallocated Corporate Expense (Income)

The change in 2022 unallocated corporate expense (income) is primarily due to the prior year \$2.0 billion pre-tax gain on sale and \$192 million of unallowable state taxes and transaction costs associated with the IT services divestiture.

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

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Favorable EAC adjustments	\$ 1,337	\$ 1,242	\$ 1,082
Unfavorable EAC adjustments	(977)	(715)	(616)
Net EAC adjustments	\$ 360	\$ 527	\$ 466

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

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Aeronautics Systems	\$ 174	\$ 25	\$ 77
Defense Systems	111	113	148
Mission Systems	138	263	216
Space Systems	(38)	134	33
Eliminations	(25)	(8)	(8)
Net EAC adjustments	\$ 360	\$ 527	\$ 466

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

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Sales	\$ 10,531	\$ 11,259	\$ 12,169	(6)%	(7)%
Operating income	1,116	1,093	1,206	2 %	(9)%
<i>Operating margin rate</i>	10.6 %	9.7 %	9.9 %		

Sales

2022 sales decreased \$728 million, or 6 percent, due to lower volume in both Manned Aircraft and Autonomous Systems, including restricted programs, a \$180 million decrease on the Global Hawk program, a \$159 million decrease on the E-2 program and a \$119 million decrease on the JSTARS program as it nears completion.

Operating Income

2022 operating income increased \$23 million, or 2 percent, due to a higher operating margin rate, partially offset by lower sales. 2022 operating margin rate increased to 10.6 percent from 9.7 percent primarily due to higher net favorable EAC adjustments and a \$38 million gain on a property sale. Higher net favorable EAC adjustments reflect \$133 million of positive adjustments on the engineering, manufacturing and development phase of the B-21 program, partially offset by lower net EAC adjustments associated with other restricted work, as well as \$135 million of unfavorable EAC adjustments on F-35 in the prior year. The prior year operating margin rate also reflects a \$21 million benefit associated with favorable overhead rate performance.

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DEFENSE SYSTEMS

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Sales	\$ 5,579	\$ 5,776	\$ 7,543	(3)%	(23)%
Operating income	664	696	846	(5)%	(18)%
<i>Operating margin rate</i>	<i>11.9 %</i>	<i>12.0 %</i>	<i>11.2 %</i>		

Sales

2022 sales decreased \$197 million, or 3 percent, due, in part, to a \$106 million reduction in sales related to the IT services divestiture. 2022 organic sales decreased \$91 million, or 2 percent, principally due to a \$154 million decrease from lower scope on an international training program, completion of a Joint Services support program and wind-down of the UKAWACS and JSTARS programs, partially offset by a \$144 million increase from ramp-up on the Integrated Air and Missile Defense Battle Command System (IBCS) program, as well as higher volume on the Special Ammunition and Weapon Systems (SAWS) and NATO Alliance Ground Surveillance In-Service Support (NATO AGS ISS) programs.

Operating Income

2022 operating income decreased \$32 million, or 5 percent, due, in part, to a \$14 million reduction in operating income related to the IT services divestiture, as well as lower sales. Operating margin rate was comparable with the prior year.

MISSION SYSTEMS

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Sales	\$ 10,396	\$ 10,134	\$ 10,080	3 %	1 %
Operating income	1,618	1,579	1,459	2 %	8 %
<i>Operating margin rate</i>	<i>15.6 %</i>	<i>15.6 %</i>	<i>14.5 %</i>		

Sales

2022 sales increased \$262 million, or 3 percent, and includes a \$42 million reduction in sales related to the IT services divestiture. 2022 organic sales increased \$304 million, or 3 percent, primarily due to higher restricted sales in the Networked Information Solutions business area, \$107 million of higher volume on airborne radar programs and a \$107 million increase on the Surface Electronic Warfare Improvement Program (SEWIP). These increases were partially offset by a \$231 million decrease on Navigation, Targeting and Survivability programs and a \$118 million decrease on the Joint Counter Radio-Controlled Improvised Explosive Device Electronic Warfare (JCREW) program.

Operating Income

2022 operating income increased \$39 million, or 2 percent, due to higher sales. Operating margin rate was comparable with the prior year and reflects a \$33 million benefit recognized in connection with a contract-related legal matter, partially offset by the previously described overhead rate benefit to fixed price contracts in the prior year.

SPACE SYSTEMS

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Sales	\$ 12,275	\$ 10,608	\$ 8,744	16 %	21 %
Operating income	1,158	1,121	893	3 %	26 %
<i>Operating margin rate</i>	<i>9.4 %</i>	<i>10.6 %</i>	<i>10.2 %</i>		

Sales

2022 sales and organic sales increased \$1.7 billion, or 16 percent, due to higher sales in both business areas. Launch & Strategic Missiles sales increased primarily due to ramp-up on development programs, including a \$454 million increase on the Ground Based Strategic Deterrent (GBSD) program and a \$449 million increase on the Next Generation Interceptor (NGI) program, as well as higher volume on the GEM63 program in support of Amazon’s Project Kuiper. Sales in the Space business area were driven by a \$320 million increase due to ramp-up on the Space Development Agency (SDA) Tranche 1 Transport and Tracking Layer programs awarded earlier this year, higher volume on restricted programs and a \$134 million increase in sales on the Commercial Resupply Services (CRS) program, partially offset by a \$149 million decrease in sales for the James Webb Space Telescope after its successful launch in December 2021.

Operating Income

2022 operating income increased \$37 million, or 3 percent, due to higher sales, partially offset by a lower operating margin rate. Operating margin rate decreased to 9.4 percent from 10.6 percent primarily due to lower net EAC adjustments and a \$45 million write-down of commercial inventory, partially offset by a \$96 million gain recognized in connection with a land exchange transaction.

NORTHROP GRUMMAN CORPORATION

PRODUCT AND SERVICE ANALYSIS

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

<i>\$ in millions</i>	Year Ended December 31					
	2022		2021		2020	
Segment Information:	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses	Sales	Operating Costs and Expenses
Aeronautics Systems						
Product	\$ 7,981	\$ 7,161	\$ 9,408	\$ 8,534	\$ 10,437	\$ 9,435
Service	2,311	2,042	1,662	1,462	1,610	1,417
Intersegment eliminations	239	212	189	170	122	111
Total Aeronautics Systems	10,531	9,415	11,259	10,166	12,169	10,963
Defense Systems						
Product	2,717	2,385	2,564	2,243	3,024	2,740
Service	2,056	1,819	2,423	2,137	3,791	3,305
Intersegment eliminations	806	711	789	700	728	652
Total Defense Systems	5,579	4,915	5,776	5,080	7,543	6,697
Mission Systems						
Product	7,376	6,291	7,064	6,017	6,744	5,757
Service	2,005	1,639	2,077	1,695	2,557	2,201
Intersegment eliminations	1,015	848	993	843	779	663
Total Mission Systems	10,396	8,778	10,134	8,555	10,080	8,621
Space Systems						
Product	10,448	9,455	8,832	7,898	6,810	6,084
Service	1,708	1,557	1,637	1,464	1,826	1,672
Intersegment eliminations	119	105	139	125	108	95
Total Space Systems	12,275	11,117	10,608	9,487	8,744	7,851
Segment Totals						
Total Product	\$ 28,522	\$ 25,292	\$ 27,868	\$ 24,692	\$ 27,015	\$ 24,016
Total Service	8,080	7,057	7,799	6,758	9,784	8,595
Total Segment⁽¹⁾	\$ 36,602	\$ 32,349	\$ 35,667	\$ 31,450	\$ 36,799	\$ 32,611

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

Product Sales and Costs

2022 product sales increased \$654 million, or 2 percent, primarily due to an increase in product sales at Space Systems, partially offset by a decrease in product sales at Aeronautics Systems. The increase at Space Systems was driven by ramp-up on development programs including GBSD and NGI, as well as higher volume on the SDA Tranche 1 Transport Layer and Tranche 1 Tracking Layer programs. The decrease at Aeronautics Systems was principally due to lower volume on restricted programs, as well as the Global Hawk and E-2 programs.

2022 product costs increased \$600 million, or 2 percent, consistent with the higher product sales described above.

Service Sales and Costs

2022 service sales increased \$281 million, or 4 percent, primarily due to an increase in service sales at Aeronautics Systems, principally on restricted programs, partially offset by a decrease in service sales at Defense Systems. The decrease at Defense Systems was driven by lower scope on an international training program, the impact of the IT services divestiture, completion of a Joint Services support program and wind-down of the UKAWACS program. Sales from the divested IT services business, which were largely included in service sales, were \$162 million in the prior year.

2022 service costs increased \$299 million, or 4 percent, consistent with the higher 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, 2022 and 2021:

<i>\$ in millions</i>	2022			2021	% Change in 2022
	Funded	Unfunded	Total Backlog	Total Backlog	
Aeronautics Systems	\$ 8,458	\$ 10,939	\$ 19,397	\$ 18,277	6 %
Defense Systems	5,881	1,634	7,515	6,349	18 %
Mission Systems	9,835	4,040	13,875	14,306	(3)%
Space Systems	8,317	29,639	37,956	37,114	2 %
Total backlog	\$ 32,491	\$ 46,252	\$ 78,743	\$ 76,046	4 %

2022 net awards totaled \$39.3 billion. Significant 2022 new awards include \$10.6 billion for restricted programs (principally at Aeronautics Systems, Mission Systems and Space Systems), \$5.3 billion for F-35, \$2.1 billion for GEM63 solid rocket boosters, largely related to Amazon's Project Kuiper, \$1.5 billion for the SDA Tranche 1 Transport and Tracking Layer programs, \$1.3 billion for Commercial Resupply Services (CRS) missions and \$1.3 billion for Ground-based Midcourse Defense (GMD).

LIQUIDITY AND CAPITAL RESOURCES

We are focused on the efficient conversion of operating income into cash to provide for the company’s material cash requirements, including working capital needs, satisfaction of contractual commitments, funding of our pension and OPB plans, investment in our business through capital expenditures, and shareholder return through dividend payments and share repurchases.

As of December 31, 2022, we had cash and cash equivalents of \$2.6 billion; \$316 million was held outside of the U.S. by foreign subsidiaries. We expect cash and cash equivalents and cash generated from operating activities, supplemented by borrowings under credit facilities, commercial paper and/or in the capital markets through our shelf registration with the SEC, if needed, to be sufficient to provide liquidity to the company in the short-term and long-term. The company has a five-year senior unsecured credit facility in an aggregate principal amount of \$2.5 billion, and in April 2022, we renewed our one-year \$500 million uncommitted credit facility. At December 31, 2022, there were no borrowings outstanding under these credit facilities.

The company’s principal contractual commitments include purchase obligations, repayments of long-term debt and related interest, and payments under operating leases. At December 31, 2022, we had \$19.0 billion of purchase obligations, approximately half of which is short-term. Purchase obligations are largely comprised of open purchase order commitments to suppliers and subcontractors under U.S. government contracts. In most circumstances, our risk associated with the purchase obligations on our U.S. government contracts is limited to the termination liability provisions within those contracts. As such, we do not believe they represent a material liquidity risk to the company. At December 31, 2022, we had capital expenditure commitments of \$1.5 billion, which we expect to satisfy with cash on hand. We also had provisions for uncertain tax positions of \$1.7 billion, some or all of which could result in future cash payments to various taxing authorities. At this time, we are unable to estimate the timing and amount of any future cash outflows related to these uncertain tax positions.

Refer to the respective notes to the consolidated financial statements for further information about our share repurchase programs (Note 3), commercial paper, credit facilities and long-term debt (Note 10), standby letters of credit and guarantees (Note 12), future minimum contributions for the company’s pension and OPB plans (Note 13), and lease payment obligations (Note 15).

COVID-19 and the CARES Act

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. Our first installment of deferred social security taxes of \$200 million was paid in the fourth quarter of 2021 and the second installment of \$200 million was

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paid in the fourth quarter of 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 sought and may continue to seek recovery for certain COVID-19-related costs under Section 3610 of the CARES Act and through our contract provisions, though it is unclear what funds will be available and how much we will be able to recover. In addition, the 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; it is unclear how long the 90 percent progress payment rate will remain in place and whether the DoD will take any further steps.

Internal Revenue Code (IRC) Section 174

Beginning in 2022, the Tax Cuts and Jobs Act of 2017 (“TCJA”) eliminated the option to deduct research and development expenditures in the current year and requires taxpayers to amortize them over five years pursuant to IRC Section 174. Our 2022 cash from operations were reduced by approximately \$900 million for federal tax payments we made related to Section 174. In the future, Congress may consider legislation that would defer the amortization requirement to later years, possibly with retroactive effect. In the meantime, we expect to continue to make additional federal tax payments based on the current Section 174 tax law. The impact of Section 174 on our cash from operations depends on the amount of research and development expenditures incurred by the company and whether the IRS issues guidance on the provision which differs from our current interpretation, among other things.

Cash Flow Measures

In addition to our cash position, we consider various cash flow measures 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.

Operating Cash Flow

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

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Net earnings	\$ 4,896	\$ 7,005	\$ 3,189
Gain on sale of business	—	(1,980)	—
Non-cash items ⁽¹⁾	(1,305)	(1,510)	1,799
Pension and OPB contributions	(136)	(141)	(887)
Changes in trade working capital	(600)	181	227
Other, net	46	12	(23)
Net cash provided by operating activities	\$ 2,901	\$ 3,567	\$ 4,305

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

2022 cash provided by operating activities decreased \$666 million principally due to lower CAS pension recoveries and changes in trade working capital, including approximately \$900 million of federal tax payments related to the Section 174 tax legislation described above. The prior year included \$785 million of tax payments related to the IT services divestiture.

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 or used in operating activities, less capital expenditures, plus proceeds from the sale of equipment to a customer (not otherwise included in net cash provided by or used in 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 stock repurchases. This non-GAAP measure may be useful to investors and other users of our financial statements as a supplemental measure of our cash performance, but should not be considered in isolation, as a measure of residual cash flow available for discretionary purposes, or as an alternative to operating cash flows presented in accordance with GAAP.

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

<i>\$ in millions</i>	Year Ended December 31			% Change in	
	2022	2021	2020	2022	2021
Net cash provided by operating activities	\$ 2,901	\$ 3,567	\$ 4,305	(19)%	(17)%
Capital expenditures	(1,435)	(1,415)	(1,420)	1 %	— %
Proceeds from sale of equipment to a customer	155	84	205	85 %	(59)%
After-tax discretionary pension contributions	—	—	593	NM	(100)%
Adjusted free cash flow	\$ 1,621	\$ 2,236	\$ 3,683	(28)%	(39)%

2022 adjusted free cash flow decreased \$615 million principally due to lower net cash provided by operating activities, partially offset by an increase in proceeds from the sale of equipment to a customer.

Investing Cash Flow

2022 net cash used in investing activities was \$1.2 billion compared to net cash provided by investing activities of \$2.1 billion in the prior year, principally due to \$3.4 billion in cash received from the sale of our IT services business during the first quarter of 2021.

Financing Cash Flow

2022 net cash used in financing activities decreased \$4.4 billion principally due to a \$2.2 billion decrease in debt repayments and a \$2.2 billion reduction in share repurchases.

CRITICAL ACCOUNTING POLICIES, ESTIMATES AND JUDGMENTS

Our consolidated financial statements are prepared in conformity with 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 also consider the impact of macroeconomic factors on our estimates, in particular on contract EACs that span several years. For example, during 2022, we included in our EACs management's best estimate of the impact inflation has had and may continue to have on our contracts. We also included our current best estimate of the impact on our EACs of disruptions we have experienced and continue to experience in the supply chain. The volatility of the recent macroeconomic environment has added complexity to our estimation process and may result in our year end 2022 contract EACs having more variability in the future than they might otherwise have had if the estimates had been prepared in a more stable macroeconomic environment.

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 and early-stage/low-rate production contracts are inherently more uncertain as to future events than on mature, full-rate production contracts. As a result, there is typically more variability in those estimates and greater financial risk associated with unanticipated cost growth on fixed-price development contracts and early-stage/low-rate production contracts. 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 5.54 percent at December 31, 2022 and 2.98 percent at December 31, 2021.

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, 2022 discount rate assumption would have the following estimated effects on 2022 pension and OPB obligations, which would be reflected in the 2022 MTM expense (benefit), and 2023 expected pension and OPB expense:

<i>\$ in millions</i>	25 Basis Point Decrease in Rate	25 Basis Point Increase in Rate
2022 pension and OPB obligation and MTM expense (benefit)	\$ 817	\$ (781)
2023 pension and OPB (benefit) expense	(20)	18

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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 its current level of 3.96 percent as of December 31, 2022, declining to 3.88 percent by 2028. Holding all other assumptions constant, an increase or decrease of 25 basis points in the December 31, 2022 cash balance crediting rate assumption would have the following estimated effects on the 2022 pension benefit obligation, which would be reflected in the 2022 MTM expense (benefit), and 2023 expected pension expense:

<i>\$ in millions</i>	25 Basis Point Decrease in Rate	25 Basis Point Increase in Rate
2022 pension obligation and MTM expense (benefit)	\$ (96)	\$ 100
2023 pension (benefit) expense	(9)	9

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 2022, the Investment Committee of the company’s benefit plans reviewed the plans’ major asset class allocations and approved an update to increase the target fixed-income asset allocation from 30% to 40%. The current asset allocation is now approximately 35% fixed-income, 30% public equities, 30% alternatives and 5% cash. At this time, the Investment Committee is not planning 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 2022 was approximately 10.7 percent and our 20-year and 30-year rolling average rates of return were approximately 8.6 percent and 8.8 percent, respectively, each determined on an arithmetic basis and net of expenses. Our 2022 losses on plan assets, net of expenses, were approximately 15.4 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. Despite the change in our target asset allocation described above, these models show a year-over-year increase in the expected rate of return on plan assets largely due to recent increases in interest rates, which more than offset the downward pressure on our EROA caused by the change in asset mix.

For determining 2022 FAS expense, we assumed an expected long-term rate of return on pension plan assets of 7.5 percent and an expected long-term rate of return on OPB plan assets of 7.19 percent. For 2023 FAS expense, we have assumed an expected long-term rate of return on pension plan assets of 7.5 percent and 7.23 percent on OPB plans. Holding all other assumptions constant, an increase or decrease of 25 basis points in our December 31, 2022 EROA assumption would have the following estimated effects on 2023 expected pension and OPB expense:

<i>\$ in millions</i>	25 Basis Point Decrease	25 Basis Point Increase
2023 pension and OPB expense (benefit)	\$ 73	\$ (73)

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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 2023 MTM expense (benefit):

<i>\$ in millions</i>	100 Basis Point Decrease	100 Basis Point Increase
2023 MTM expense (benefit)	\$ 292	\$ (292)

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 (NAV), 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 2021, the RPEC released a new projection scale (MP-2021) that included additional underlying data for 2019, which included an increase in life expectancies relative to the prior year.

The RPEC did not release a MP-2022 projection scale citing complexities in incorporating the substantial number of “excess deaths” in 2020 into their existing model and uncertainties about future expectations primarily related to COVID-19. As such, after considering the information released by the RPEC in October 2021 as well as the company’s recent mortality experience in light of the COVID-19 pandemic, we adopted the full MP-2021 projection scale while continuing to use the Pri-2012 White Collar table. While the amounts and structure of the PRI-2012 base mortality table with the MP-2021 projection scale continues to reflect a reasonable estimate of mortality, we supplemented the table with 50% of the Gradual Wear-Off illustration as outlined in the RPEC’s 2022 Mortality Improvement Update paper to reflect the future impacts of COVID-19. Accordingly, we updated the mortality assumptions used in calculating our pension and OPB obligations recognized at December 31, 2022, and the amounts estimated for our 2023 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. We exercise judgment in determining the level of evidence necessary and appropriate to support our 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.

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 Long-Lived 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.

We record property, plant and equipment (PP&E) for capital assets used in operating our business. Depreciation expense associated with our PP&E is generally an allowable and allocable cost in accordance with applicable FAR and CAS requirements. However, depreciation expense associated with PP&E used in our commercial businesses, as well as the additional depreciation expense related to the step-up in fair value of PP&E acquired through business combinations, is not allocable to government contracts and is therefore subject to greater recoverability risk than the PP&E for which depreciation expense is recovered through our U.S. government contracts.

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, 2022 and 2021, respectively, indicated that the estimated fair value of each reporting unit significantly exceeded its respective carrying value. There were no impairment charges recorded in the years ended December 31, 2022, 2021 and 2020.

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 2022, we 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 long-lived assets, including PP&E and 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, 2022, 2021 and 2020.

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.

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 \$332 million at December 31, 2022. 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, 2022. At December 31, 2022, we have \$12.9 billion of long-term debt, primarily consisting of fixed-rate debt, with a fair value of approximately \$12.1 billion. The terms of our fixed-rate debt obligations do not generally allow investors to demand payment of these obligations prior to maturity. Therefore, we do not have significant exposure to interest rate risk for our fixed-rate debt; however, we do have exposure to fair value risk if we repurchase or exchange long-term debt prior to maturity. Additionally, if we were to refinance our long-term debt, it may be refinanced at higher interest rates.

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, 2022, foreign currency forward contracts with a notional amount of \$221 million were outstanding. At December 31, 2022, 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

The global macroeconomic environment has experienced, and continues to experience, extraordinary challenges, including the highest rates of inflation in 40 years. These macroeconomic factors have contributed, and we expect will continue to contribute, to increased costs, among other concerns. We cannot predict how long these inflationary pressures will continue, or how they may change over time, but we expect to see continued impacts on the global economy, our customers, our industry and our company.

Historically, we generally have been able to anticipate such increases in costs when pricing our contracts, and our bids for longer-term firm fixed-price contracts have typically included assumptions regarding cost escalations in amounts that have been sufficient to cover most cost increases over the period of performance, including as offset by operational efficiencies. However, the company, its subcontractors and other suppliers, have experienced, and continue to experience, increased pressures from recent heightened levels of inflation and the challenges of the current macroeconomic environment, which we have not been able to fully mitigate. If inflationary pressures continue to persist, they may continue to have an adverse impact on our consolidated financial position, results of operations and/or cash flows.

Item 8. Financial Statements and Supplementary Data

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

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

Opinion on the Financial Statements

We have audited the accompanying consolidated statements of financial position of Northrop Grumman Corporation and subsidiaries (the “Company”) as of December 31, 2022 and 2021, 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, 2022, 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, 2022 and 2021, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2022, 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, 2022, 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 25, 2023 expressed an unqualified opinion on the Company’s internal control over financial reporting.

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 and risk 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

NORTHROP GRUMMAN CORPORATION

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 of relevant program teams 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 macroeconomic 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

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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 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 25, 2023

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

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF EARNINGS AND COMPREHENSIVE INCOME

<i>\$ in millions, except per share amounts</i>	Year Ended December 31		
	2022	2021	2020
Sales			
Product	\$ 28,522	\$ 27,868	\$ 27,015
Service	8,080	7,799	9,784
Total sales	36,602	35,667	36,799
Operating costs and expenses			
Product	22,761	22,309	21,559
Service	6,367	6,090	7,762
General and administrative expenses	3,873	3,597	3,413
Total operating costs and expenses	33,001	31,996	32,734
Gain on sale of business	—	1,980	—
Operating income	3,601	5,651	4,065
Other (expense) income			
Interest expense	(506)	(556)	(593)
Non-operating FAS pension benefit	1,505	1,469	1,198
Mark-to-market pension and OPB benefit (expense)	1,232	2,355	(1,034)
Other, net	4	19	92
Earnings before income taxes	5,836	8,938	3,728
Federal and foreign income tax expense	940	1,933	539
Net earnings	\$ 4,896	\$ 7,005	\$ 3,189
Basic earnings per share	\$ 31.61	\$ 43.70	\$ 19.08
Weighted-average common shares outstanding, in millions	154.9	160.3	167.1
Diluted earnings per share	\$ 31.47	\$ 43.54	\$ 19.03
Weighted-average diluted shares outstanding, in millions	155.6	160.9	167.6
Net earnings (from above)	\$ 4,896	\$ 7,005	\$ 3,189
Other comprehensive loss, net of tax			
Change in unamortized prior service credit	(1)	(8)	(41)
Change in cumulative translation adjustment and other, net	(9)	(7)	10
Other comprehensive loss, net of tax	(10)	(15)	(31)
Comprehensive income	\$ 4,886	\$ 6,990	\$ 3,158

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

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF FINANCIAL POSITION

<i>\$ in millions, except par value</i>	December 31	
	2022	2021
Assets		
Cash and cash equivalents	\$ 2,577	\$ 3,530
Accounts receivable, net	1,511	1,467
Unbilled receivables, net	5,983	5,492
Inventoried costs, net	978	811
Prepaid expenses and other current assets	1,439	1,126
Total current assets	12,488	12,426
Property, plant and equipment, net of accumulated depreciation of \$7,258 for 2022 and \$6,819 for 2021	8,800	7,894
Operating lease right-of-use assets	1,811	1,655
Goodwill	17,516	17,515
Intangible assets, net	384	578
Deferred tax assets	162	200
Other non-current assets	2,594	2,311
Total assets	\$ 43,755	\$ 42,579
Liabilities		
Trade accounts payable	\$ 2,587	\$ 2,197
Accrued employee compensation	2,057	1,993
Advance payments and billings in excess of costs incurred	3,609	3,026
Other current liabilities	3,334	2,314
Total current liabilities	11,587	9,530
Long-term debt, net of current portion of \$1,072 for 2022 and \$6 for 2021	11,805	12,777
Pension and other postretirement benefit plan liabilities	1,188	3,269
Operating lease liabilities	1,824	1,590
Deferred tax liabilities	132	490
Other non-current liabilities	1,907	1,997
Total liabilities	28,443	29,653
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: 2022—153,157,924 and 2021—156,284,423	153	156
Paid-in capital	—	—
Retained earnings	15,312	12,913
Accumulated other comprehensive loss	(153)	(143)
Total shareholders' equity	15,312	12,926
Total liabilities and shareholders' equity	\$ 43,755	\$ 42,579

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

NORTHROP GRUMMAN CORPORATION

CONSOLIDATED STATEMENTS OF CASH FLOWS

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Operating activities			
Net earnings	\$ 4,896	\$ 7,005	\$ 3,189
Adjustments to reconcile to net cash provided by operating activities:			
Depreciation and amortization	1,342	1,239	1,267
Mark-to-market pension and OPB (benefit) expense	(1,232)	(2,355)	1,034
Stock-based compensation	99	94	90
Deferred income taxes	(321)	603	210
Gain on sale of business	—	(1,980)	—
Net periodic pension and OPB income	(1,193)	(1,091)	(802)
Pension and OPB contributions	(136)	(141)	(887)
Changes in assets and liabilities:			
Accounts receivable, net	(44)	(10)	(285)
Unbilled receivables, net	(646)	(414)	160
Inventoried costs, net	(205)	(52)	18
Prepaid expenses and other assets	2	66	(147)
Accounts payable and other liabilities	572	376	719
Income taxes payable, net	(279)	215	(238)
Other, net	46	12	(23)
Net cash provided by operating activities	2,901	3,567	4,305
Investing activities			
Divestiture of IT services business	—	3,400	—
Capital expenditures	(1,435)	(1,415)	(1,420)
Proceeds from sale of equipment to a customer	155	84	205
Other, net	39	(11)	4
Net cash (used in) provided by investing activities	(1,241)	2,058	(1,211)
Financing activities			
Net proceeds from issuance of long-term debt	—	—	2,239
Payments of long-term debt	—	(2,236)	(1,027)
Payments to credit facilities	—	—	(78)
Common stock repurchases	(1,504)	(3,705)	(490)
Cash dividends paid	(1,052)	(983)	(953)
Payments of employee taxes withheld from share-based awards	(50)	(34)	(66)
Other, net	(7)	(44)	(57)
Net cash used in financing activities	(2,613)	(7,002)	(432)
(Decrease) increase in cash and cash equivalents	(953)	(1,377)	2,662
Cash and cash equivalents, beginning of year	3,530	4,907	2,245
Cash and cash equivalents, end of year	\$ 2,577	\$ 3,530	\$ 4,907

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

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CONSOLIDATED STATEMENTS OF CHANGES IN SHAREHOLDERS' EQUITY

<i>\$ in millions, except per share amounts</i>	Year Ended December 31		
	2022	2021	2020
Common stock			
Beginning of year	\$ 156	\$ 167	\$ 168
Common stock repurchased	(4)	(11)	(1)
Shares issued for employee stock awards and options	1	—	—
End of year	153	156	167
Paid-in capital			
Beginning of year	—	58	—
Common stock repurchased	—	(60)	—
Stock compensation	—	2	63
Other	—	—	(5)
End of year	—	—	58
Retained earnings			
Beginning of year	12,913	10,482	8,748
Common stock repurchased	(1,497)	(3,645)	(479)
Net earnings	4,896	7,005	3,189
Dividends declared	(1,052)	(989)	(951)
Stock compensation	52	60	(36)
Other	—	—	11
End of year	15,312	12,913	10,482
Accumulated other comprehensive loss			
Beginning of year	(143)	(128)	(97)
Other comprehensive loss, net of tax	(10)	(15)	(31)
End of year	(153)	(143)	(128)
Total shareholders' equity	\$ 15,312	\$ 12,926	\$ 10,579
Cash dividends declared per share	\$ 6.76	\$ 6.16	\$ 5.67

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 is a leading global aerospace and defense technology company. We deliver a broad range of products, services and solutions to U.S. and international customers, and principally to the U.S. Department of Defense and intelligence community. Our broad portfolio is aligned to support national security priorities and our solutions equip our customers with capabilities they need to connect, protect and advance humanity.

The company is a leading provider of space systems, advanced aircraft, missile defense, advanced weapons and long-range fires capabilities, mission systems, networking and communications, strategic deterrence systems, and breakthrough technologies, such as artificial intelligence, advanced computing and cyber. We are focused on competing and winning programs that enable continued growth, performing on our commitments and affordably delivering capability our customers need. With the investments we've made in advanced technologies, combined with our talented workforce and digital transformation capabilities, Northrop Grumman is well positioned to meet our customers' needs today and in the future.

Principles of Consolidation

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

Basis of Presentation

Effective January 30, 2021 (the "Divestiture date"), we completed the sale of our IT and mission support services business (the "IT services divestiture") for \$3.4 billion in cash and recorded a pre-tax gain of \$2.0 billion. The IT and mission support services business was comprised of the majority of the former IS&S division of Defense Systems (excluding the Vinnell Arabia business); select cyber, intelligence and missions support programs, which were part of the former CIMS division of Mission Systems; and the former Space Technical Services business unit of Space Systems. Operating results include sales and operating income for the IT and mission support services business prior to the Divestiture date. See Note 2 for further information regarding the divestiture.

Accounting Estimates

The company's consolidated financial statements are prepared in conformity with U.S. GAAP. 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.

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

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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).

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 EAC adjustment.

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 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 G&A costs, is charged against income in the period the loss is identified.

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

<i>\$ in millions, except per share data</i>	Year Ended December 31		
	2022	2021	2020
Revenue	\$ 447	\$ 568	\$ 504
Operating income	360	527	466
Net earnings ⁽¹⁾	284	416	368
Diluted earnings per share ⁽¹⁾	1.83	2.59	2.20

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

EAC adjustments on a single performance obligation can have a significant effect on the company's financial statements. When such adjustments occur, we generally disclose the nature, underlying conditions and financial impact of the adjustments. During the first and fourth quarters of 2022, we recorded favorable EAC adjustments of \$67 million and \$66 million, respectively, on the engineering, manufacturing and development (EMD) phase of the B-21 program at Aeronautics Systems largely related to an increase in the amount of performance incentives we expect to earn. See Note 12 for a discussion of reasonably possible losses we may incur on the low-rate initial production (LRIP) phase of B-21. During 2021, we recorded \$135 million of unfavorable EAC adjustments on the F-35 program at Aeronautics Systems due to labor-related production impacts largely driven by COVID-19. No other such adjustments were significant to the financial statements during the years ended December 31, 2022, 2021 and 2020.

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 IDIQ contracts are not included in backlog until the time an option or IDIQ task order is exercised or awarded.

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Company backlog as of December 31, 2022 was \$78.7 billion. Of our December 31, 2022 backlog, we expect to recognize approximately 40 percent as revenue over the next 12 months and 65 percent as revenue over the next 24 months, 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 include amounts that may be billed and collected beyond one year due to the long-cycle nature of many of our contracts. Accumulated contract costs in unbilled receivables include costs such as direct production costs, factory and engineering overhead, production tooling costs, and allowable G&A. Unbilled receivables also include certain estimates of variable consideration described above. These contract assets are not considered a significant financing component of the company's contracts as the payment terms are intended to protect the customer in the event the company does not perform on its obligations under the contract.

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

Net contract assets are as follows:

<i>\$ in millions</i>	December 31, 2022	December 31, 2021	\$ Change	% Change
Unbilled receivables, net	\$ 5,983	\$ 5,492	\$ 491	9 %
Advance payments and amounts in excess of costs incurred	(3,609)	(3,026)	(583)	19 %
Net contract assets	\$ 2,374	\$ 2,466	\$ (92)	(4)%

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, 2022 decreased 4 percent from the prior year, primarily due to decreases in net contracts assets at Aeronautics Systems and Space Systems, partially offset by an increase in net contract assets at Defense Systems.

The amount of revenue recognized for the years ended December 31, 2022, 2021 and 2020 that was included in the contract liability balance at the beginning of each year was \$2.4 billion, \$2.0 billion and \$1.6 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 applicable FAR and CAS requirements, most general management and corporate expenses incurred at the segment and corporate locations are considered allowable and allocable costs to our U.S. government contracts. 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 \$1.2 billion, \$1.1 billion and \$1.1 billion in 2022, 2021 and 2020,

respectively, which represented 3.3 percent, 3.2 percent and 2.9 percent of total sales, respectively. Customer-funded research and development activities are charged directly to the related contracts.

Income Taxes

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

In accordance with applicable FAR and CAS requirements, current state and local income and franchise taxes are generally considered allowable and allocable costs to our U.S. government contracts 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 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 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 Other, net in the consolidated statements of earnings and comprehensive income, while 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 using internal models based on observable market inputs such as forward rates, interest rates, our own credit risk and our counterparties' credit risks.

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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.

Inventoried costs include direct production costs, factory and engineering overhead, production tooling costs, and allowable G&A. G&A included in Inventoried costs, net was \$59 million and \$44 million as of December 31, 2022 and 2021, respectively. Inventoried costs are classified as current assets and include amounts related to contracts having production cycles longer than one year due to the long-cycle nature of our business.

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, 2022 and 2021, the carrying values associated with these policies were \$367 million and \$440 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 (PP&E) 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 an allowable and allocable cost in accordance with applicable FAR and CAS requirements and 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 allocable to government contracts and not considered part of management's evaluation of segment operating performance. Major classes of property, plant and equipment and their useful lives are as follows:

<i>Useful life in years, \$ in millions</i>	Useful Life	December 31	
		2022	2021
Land and land improvements	Up to 40 ⁽¹⁾	\$ 741	\$ 636
Buildings and improvements	Up to 45	3,272	3,019
Machinery and other equipment	Up to 20	8,774	8,064
Capitalized software costs	3-5	524	481
Leasehold improvements	Lease Term ⁽²⁾	2,747	2,513
Property, plant and equipment, at cost		16,058	14,713
Accumulated depreciation		(7,258)	(6,819)
Property, plant and equipment, net		\$ 8,800	\$ 7,894

⁽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. 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

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payments of \$155 million, \$84 million and \$205 million related to the equipment sale during 2022, 2021 and 2020, respectively, and included it in Proceeds from sale of equipment to a customer in the consolidated statement of cash flows.

During the year ended December 31, 2022, the company acquired \$46 million of internal use software through long-term financing directly with the supplier. The software was recorded in PP&E as a non-cash investing activity and the related liability was recorded in long-term debt as a non-cash financing activity. During the years ended December 31, 2022 and 2021, the company received lease incentives for landlord funded leasehold improvements of \$96 million and \$150 million, respectively, related to a Space Systems real estate lease, which were recorded in PP&E and included in non-cash investing activities.

On December 28, 2022 the company acquired certain leased land in exchange for company-owned land, which had been used previously for production-related activities at Space Systems. The exchange was accounted for as a nonmonetary transaction, and the acquired land, valued at approximately \$155 million, was recorded in PP&E as a non-cash investing activity. The transaction resulted in a \$96 million gain, which was reflected in operating costs and expenses in the consolidated statements of earnings and comprehensive income.

Non-cash investing activities also include capital expenditures incurred but not yet paid of \$113 million, \$91 million and \$72 million as of December 31, 2022, 2021 and 2020, 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 allocable to government contracts and 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. 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 generally 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 OPB plans 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 applicable FAR and CAS requirements, 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 MTM benefit (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 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. 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, net of tax, are as follows:

<i>\$ in millions</i>	December 31	
	2022	2021
Unamortized prior service credit	\$ 1	\$ 2
Cumulative translation adjustment and other, net	(154)	(145)
Total accumulated other comprehensive loss	\$ (153)	\$ (143)

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, 2022, are not expected to have a material effect on the company’s consolidated financial position, annual results of operations and/or cash flows.

2. DISPOSITIONS

Disposition of IT and Mission Support Services Business

Effective January 30, 2021, we completed the IT services divestiture for \$3.4 billion in cash and recorded a pre-tax gain of \$2.0 billion. The IT and mission support services business was comprised of the majority of the former IS&S division of Defense Systems (excluding the Vinnell Arabia business); select cyber, intelligence and missions support programs, which were part of the former CIMS division of Mission Systems; and the former Space Technical Services business unit of Space Systems. Operating results include sales and operating income for the IT and mission support services business prior to the Divestiture date; therefore, no sales and operating income were recognized for this business during the year ended December 31, 2022.

The company recorded pre-tax profit of the IT and mission support services business of \$20 million and \$247 million for the years ended December 31, 2021 and 2020, respectively.

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

Basic Earnings Per Share

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

Diluted Earnings Per Share

Diluted earnings per share include the dilutive effect of awards granted to employees under stock-based compensation plans. The dilutive effect of these securities totaled 0.7 million, 0.6 million and 0.5 million shares for the years ended December 31, 2022, 2021 and 2020, 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”). 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 2015 Repurchase Program commenced in March 2016 and were completed in March 2020, at which time repurchases under the 2018 Repurchase Program commenced. Repurchases under the 2018 Repurchase Program were completed in October 2021.

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”). Repurchases under the 2021 Repurchase Program commenced in October 2021 upon the completion of the 2018 Repurchase Program. As of December 31, 2022, repurchases under the 2021 Repurchase Program totaled \$2.4 billion; \$0.6 billion remained under this share repurchase authorization. By its terms, the 2021 Repurchase Program is set to expire when we have used all authorized funds for repurchases.

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On January 24, 2022, the company’s board of directors authorized a new share repurchase program of up to an additional \$2.0 billion in share repurchases of the company’s common stock (the “2022 Repurchase Program”). By its terms, repurchases under the 2022 Repurchase Program will commence upon completion of the 2021 Repurchase Program and will expire when we have used all authorized funds for repurchases. As of December 31, 2022, there have been no repurchases under the 2022 Repurchase Program and the company’s total outstanding share repurchase authorization was \$2.6 billion.

During the first quarter of 2021, the company entered into an accelerated share repurchase (ASR) agreement with Goldman Sachs & Co. LLC (Goldman Sachs) to repurchase \$2.0 billion of the company’s common stock as part of the 2018 Repurchase Program. Under the agreement, we made a payment of \$2.0 billion to Goldman Sachs and received an initial delivery of 5.9 million shares valued at \$1.7 billion that were immediately canceled by the company. The remaining balance of \$300 million was settled on June 1, 2021 with a final delivery of 0.2 million shares from Goldman Sachs. The final average purchase price was \$327.29 per share.

During the fourth quarter of 2021, the company entered into an ASR agreement with Goldman Sachs to repurchase \$500 million of the company’s common stock as part of the 2021 Repurchase Program. Under the agreement, we made a payment of \$500 million to Goldman Sachs and received an initial delivery of 1.2 million shares valued at \$425 million that were immediately canceled by the company. The remaining balance of \$75 million was settled on February 1, 2022 with a final delivery of 0.1 million shares from Goldman Sachs. The final average purchase price was \$374.79 per share.

Share repurchases take place from time to time, subject to market and regulatory 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 2022	2021	2020
September 16, 2015	\$ 4,000	15.4	\$ 260.33	March 2020	—	—	0.9
December 4, 2018	\$ 3,000	8.9	\$ 337.18	October 2021	—	8.4	0.5
January 25, 2021	\$ 3,000	5.5	\$ 426.46		3.3	2.2	—
January 24, 2022	\$ 2,000	—	\$ —		—	—	—
					3.3	10.6	1.4

⁽¹⁾ Includes commissions paid.

Dividends on Common Stock

In May 2022, the company increased the quarterly common stock dividend 10 percent to \$1.73 per share from the previous amount of \$1.57 per share.

In May 2021, the company increased the quarterly common stock dividend 8 percent to \$1.57 per share from the previous amount of \$1.45 per share.

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.

4. ACCOUNTS RECEIVABLE, NET

Accounts receivable, net represent amounts billed and due from customers. Substantially all accounts receivable at December 31, 2022 are expected to be collected in 2023. The company does not believe it has significant exposure to credit risk as the majority of our accounts receivable are due from the U.S. government either as the ultimate customer or in connection with foreign military sales.

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Accounts receivable, net consisted of the following:

<i>\$ in millions</i>	December 31	
	2022	2021
Due from U.S. government ⁽¹⁾	\$ 1,215	\$ 1,173
Due from international and other customers	304	328
Accounts receivable, gross	1,519	1,501
Allowance for expected credit losses	(8)	(34)
Accounts receivable, net	\$ 1,511	\$ 1,467

⁽¹⁾ Includes receivables due from the U.S. government associated with FMS sales. 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, 2022 are expected to be billed and collected in 2023. Progress and performance-based payments are reflected as an offset to the related unbilled receivable balances.

Unbilled receivables, net consisted of the following:

<i>\$ in millions</i>	December 31	
	2022	2021
Due from U.S. government ⁽¹⁾		
Unbilled receivables	\$ 23,304	\$ 22,140
Progress and performance-based payments received	(17,664)	(17,038)
Total due from U.S. government	5,640	5,102
Due from international and other customers		
Unbilled receivables	1,822	2,913
Progress and performance-based payments received	(1,460)	(2,503)
Total due from international and other customers	362	410
Unbilled receivables, net of progress and performance-based payments received	6,002	5,512
Allowance for expected credit losses	(19)	(20)
Unbilled receivables, net	\$ 5,983	\$ 5,492

⁽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 principally 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 associated with our commercial businesses, while less significant in total, are subject to a greater level of recoverability risk. During the year ended December 31, 2022, the company recorded a \$45 million write-down of commercial business inventory at Space Systems for which its cost exceeded net realizable value.

Inventoried costs, net consisted of the following:

<i>\$ in millions</i>	December 31	
	2022	2021
Contracts in process	\$ 574	\$ 478
Product inventory	404	333
Inventoried costs, net	\$ 978	\$ 811

7. INCOME TAXES

Federal and foreign income tax expense consisted of the following:

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Federal income tax expense:			
Current	\$ 1,289	\$ 1,398	\$ 246
Deferred	(353)	518	288
Total federal income tax expense	936	1,916	534
Foreign income tax expense:			
Current	3	6	3
Deferred	1	11	2
Total foreign income tax expense	4	17	5
Total federal and foreign income tax expense	\$ 940	\$ 1,933	\$ 539

Earnings before income taxes associated with the company's foreign operations are not material in the 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:

<i>\$ in millions</i>	Year Ended December 31					
	2022		2021		2020	
Income tax expense at statutory rate	\$ 1,226	21.0 %	\$ 1,877	21.0 %	\$ 783	21.0 %
Research credit	(177)	(3.0)	(192)	(2.2)	(206)	(5.5)
Foreign derived intangible income	(66)	(1.1)	(50)	(0.6)	(55)	(1.5)
IT services divestiture nondeductible goodwill	—	—	250	2.8	—	—
Settlements with taxing authorities	(86)	(1.5)	—	—	—	—
Other, net	43	0.7	48	0.6	17	0.5
Total federal and foreign income taxes	\$ 940	16.1 %	\$ 1,933	21.6 %	\$ 539	14.5 %

The year to date 2022 ETR decreased to 16.1 percent from 21.6 percent in 2021 primarily due to an \$86 million benefit resulting from the resolution of the IRS examination of certain legacy OATK tax returns, as well as additional federal income taxes in the prior year resulting from the IT services divestiture. The company's 2022 MTM benefit increased the 2022 ETR by 1.2 percentage points; however, the MTM benefit in 2021 did not significantly impact the 2021 ETR.

The year to date 2021 ETR increased to 21.6 percent from 14.5 percent in 2020 primarily due to the federal income taxes resulting from the IT services divestiture described above. The company's 2021 MTM benefit did not significantly impact the 2021 ETR; however, MTM expense in 2020 reduced the 2020 ETR by 1.3 percentage points.

Income tax payments, net of refunds received, were \$1.5 billion, \$1.3 billion and \$312 million for the years ended December 31, 2022, 2021 and 2020, respectively. Taxes receivable, which are included in Prepaid expenses and other current assets in the consolidated statements of financial position, were \$850 million and \$571 million as of December 31, 2022 and 2021, 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 2014-2020 federal tax returns and refund claims related to its 2007-2016 federal tax returns are currently under Internal Revenue Service (IRS) examination. During the second quarter of 2022, the company's 2014-2016 federal income tax returns and refund claims related to its 2007-2016 federal tax returns reverted back from IRS Appeals to IRS examination for additional factual review. During the fourth quarter of 2022, the U.S. Congressional Joint Committee on Taxation approved a resolution of the IRS examination of the legacy OATK federal tax returns for the years ended March 31, 2014 and 2015, the nine-month transition period ended December 31, 2015 and calendar years 2016-2017, which resulted in a \$110 million reduction to our unrecognized tax benefits and an \$86 million reduction to income tax expense.

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 2022, 2021 and 2020, excluding interest, is as follows:

<i>\$ in millions</i>	December 31		
	2022	2021	2020
Unrecognized tax benefits at beginning of the year	\$ 1,630	\$ 1,481	\$ 1,223
Additions based on tax positions related to the current year	262	355	187
Additions for tax positions of prior years	6	47	270
Reductions for tax positions of prior years	(124)	(251)	(190)
Settlements with taxing authorities	(110)	(1)	(7)
Other, net	(1)	(1)	(2)
Net change in unrecognized tax benefits	33	149	258
Unrecognized tax benefits at end of the year	\$ 1,663	\$ 1,630	\$ 1,481

Our 2022 increase in unrecognized tax benefits was primarily related to our methods of accounting associated with the timing of revenue recognition and related costs and the 2017 Tax Cuts and Jobs Act, which includes related final revenue recognition regulations issued in December 2020 under IRC Section 451(b) and procedural guidance issued in August 2021. As of December 31, 2022, we have approximately \$1.7 billion in unrecognized tax benefits, including \$543 million related to our position on IRC Section 451(b). If these matters, including our position on IRC Section 451(b), are unfavorably resolved, there could be a material impact on our future cash flows. It is reasonably possible that within the next 12 months our unrecognized tax benefits may increase by approximately \$120 million. Additionally, it is reasonably possible that within the next 12 months, unrecognized tax benefits claimed primarily related to California state apportionment in the company's 2007 to 2016 tax years may decline by up to \$100 million through administrative resolution with the California Franchise Tax Board.

Our current unrecognized tax benefits, which are included in Other current liabilities in the consolidated statements of financial position, were \$728 million and \$590 million as of December 31, 2022 and 2021, respectively, with the remainder of our unrecognized tax benefits included within Other non-current liabilities. These liabilities include \$216 million and \$175 million of accrued interest and penalties as of December 31, 2022 and 2021, respectively. If the income tax benefits from these tax positions are ultimately realized, \$636 million of federal and foreign tax benefits would reduce the company's ETR.

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

<i>\$ in millions</i>	December 31	
	2022	2021
Deferred Tax Assets		
Retiree benefits	\$ 117	\$ 804
Capitalized research and experimental expenditures	1,671	—
Accrued employee compensation	378	371
Provisions for accrued liabilities	65	156
Inventory	484	649
Stock-based compensation	37	39
Operating lease liabilities	556	493
Tax credits	464	431
Other	144	135
Gross deferred tax assets	3,916	3,078
Less: valuation allowance	(428)	(349)
Net deferred tax assets	3,488	2,729
Deferred Tax Liabilities		
Goodwill	534	533
Purchased intangibles	98	148
Property, plant and equipment, net	854	755
Operating lease right-of-use assets	545	444
Contract accounting differences	1,348	1,036
Other	79	103
Deferred tax liabilities	3,458	3,019
Total net deferred tax assets (liabilities)	\$ 30	\$ (290)

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, 2022, the company has available tax credits and unused net operating losses of \$510 million and \$349 million, respectively, that may be applied against future taxable income. The majority of tax credits and net operating losses expire in 2023 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 \$295 million and \$32 million, respectively, as of December 31, 2022.

Undistributed Foreign Earnings

As of December 31, 2022, the company has accumulated undistributed earnings generated by our foreign subsidiaries and most have been taxed in the U.S. 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, 2021 and 2022, were as follows:

<i>\$ in millions</i>	Aeronautics Systems	Defense Systems	Mission Systems	Space Systems	Total
Balance as of December 31, 2020	\$ 3,467	\$ 3,415	\$ 5,881	\$ 4,755	\$ 17,518
Other ⁽¹⁾	—	(3)	—	—	(3)
Balance as of December 31, 2021	\$ 3,467	\$ 3,412	\$ 5,881	\$ 4,755	\$ 17,515
Other ⁽¹⁾	—	1	—	—	1
Balance as of December 31, 2022	\$ 3,467	\$ 3,413	\$ 5,881	\$ 4,755	\$ 17,516

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

At December 31, 2022 and 2021, 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:

<i>\$ in millions</i>	December 31	
	2022	2021
Gross customer-related and other intangible assets	\$ 3,364	\$ 3,361
Less accumulated amortization	(2,980)	(2,783)
Net customer-related and other intangible assets	\$ 384	\$ 578

Amortization expense for 2022, 2021 and 2020, was \$197 million, \$204 million and \$262 million, respectively. As of December 31, 2022, the expected future amortization of purchased intangibles for each of the next five years is as follows:

<i>\$ in millions</i>	
2023	\$ 80
2024	57
2025	45
2026	42
2027	31

9. FAIR VALUE OF FINANCIAL INSTRUMENTS

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

<i>\$ in millions</i>	December 31, 2022				December 31, 2021			
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total
Financial Assets								
Marketable securities	\$ 310	\$ 1	\$ 8	\$ 319	\$ 393	\$ 1	\$ 7	\$ 401
Marketable securities valued using NAV				13				17
Total marketable securities	310	1	8	332	393	1	7	418
Derivatives	—	7	—	7	—	(1)	—	(1)

The notional value of the company's foreign currency forward contracts at December 31, 2022 and 2021 was \$221 million and \$120 million, respectively. The portion of notional value designated as a cash flow hedge at December

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31, 2022, was \$87 million. At December 31, 2021, no portion of the notional value was designated as a cash flow hedge.

The derivative fair values and related unrealized gains/losses at December 31, 2022 and 2021 were not material.

There were no transfers of financial instruments into or out of Level 3 of the fair value hierarchy during the years ended December 31, 2022 and 2021.

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. In December 2022, the company amended its commercial paper program to increase its capacity to issue unsecured commercial paper notes from \$2.0 billion to \$2.5 billion. There were no commercial paper borrowings outstanding at December 31, 2022 and December 31, 2021, respectively. The outstanding balance of commercial paper borrowings is recorded in Other current liabilities in the consolidated statements of financial position.

Credit Facility

In August 2022, the company entered into a new five-year senior unsecured credit facility in an aggregate principal amount of \$2.5 billion (the "2022 Credit Agreement"). The 2022 Credit Agreement replaced the company's prior five-year, \$2.0 billion revolving credit facility entered into on August 17, 2018 and as amended on October 17, 2019. The revolving credit facility established under the 2022 Credit Agreement is intended to support the company's commercial paper program and other general corporate purposes. Commercial paper borrowings reduce the amount available for borrowing under the 2022 Credit Agreement. At December 31, 2022, there were no borrowings outstanding under this facility.

The 2022 Credit Agreement contains 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 agreement) to exceed 65 percent. At December 31, 2022, the company was in compliance with all covenants under its credit agreement.

Unsecured Senior Notes

Repayments of Senior Notes

In March 2021, the company repaid \$700 million of 3.50 percent unsecured notes upon maturity.

In March 2021, the company redeemed \$1.5 billion of 2.55 percent unsecured notes due October 2022. The company recorded a pre-tax charge of \$54 million principally related to the premium paid on the redemption, which was recorded in Other, net in the unaudited condensed consolidated statements of earnings and comprehensive income.

Debt Exchange

On September 2, 2021, the company completed an exchange offer to eligible holders of the outstanding notes of our direct wholly owned subsidiary, Northrop Grumman Systems Corporation ("NGSC"), maturing through 2036. An aggregate principal amount of \$422 million of the NGSC notes was exchanged for \$422 million of unregistered Northrop Grumman Corporation notes (the "Unregistered Notes") with the same interest rates and maturity dates as the NGSC notes exchanged.

On June 15, 2022, the company completed a registered exchange offer pursuant to which the company exchanged an aggregate principal amount of \$414 million of the Unregistered Notes for \$414 million of new notes registered under the Securities Act of 1933, as amended, (the "Registered Notes") with the same interest rates and maturity dates as the Unregistered Notes.

Because the debt instruments were not substantially different in either of the exchange offers, both exchanges were treated as debt modifications for accounting purposes with no gain or loss recognized.

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Long-term debt consists of the following:

<i>\$ in millions</i>		December 31	
		2022	2021
Fixed-rate notes and debentures, maturing in	Interest rate		
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	750
2031	7.75%	466	466
2040	5.05% - 5.15%	800	800
2043	4.75%	950	950
2045	3.85%	600	600
2047	4.03%	2,250	2,250
2050	5.25%	1,000	1,000
Other	Various	293	205
Debt issuance costs		(59)	(65)
Total long-term debt		12,877	12,783
Less: current portion ⁽¹⁾		1,072	6
Long-term debt, net of current portion		\$ 11,805	\$ 12,777

⁽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 \$12.1 billion and \$15.1 billion as of December 31, 2022 and 2021, 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 \$474 million, \$570 million and \$572 million for the years ended December 31, 2022, 2021 and 2020, respectively.

Maturities of long-term debt as of December 31, 2022, are as follows:

<i>\$ in millions</i>	
Year Ending December 31	
2023	\$ 1,072
2024	67
2025	1,521
2026	530
2027	753
Thereafter	9,006
Total principal payments	12,949
Unamortized premium on long-term debt, net of discount	(13)
Debt issuance costs	(59)
Total long-term debt	\$ 12,877

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 related 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 sought 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, primarily for delay and lost savings. On February 3, 2020, after extensive discovery and motions practice, the parties commenced what was expected to be a seven-week trial. After COVID-19-related interruptions, trial concluded on March 5, 2021. On June 27, 2022, the judge issued a decision in the company's favor. On July 18, 2022, the government filed a motion for reconsideration. On October 17, 2022, the court denied the government's motion for reconsideration and on October 19, 2022, the court entered judgment in the company's favor. On November 9, 2022, the Postal Service paid the company the full judgment amount of approximately \$83 million. Neither party appealed prior to the December 19, 2022 deadline.

The company is 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, the company has 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 would take to implement the State's Amended Record of Decision and to resolve certain potential other claims, including for natural resource damages. On September 22, 2021, the State of New York issued for public comment a new consent decree reflecting the agreement. On December 7, 2021, the public comment period closed. On August 3, 2022, the court approved the consent decree. We have also reached agreements with the Department of Defense and the Bethpage and South Farmingdale Water Districts to resolve claims involving these parties. Those agreements have also been approved by the courts as necessary. The company continues to be involved in related disputes with the Towns of Oyster Bay and Hempstead.

We have incurred, and expect to continue to incur, as included in Note 12, substantial remediation costs related to the legacy Bethpage environmental conditions. It is also possible that applicable remediation standards and other requirements to which we are subject may continue to change, and that our costs may increase materially. In addition to disputes and legal proceedings related to environmental conditions and remediation at the site, we are a party to various individual lawsuits and a putative class action alleging personal injury and property damage in the Eastern District of New York. The filed individual lawsuits have been stayed, pending a court decision on class certification. We are also a party, and may become a party, to other lawsuits brought by or against insurance carriers, and by other individual plaintiffs and/or putative classes, as well as other parties. We cannot at this time predict or reasonably estimate the potential cumulative outcomes or ranges of possible liability of these Bethpage lawsuits.

In June 2018, the FTC issued a Decision and Order enabling the company's acquisition of OATK to proceed and providing generally for the company to continue to make solid rocket motors available to competing missile primes on a non-discriminatory basis. 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 (CID) from the FTC requesting certain information relating to a potential issue regarding the company's compliance with the Order in connection with a then pending missile competition. The company promptly provided information in response to the request. In late 2021, the company resumed discussions with staff at the FTC regarding our response and their views on compliance issues. More recently, the company received and is responding to a follow-on CID. We cannot predict the outcome of those discussions, but we do not believe they are likely to have a material adverse effect on the company's consolidated financial position as of December 31, 2022, or its annual results of operations and/or cash flows. We believe the company has been and continues to be in compliance with the Order.

On December 9, 2022, the company received from the U.S. Department of Justice (DOJ) a criminal subpoena seeking information regarding financial and cost accounting and controls that appears focused on the interest rate

assumptions the company used to determine our CAS pension expense, which we have previously discussed in Note 12 below. The company has begun discussions with DOJ regarding the scope of the subpoena and is preparing to respond to it. We cannot at this point predict the outcome of this matter.

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, 2022, 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, 2022, or its annual results of operations and/or cash flows.

In 2019, the Defense Contract Management Agency (DCMA) raised questions about an interest rate assumption used by the company to determine our CAS pension expense. On June 1, 2020, DCMA 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 believed demonstrates the appropriateness of the assumptions used. On November 24, 2020, DCMA replied to the company's response, disagreeing with our position and requesting additional input, which we provided on February 22, 2021. We continued to exchange correspondence and engage with DCMA and DoD on this matter, including responding to requests for and providing additional information. As noted in Note 11 above, on December 8, 2022, the U.S. Department of Justice (DOJ) issued to the company a criminal subpoena seeking information that appears related to the interest rate assumptions at issue in our discussions with DCMA. The company has begun discussions with DOJ regarding the scope of the subpoena and is preparing to respond to it. We cannot at this point predict the outcome of this matter. The company is also continuing to engage with DCMA/DoD. As previously described, the sensitivity to changes in interest rate assumptions makes it reasonably possible the outcome of the DCMA 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.

B-21 Low-Rate Initial Production Options

In 2015, the U.S. Air Force awarded to Northrop Grumman the B-21 contract, including a base contract for engineering, manufacturing, and design (EMD) and five low-rate initial production (LRIP) options. The EMD phase of the program is largely cost type and began at contract award. The LRIP options are largely fixed price and are expected to be awarded and executed over the next decade. In the fourth quarter of 2022, we updated our estimated cost to complete the LRIP phase of the B-21 program. Principally due to the company's latest estimate of the impact macroeconomic factors may have on our cost to complete the LRIP options, as well as ongoing discussions with our suppliers and our customer, we now believe it is reasonably possible one or more of the LRIP options could be performed at a loss and the range of such loss across the five LRIP options is between \$0 and \$1.2 billion. As we do

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not currently believe a loss is probable on any of the LRIP options, we have not recognized any such loss in our financial results for the period ended December 31, 2022.

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, 2022 and 2021:

<i>\$ in millions</i>	Accrued Costs ⁽¹⁾⁽²⁾	Reasonably Possible Future Costs in Excess of Accrued Costs ⁽²⁾	Deferred Costs ⁽³⁾
December 31, 2022	\$ 565	\$ 353	\$ 486
December 31, 2021	572	363	486

⁽¹⁾ As of December 31, 2022, \$198 million is recorded in Other current liabilities and \$367 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, 2022, \$180 million is deferred in Prepaid expenses and other current assets and \$306 million is deferred in Other non-current assets. These amounts are evaluated for recoverability on a routine basis.

Although management cannot predict whether (i) new information gained as our environmental remediation projects progress, (ii) changes in remediation standards or other requirements to which we are subject, or (iii) other changes in facts and circumstances will materially affect the estimated liability accrued, 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, 2022, or its annual results of operations and/or cash flows.

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, 2022, there were \$373 million of stand-by letters of credit and guarantees and \$77 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, 2022, 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 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, 2022, 2021 and 2020, were \$558 million, \$588 million and \$590 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.

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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 for substantially all of its remaining postretirement medical and life benefit plans. In addition, after January 1, 2005 (or earlier at some businesses), newly hired employees are not eligible for subsidized postretirement medical and life benefits.

Summary Plan Results

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

<i>\$ in millions</i>	Year Ended December 31					
	Pension Benefits			Medical and Life Benefits		
	2022	2021	2020	2022	2021	2020
Components of net periodic benefit cost (benefit)						
Service cost	\$ 367	\$ 414	\$ 409	\$ 9	\$ 16	\$ 17
Interest cost	1,136	1,054	1,226	47	53	67
Expected return on plan assets	(2,641)	(2,512)	(2,376)	(110)	(105)	(102)
Amortization of prior service (credit) cost	—	(9)	(59)	(1)	(1)	4
Mark-to-market (benefit) expense	(1,262)	(1,921)	1,034	30	(434)	—
Other	—	(1)	10	—	—	2
Net periodic benefit cost (benefit)	\$ (2,400)	\$ (2,975)	\$ 244	\$ (25)	\$ (471)	\$ (12)

The table below summarizes the components of changes in unamortized prior service credit (cost) for the years ended December 31, 2020, 2021 and 2022:

<i>\$ in millions</i>	Pension Benefits	Medical and Life Benefits	Total
Changes in unamortized prior service credit (cost)			
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
Amortization of prior service credit (cost)	9	1	10
Tax expense	(2)	—	(2)
Change in unamortized prior service credit (cost) – 2021	7	1	8
Amortization of prior service credit (cost)	—	1	1
Tax expense	—	—	—
Change in unamortized prior service credit (cost) – 2022	\$ —	\$ 1	\$ 1

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.

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<i>\$ in millions</i>	Pension Benefits		Medical and Life Benefits	
	2022	2021	2022	2021
Plan Assets				
Fair value of plan assets at beginning of year	\$ 36,236	\$ 34,452	\$ 1,588	\$ 1,515
Net (loss) gain on plan assets	(5,422)	3,637	(257)	170
Employer contributions	101	104	35	37
Participant contributions	7	8	24	23
Benefits paid	(1,973)	(1,964)	(164)	(157)
Other	(29)	(1)	—	—
Fair value of plan assets at end of year	28,920	36,236	1,226	1,588
Projected Benefit Obligation				
Projected benefit obligation at beginning of year	38,888	40,182	1,685	2,119
Service cost	367	414	9	16
Interest cost	1,136	1,054	47	53
Participant contributions	7	8	24	23
Actuarial loss	(9,325)	(794)	(337)	(369)
Benefits paid	(1,973)	(1,964)	(164)	(157)
Other	(33)	(12)	—	—
Projected benefit obligation at end of year	29,067	38,888	1,264	1,685
Funded status	\$ (147)	\$ (2,652)	\$ (38)	\$ (97)

The decrease in the fair value of our plan assets for the year ended December 31, 2022 was principally driven by losses of 15.4 percent on plan assets and \$2.1 billion of benefit payments. The decrease in our projected benefit obligation for the year ended December 31, 2022, was primarily driven by a 256 basis point increase in the discount rate from year end 2021 and \$2.1 billion of benefit payments, partially offset by \$1.2 billion of interest cost.

<i>\$ in millions</i>	Pension Benefits		Medical and Life Benefits	
	2022	2021	2022	2021
Classification of amounts recognized in the consolidated statements of financial position				
Non-current assets	\$ 982	\$ 462	\$ 240	\$ 285
Current liability	(177)	(182)	(42)	(45)
Non-current liability	(952)	(2,932)	(236)	(337)

The accumulated benefit obligation for all defined benefit pension plans was \$28.8 billion and \$38.3 billion at December 31, 2022 and 2021, respectively.

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

<i>\$ in millions</i>	December 31	
	2022	2021
Projected benefit obligation	\$ 1,126	\$ 36,524
Accumulated benefit obligation	1,117	35,994
Fair value of plan assets	2	33,410

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Plan Assumptions

On a weighted-average basis, the following assumptions were used to determine benefit obligations at December 31 of each year and net periodic benefit cost for the following year:

	Pension Benefits			Medical and Life Benefits		
	2022	2021	2020	2022	2021	2020
Discount rate	5.54 %	2.98 %	2.68 %	5.57 %	2.93 %	2.58 %
Expected long-term return on plan assets	7.50 %	7.50 %	7.50 %	7.23 %	7.19 %	7.22 %
Initial cash balance crediting rate assumed for the next year	3.96 %	2.25 %	2.25 %			
Rate to which the cash balance crediting rate is assumed to increase/decrease (the ultimate rate)	3.88 %	2.25 %	2.25 %			
Year that the cash balance crediting rate reaches the ultimate rate	2028	2027	2026			
Rate of compensation increase	3.00 %	3.00 %	3.00 %			
Initial health care cost trend rate assumed for the next year				6.50 %	5.30 %	5.60 %
Rate to which the health care cost trend rate is assumed to decline (the ultimate trend rate)				5.00 %	5.00 %	5.00 %
Year that the health care cost trend rate reaches the ultimate trend rate				2028	2023	2023

Plan Assets and Investment Policy

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

Our investment policies and procedures are designed to ensure the plans' investments are in compliance with 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, 2022:

	Asset Allocation Ranges
Cash and cash equivalents	0% - 12%
Global public equities	24% - 44%
Fixed-income securities	31% - 51%
Alternative investments	14% - 34%

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The table below provides the fair values of the company's pension and Voluntary Employees' Beneficiary Association (VEBA) trust plan assets at December 31, 2022 and 2021, 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, 2022 and 2021, there were no investments expected to be sold at a value materially different than NAV.

<i>\$ in millions</i>	Level 1		Level 2		Level 3		Total	
	2022	2021	2022	2021	2022	2021	2022	2021
Asset category								
Cash and cash equivalents	\$ 115	\$ 119	\$ 1,076	\$ 2,268			\$ 1,191	\$ 2,387
U.S. equities	2,138	3,085	1	2			2,139	3,087
International equities	1,784	3,105			\$ —	\$ 3	1,784	3,108
Fixed-income securities								
U.S. Treasuries	22	21	2,977	2,815			2,999	2,836
U.S. Government Agency			145	180			145	180
Non-U.S. Government			172	277			172	277
Corporate debt	28	30	4,717	5,501			4,745	5,531
Asset backed			353	987			353	987
High yield debt	12	19	19	31			31	50
Bank loans			13	21			13	21
Other assets		33	2	57	2	2	4	92
Investments valued using NAV as a practical expedient								
U.S. equities							1,043	1,652
International equities							3,904	6,849
Fixed-income funds							2,569	1,461
Hedge funds							44	63
Opportunistic investments							2,983	3,039
Private equity funds							3,299	3,535
Real estate funds							2,753	2,742
Payables, net							(25)	(73)
Fair value of plan assets at the end of the year	\$ 4,099	\$ 6,412	\$ 9,475	\$ 12,139	\$ 2	\$ 5	\$ 30,146	\$ 37,824

There were no transfers of plan assets into or out of Level 3 of the fair value hierarchy during the years ended December 31, 2022 and 2021.

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 \$71 million and \$78 million, derivative liabilities with a fair value of \$117 million and \$38 million, and net notional amounts of \$3.2 billion and \$3.7 billion, as of December 31, 2022 and 2021, 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

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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, 2022, there were no unfunded commitments. As of December 31, 2021, unfunded commitments were \$100 million.

Fixed-income funds: Generally, redemption periods are daily, monthly or quarterly with a notice requirement of two days. There were no unfunded commitments as of December 31, 2022 and 2021.

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, 2022 and 2021, unfunded commitments were \$6 million.

Opportunistic investments: Primarily held in partnerships with a 5-10 year life. As of December 31, 2022 and 2021, unfunded commitments were \$1.5 billion and \$1.7 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, 2022 and 2021, unfunded commitments were \$2.0 billion and \$2.1 billion, respectively.

Real estate funds: Consist primarily of open-end funds that generally allow investors to redeem their interests in the funds. Certain closed-end real estate funds have terms of 10 or more years. As of December 31, 2022 and 2021, unfunded commitments were \$44 million and \$350 million, respectively.

For the years ended December 31, 2022 and 2021, 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, 2022:

<i>\$ in millions</i>	Pension Plans	Medical and Life Plans	Total
Year Ending December 31			
2023	\$ 1,949	\$ 139	\$ 2,088
2024	2,001	141	2,142
2025	2,041	135	2,176
2026	2,077	112	2,189
2027	2,108	107	2,215
2028 through 2032	10,717	474	11,191

In 2023, the company expects to contribute the required minimum funding of approximately \$100 million to its pension plans and approximately \$36 million to its medical and life benefit plans. During the year ended December 31, 2022, the company made no discretionary pension contributions.

14. STOCK COMPENSATION PLANS AND OTHER COMPENSATION ARRANGEMENTS

Stock Compensation Plans

At December 31, 2022, 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, 2022, 4.6 million shares remain available for issuance.

NORTHROP GRUMMAN CORPORATION

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 certain performance metrics 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, 2022, 2021 and 2020 was \$99 million, \$94 million and \$90 million, respectively. The related tax benefits (deficiencies) for stock-based compensation for the years ended December 31, 2022, 2021 and 2020 were \$10 million, \$(2) million and \$14 million, respectively.

At December 31, 2022, 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.

NORTHROP GRUMMAN CORPORATION

Stock award activity for the years ended December 31, 2020, 2021 and 2022, 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, 2020	701	\$ 278	0.9
Granted	262	350	
Vested	(296)	305	
Forfeited	(64)	303	
Outstanding at December 31, 2020	603	\$ 311	1.4
Granted	304	296	
Vested	(269)	286	
Forfeited	(58)	318	
Outstanding at December 31, 2021	580	\$ 314	1.4
Granted	238	397	
Vested	(226)	327	
Forfeited	(31)	320	
Outstanding at December 31, 2022	561	\$ 344	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 \$93 million, \$103 million and \$118 million during the years ended December 31, 2022, 2021 and 2020, respectively.

Cash Awards

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

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Minimum aggregate payout amount	\$ 32	\$ 31	\$ 31
Maximum aggregate payout amount	183	178	175

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 certain performance metrics over a three-year period. At December 31, 2022, there was \$119 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:

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Operating lease cost	\$ 332	\$ 315	\$ 320
Variable lease cost	35	31	28
Short-term lease cost	51	80	93
Total lease cost	\$ 418	\$ 426	\$ 441

Supplemental Balance Sheet Information

Supplemental operating lease balance sheet information consists of the following:

<i>\$ in millions</i>	Year Ended December 31	
	2022	2021
Operating lease right-of-use assets	\$ 1,811	\$ 1,655
Other current liabilities	299	284
Operating lease liabilities	1,824	1,590
Total operating lease liabilities	\$ 2,123	\$ 1,874

Other Supplemental Information

Other supplemental operating lease information consists of the following:

<i>\$ in millions</i>	Year Ended December 31	
	2022	2021
Cash paid for amounts included in the measurement of operating lease liabilities	\$ 316	\$ 306
Right-of-use assets obtained in exchange for new lease liabilities	438	394
Weighted average remaining lease term	11.2 years	11.3 years
Weighted average discount rate	3.4 %	3.1 %

Maturities of Lease Liabilities

Maturities of operating lease liabilities as of December 31, 2022 are as follows:

<i>\$ in millions</i>	
Year Ending December 31	
2023	\$ 351
2024	320
2025	279
2026	238
2027	188
Thereafter	1,263
Total lease payments	2,639
Less: imputed interest	(516)
Present value of operating lease liabilities	\$ 2,123

As of December 31, 2022, we have approximately \$82 million in rental commitments for real estate leases that have not yet commenced. These leases are expected to commence in 2023 and 2024 with lease terms of 4 to 12 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.

The following table presents sales and operating income by segment:

<i>\$ in millions</i>	Year Ended December 31		
	2022	2021	2020
Sales			
Aeronautics Systems	\$ 10,531	\$ 11,259	\$ 12,169
Defense Systems	5,579	5,776	7,543
Mission Systems	10,396	10,134	10,080
Space Systems	12,275	10,608	8,744
Intersegment eliminations	(2,179)	(2,110)	(1,737)
Total sales	36,602	35,667	36,799
Operating income			
Aeronautics Systems	1,116	1,093	1,206
Defense Systems	664	696	846
Mission Systems	1,618	1,579	1,459
Space Systems	1,158	1,121	893
Intersegment eliminations	(303)	(272)	(216)
Total segment operating income	4,253	4,217	4,188
FAS/CAS operating adjustment	(200)	130	418
Unallocated corporate (expense) income	(452)	1,304	(541)
Total operating income	\$ 3,601	\$ 5,651	\$ 4,065

FAS/CAS Operating 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 applicable FAR and CAS requirements. The FAS/CAS operating adjustment, previously referred to as 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) Income

Unallocated corporate (expense) income includes the portion of corporate costs not considered allowable or allocable under the applicable FAR and CAS requirements, and therefore not allocated to the segments, such as changes in deferred state income taxes and a portion of management and administration, legal, environmental, compensation, retiree benefits, advertising and other corporate unallowable costs. Unallocated corporate (expense) income 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.

During the first quarter of 2021, the \$2.0 billion pre-tax gain on the sale of our IT services business and \$192 million of unallowable state taxes and transaction costs associated with the divestiture were recorded in Unallocated corporate (expense) income.

NORTHROP GRUMMAN CORPORATION

Disaggregation of Revenue

<i>Sales by Customer Type</i>	Year Ended December 31					
	2022		2021		2020	
	\$	% ⁽³⁾	\$	% ⁽³⁾	\$	% ⁽³⁾
<i>\$ in millions</i>						
Aeronautics Systems						
U.S. government ⁽¹⁾	\$ 8,930	85 %	\$ 9,631	85 %	\$ 10,411	86 %
International ⁽²⁾	1,344	13 %	1,421	13 %	1,595	13 %
Other customers	18	— %	18	— %	41	— %
Intersegment sales	239	2 %	189	2 %	122	1 %
Aeronautics Systems sales	10,531	100 %	11,259	100 %	12,169	100 %
Defense Systems						
U.S. government ⁽¹⁾	3,344	61 %	3,595	62 %	5,103	68 %
International ⁽²⁾	1,358	24 %	1,317	23 %	1,317	17 %
Other customers	71	1 %	75	1 %	395	5 %
Intersegment sales	806	14 %	789	14 %	728	10 %
Defense Systems sales	5,579	100 %	5,776	100 %	7,543	100 %
Mission Systems						
U.S. government ⁽¹⁾	7,471	72 %	7,223	71 %	7,279	72 %
International ⁽²⁾	1,809	17 %	1,846	18 %	1,945	19 %
Other customers	101	1 %	72	1 %	77	1 %
Intersegment sales	1,015	10 %	993	10 %	779	8 %
Mission Systems sales	10,396	100 %	10,134	100 %	10,080	100 %
Space Systems						
U.S. government ⁽¹⁾	11,578	94 %	9,885	93 %	8,110	93 %
International ⁽²⁾	337	3 %	398	4 %	331	4 %
Other customers	241	2 %	186	2 %	195	2 %
Intersegment sales	119	1 %	139	1 %	108	1 %
Space Systems sales	12,275	100 %	10,608	100 %	8,744	100 %
Total						
U.S. government ⁽¹⁾	31,323	86 %	30,334	85 %	30,903	84 %
International ⁽²⁾	4,848	13 %	4,982	14 %	5,188	14 %
Other customers	431	1 %	351	1 %	708	2 %
Total Sales	\$ 36,602	100 %	\$ 35,667	100 %	\$ 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.

⁽³⁾ Percentages calculated based on total segment sales.

NORTHROP GRUMMAN CORPORATION
Sales by Contract Type

<i>\$ in millions</i>	Year Ended December 31					
	2022		2021		2020	
	\$	% ⁽¹⁾	\$	% ⁽¹⁾	\$	% ⁽¹⁾
Aeronautics Systems						
Cost-type	\$ 5,013	49 %	\$ 5,419	49 %	\$ 6,142	51 %
Fixed-price	5,279	51 %	5,651	51 %	5,905	49 %
Intersegment sales	239		189		122	
Aeronautics Systems sales	10,531		11,259		12,169	
Defense Systems						
Cost-type	1,497	31 %	1,739	35 %	2,345	34 %
Fixed-price	3,276	69 %	3,248	65 %	4,470	66 %
Intersegment sales	806		789		728	
Defense Systems sales	5,579		5,776		7,543	
Mission Systems						
Cost-type	3,622	39 %	3,139	34 %	3,582	39 %
Fixed-price	5,759	61 %	6,002	66 %	5,719	61 %
Intersegment sales	1,015		993		779	
Mission Systems sales	10,396		10,134		10,080	
Space Systems						
Cost-type	8,579	71 %	7,731	74 %	6,369	74 %
Fixed-price	3,577	29 %	2,738	26 %	2,267	26 %
Intersegment sales	119		139		108	
Space Systems sales	12,275		10,608		8,744	
Total						
Cost-type	18,711	51 %	18,028	51 %	18,438	50 %
Fixed-price	17,891	49 %	17,639	49 %	18,361	50 %
Total Sales	\$ 36,602		\$ 35,667		\$ 36,799	

⁽¹⁾ Percentages calculated based on external customer sales.

NORTHROP GRUMMAN CORPORATION
Sales by Geographic Region

Year Ended December 31

<i>\$ in millions</i>	2022		2021		2020	
	\$	% ⁽²⁾	\$	% ⁽²⁾	\$	% ⁽²⁾
Aeronautics Systems						
United States	\$ 8,948	87 %	\$ 9,649	87 %	\$ 10,452	87 %
Asia/Pacific	708	7 %	896	8 %	841	7 %
Europe	585	6 %	461	4 %	574	5 %
All other ⁽¹⁾	51	— %	64	1 %	180	1 %
Intersegment sales	239		189		122	
Aeronautics Systems sales	10,531		11,259		12,169	
Defense Systems						
United States	3,415	71 %	3,670	74 %	5,498	81 %
Asia/Pacific	454	10 %	465	9 %	402	6 %
Europe	477	10 %	314	6 %	315	4 %
All other ⁽¹⁾	427	9 %	538	11 %	600	9 %
Intersegment sales	806		789		728	
Defense Systems sales	5,579		5,776		7,543	
Mission Systems						
United States	7,572	81 %	7,295	80 %	7,356	79 %
Asia/Pacific	531	6 %	518	6 %	707	8 %
Europe	977	10 %	1,004	10 %	893	9 %
All other ⁽¹⁾	301	3 %	324	4 %	345	4 %
Intersegment sales	1,015		993		779	
Mission Systems sales	10,396		10,134		10,080	
Space Systems						
United States	11,819	97 %	10,071	96 %	8,305	96 %
Asia/Pacific	109	1 %	60	1 %	18	— %
Europe	213	2 %	328	3 %	300	4 %
All other ⁽¹⁾	15	— %	10	— %	13	— %
Intersegment sales	119		139		108	
Space Systems sales	12,275		10,608		8,744	
Total						
United States	31,754	87 %	30,685	86 %	31,611	86 %
Asia/Pacific	1,802	5 %	1,939	5 %	1,968	5 %
Europe	2,252	6 %	2,107	6 %	2,082	6 %
All other ⁽¹⁾	794	2 %	936	3 %	1,138	3 %
Total Sales	\$ 36,602		\$ 35,667		\$ 36,799	

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

⁽²⁾ Percentages calculated based on external customer sales.

NORTHROP GRUMMAN CORPORATION

Intersegment Sales and Operating Income

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

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

<i>\$ in millions</i>	Year Ended December 31					
	2022		2021		2020	
	Sales	Operating Income	Sales	Operating Income	Sales	Operating Income
Intersegment sales and operating income						
Aeronautics Systems	\$ 239	\$ 27	\$ 189	\$ 19	\$ 122	\$ 11
Defense Systems	806	95	789	89	728	76
Mission Systems	1,015	167	993	150	779	116
Space Systems	119	14	139	14	108	13
Total	\$ 2,179	\$ 303	\$ 2,110	\$ 272	\$ 1,737	\$ 216

Assets

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

<i>\$ in millions</i>	December 31	
	2022	2021
Assets		
Aeronautics Systems	\$ 9,701	\$ 9,423
Defense Systems	6,163	5,911
Mission Systems	10,120	9,869
Space Systems	11,540	10,760
Corporate assets ⁽¹⁾	6,231	6,616
Total assets	\$ 43,755	\$ 42,579

⁽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.

Capital Expenditures and Depreciation and Amortization

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

<i>\$ in millions</i>	Year Ended December 31					
	2022	2021	2020	2022	2021	2020
	Capital Expenditures			Depreciation and Amortization ⁽²⁾		
Aeronautics Systems	\$ 490	\$ 465	\$ 540	\$ 322	\$ 266	\$ 282
Defense Systems	110	133	78	101	91	108
Mission Systems	248	236	302	242	233	209
Space Systems	529	530	440	396	344	291
Corporate ⁽¹⁾	58	51	60	281	305	377
Total	\$ 1,435	\$ 1,415	\$ 1,420	\$ 1,342	\$ 1,239	\$ 1,267

⁽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.

⁽²⁾ Beginning in 2022, depreciation and amortization amounts include the amortization expense related to the company's right-of-use assets. Prior year amounts have been recast to conform to current year presentation. This change in presentation had no impact on depreciation and amortization expense in the consolidated statements of earnings and comprehensive income.

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 (Chair, 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, 2022, 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, 2022, 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, 2022.

Deloitte & Touche LLP issued an attestation report dated January 25, 2023, 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, 2022, 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
Chair, Chief Executive Officer and President

/s/ David F. Keffer
Corporate Vice President and Chief Financial Officer
January 25, 2023

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, 2022, 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, 2022, 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, 2022 of the Company and our report dated January 25, 2023 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 25, 2023

Item 9C. Disclosure Regarding Foreign Jurisdictions that Prevent Inspections

None.

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 2023 Annual Meeting of Shareholders, to be filed with the SEC within 120 days after the end of the company's fiscal year.

INFORMATION ABOUT OUR EXECUTIVE OFFICERS

Our executive officers as of January 25, 2023, are listed below, along with their ages on that date, positions and offices held with the company, and principal occupations and employment, focused primarily on the past five years.

<u>Name</u>	<u>Age</u>	<u>Office Held</u>	<u>Since</u>	<u>Recent Business Experience</u>
Kathy J. Warden	51	Chair, Chief Executive Officer and President	2019	Chief Executive Officer and President (2019); President and Chief Operating Officer (2018)
Ann M. Addison	61	Corporate Vice President and Chief Human Resources Officer	2019	Corporate Vice President (2018); Executive Vice President and Chief Human Resources Officer, Leidos (2016-2018)
Matthew Bromberg	52	Corporate Vice President, Global Operations	2022	President, Military Engines, Pratt & Whitney (2017-2021)
Mark A. Caylor	58	Corporate Vice President and President, Mission Systems Sector	2018	
Sheila C. Cheston	64	Corporate Vice President and General Counsel	2010	
Michael A. Hardesty	51	Corporate Vice President, Controller, and Chief Accounting Officer	2013	
Thomas H. Jones	56	Corporate Vice President and President, Aeronautics Systems Sector	2021	Vice President and General Manager, Airborne C4ISR Division, Mission Systems Sector (2017-2020)
Lesley A. Kalan	49	Corporate Vice President and Chief Strategy and Development Officer	2020	Corporate Vice President, Government Relations (2018-2019)
David F. Keffer	45	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)
David T. Perry	58	Corporate Vice President and Chief Global Business Officer	2019	Corporate Vice President and Chief Global Business Development Officer (2012-2019)

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<u>Name</u>	<u>Age</u>	<u>Office Held</u>	<u>Since</u>	<u>Recent Business Experience</u>
Mary D. Petryszyn	61	Corporate Vice President	2022	Corporate Vice President and President, Defense Systems Sector (2020-2022); Vice President and General Manager, Land and Avionics C4ISR Division, Mission Systems Sector (2016-2019)
Roshan Roeder	43	Corporate Vice President and President, Defense Systems Sector	2022	Vice President and General Manager, Airborne Multifunction Sensors, Mission Systems Sector (2020-2022); Vice President Program Management, Communications Business Unit, Mission Systems Sector (2018-2020); Vice President Program Management, Advanced Ground Sensors, Mission Systems Sector (2016-2018)
Lucy C. Ryan	49	Corporate Vice President, Communications	2019	Vice President, Enterprise Communications (2018); Director of Communications, General Dynamics (2010-2018)
Thomas L. Wilson	54	Corporate Vice President and President, Space Systems Sector	2022	Vice President and General Manager, Strategic Space Systems Division, Space Systems Sector (2020-2021); Vice President of Strategy and Business Development, Space Systems Sector (2020); Vice President of Business Development, Former Innovation Systems Sector (2018-2020); Vice President of Strategy and Business Development, Space Systems Group, Orbital ATK, Inc. (2015-2018)

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 2023 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 “Who We Are – 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 2023 Annual Meeting of Shareholders.

Item 11. Executive Compensation

Information concerning Executive Compensation required by this Item 11, 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 2023 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 2023 Annual Meeting of Shareholders.

NORTHROP GRUMMAN CORPORATION

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 2023 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 2023 Annual Meeting of Shareholders.

PART IV

Item 15. Exhibits, Financial Statement Schedules

- (a) 1. Report of Independent Registered Public Accounting Firm (PCAOB ID No. 34)

Financial Statements

Consolidated Statements of Earnings and Comprehensive Income
Consolidated Statements of Financial Position
Consolidated Statements of Cash Flows
Consolidated Statements of Changes in Shareholders' Equity
Notes to Consolidated Financial Statements

2. Financial Statement Schedules

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

3. Exhibits

- 2(a) Agreement and Plan of Merger 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(b) Transaction Agreement dated as of April 28, 2014, among Alliant Techsystems Inc., Vista Spingo 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) 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(b) 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(c) 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(d) 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(e) 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)

NORTHROP GRUMMAN CORPORATION

- 4(f) 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(g) 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(h) 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(i) 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(j) 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(k) 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(l) 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(m) 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(n) Fifth Supplemental Indenture between TRW Inc. (predecessor-in-interest to Northrop Grumman Systems Corporation) and The Chase Manhattan Bank, as successor trustee, dated as of June 2, 1999 (incorporated by reference to Exhibit 4(f) to Form S-4 Registration Statement No. 333-83227 of TRW Inc. filed July 20, 1999)
- 4(o) Ninth Supplemental Indenture dated as of December 31, 2009 among Northrop Grumman Space & Mission Systems Corp. (predecessor-in-interest to Northrop Grumman Systems Corporation); The Bank of New York Mellon, as successor trustee; Northrop Grumman Corporation; and Northrop Grumman Systems Corporation (incorporated by reference to Exhibit 4(p) to Form 10-K for the year ended December 31, 2009, filed February 9, 2010, File No. 001-16411)

NORTHROP GRUMMAN CORPORATION

- 4(p) Tenth Supplemental Indenture dated as of March 30, 2011, by and among Northrop Grumman Systems Corporation (successor-in-interest to Northrop Grumman Space & Mission Systems Corp. and TRW, Inc.), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank and to Mellon Bank, N.A., Titan II Inc. (formerly known as Northrop Grumman Corporation), and Titan Holdings II, L.P., to Indenture between TRW Inc. and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 (incorporated by reference to Exhibit 4.7 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
- 4(q) Eleventh Supplemental Indenture dated as of March 30, 2011, by and among Northrop Grumman Systems Corporation (successor-in-interest to Northrop Grumman Space & Mission Systems Corp. and TRW Inc.), The Bank of New York Mellon, as successor trustee to JPMorgan Chase Bank and to Mellon Bank, N.A., Titan Holdings II, L.P., and Northrop Grumman Corporation (formerly known as New P, Inc.) to Indenture between TRW Inc. and Mellon Bank, N.A., as trustee, dated as of May 1, 1986 (incorporated by reference to Exhibit 4.8 to Form 10-Q for the quarter ended March 31, 2011, filed April 27, 2011, File No. 001-16411)
- 4(r) Twelfth Supplemental Indenture, dated as of August 25, 2021, to the Indenture dated as of May 1, 1986, by and among Northrop Grumman Systems Corporation, Northrop Grumman Corporation and The Bank of New York Mellon, as trustee (incorporated by reference to Exhibit 4.1 to Form 8-K filed August 27, 2021, File No. 001-16411)
- 4(s) Thirteenth Supplemental Indenture, dated as of August 25, 2021, to the Indenture dated as of May 1, 1986, by and among Northrop Grumman Systems Corporation, Northrop Grumman Corporation and The Bank of New York Mellon, as trustee (incorporated by reference to Exhibit 4.2 to Form 8-K filed August 27, 2021, File No. 001-16411)
- 4(t) 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(u) 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(v) 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(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)

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- 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 2.930% Senior Note due 2025 (incorporated by reference to Exhibit C to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
- 4(jj) Form of 3.250% Senior Note due 2028 (incorporated by reference to Exhibit D to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
- 4(kk) Form of 4.030% Senior Note due 2047 (incorporated by reference to Exhibit E to Exhibit 4.1 to Form 8-K filed October 13, 2017, File No. 001-16411)
- 4(ll) 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(mm) 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(nn) 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(oo) Tenth Supplemental Indenture, dated as of September 2, 2021, 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 September 3, 2021, File No. 001-16411)
- 4(pp) Form of 7.875% Senior Note due 2026 (incorporated by reference to Exhibit A in Exhibit 4.1 to Form 8-K filed September 3, 2021, File No. 001-16411)
- 4(qq) Form of 7.750% Senior Note due 2026 (incorporated by reference to Exhibit B in Exhibit 4.1 to Form 8-K filed September 3, 2021, File No. 001-16411)
- 4(rr) Form of 6.650% Senior Note due 2028 (incorporated by reference to Exhibit C in Exhibit 4.1 to Form 8-K filed September 3, 2021, File No. 001-16411)
- 4(ss) Form of 7.750% Senior Note due 2029 (incorporated by reference to Exhibit D in Exhibit 4.1 to Form 8-K filed September 3, 2021, File No. 001-16411)
- 4(tt) Form of 7.750% Senior Note due 2031 (incorporated by reference to Exhibit E in Exhibit 4.1 to Form 8-K filed September 3, 2021, File No. 001-16411)

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- 4(uu) Form of 6.980% Senior Note due 2036 (incorporated by reference to Exhibit F in Exhibit 4.1 to Form 8-K filed September 3, 2021, File No. 001-16411)
- 4(vv) Description of Securities (incorporated by reference to Exhibit 4(II) 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 23, 2022, 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 23, 2022, File No. 001-16411)
- 10(b) 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(c) 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(d) 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(e) 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)
 - (i) First Amendment to Guarantee, dated as of August 25, 2021, to the Guarantee dated as of March 27, 2003, by and among Northrop Grumman Systems Corporation, Northrop Grumman Corporation and The Bank of New York Mellon, as trustee (incorporated by reference to Exhibit 10.1 to Form 8-K filed August 27, 2021, File No. 001-16411)
- +10(f) 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(g) Amended and Restated 2011 Long-Term Incentive Stock Plan (as amended and restated effective as of May 20, 2015) (incorporated by reference to Appendix B to the Company's Proxy Statement on Schedule 14A for the 2015 Annual Meeting of Shareholders filed April 6, 2015, 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) 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)

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- (iii) 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)
 - (iv) 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)
 - (v) 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)
 - (vi) 2021 Restricted 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, 2021, filed April 29, 2021, File No. 001-16411)
 - (vii) 2021 Restricted Performance Stock Rights Grant Agreement Granted 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, 2021, filed April 29, 2021, File No. 001-16411)
 - (viii) 2022 Restricted 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, 2022, filed April 28, 2022, File No. 001-16411)
 - (ix) 2022 Restricted Performance Stock Rights Grant Agreement Granted 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, 2022, filed April 28, 2022, File No. 001-16411)
- +10(h) Northrop Grumman 2011 Long-Term Incentive Stock Plan (As Amended Through December 4, 2014) (incorporated by reference to Exhibit 10(h) to Form 10-K for the year ended December 31, 2014, filed February 2, 2015, 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(i) 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)

NORTHROP GRUMMAN CORPORATION

- (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(j) Northrop Grumman Supplementary Retirement Income Plan (formerly TRW Supplementary Retirement Income Plan) (Amended and Restated Effective January 1, 2014) (incorporated by reference to Exhibit 10(m) to Form 10-K for the year ended December 31, 2013, filed February 3, 2014, File No. 001-16411)
- +10(k) 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(l) Non-Employee Director Compensation Term Sheet, effective May 19, 2021 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2021, filed July 29, 2021, File No. 001-16411)
- +10(m) Non-Employee Director Compensation Term Sheet, effective May 18, 2022 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended June 30, 2022, filed July 28, 2022, File No. 001-16411)
- +10(n) Form of Indemnification Agreement between Northrop Grumman Corporation and its directors and executive officers (incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2012, filed April 25, 2012, File No. 001-16411)
- +10(o) Northrop Grumman Deferred Compensation Plan (Amended and Restated Effective as of April 1, 2016) (incorporated by reference to Exhibit 10.3 to Form 10-Q for the quarter ended March 31, 2016, filed April 27, 2016, File No. 001-16411)
- +10(p) The 2002 Incentive Compensation Plan of Northrop Grumman Corporation, As Amended and Restated effective January 1, 2009 (incorporated by reference to Exhibit 10.6 to Form 10-Q for the quarter ended March 31, 2009, filed April 22, 2009, File No. 001-16411)
- +10(q) Northrop Grumman 2006 Annual Incentive Plan and Incentive Compensation Plan, as amended and restated effective January 1, 2022 (incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended June 30, 2021, filed July 29, 2021, File No. 001-16411)
- +10(r) 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(s) 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(t) Northrop Grumman Officers Retirement Account Contribution Plan (Amended and Restated Effective as of January 1, 2019) (incorporated by reference to Exhibit 10(v) to Form 10-K for the year ended December 31, 2018, filed January 31, 2019, File No. 001-16411)
- +10(u) Northrop Grumman 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)

NORTHROP GRUMMAN CORPORATION

- +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 10, 2022
- +10(z) Group Personal Excess Liability Policy effective as of January 1, 2022 (incorporated by reference to Exhibit 10.1 to Form 10-Q for the quarter ended March 31, 2022, filed April 28, 2022, File No. 001-16411)
- +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) Consultant Contract dated as of April 11, 2022 by and between Northrop Grumman Systems Corporation and Blake E. Larson (incorporated by reference to Exhibit 10.2 to Form 10-Q for the quarter ended June 30, 2022, filed July 28, 2022, File No. 001-16411)
- *+10(dd) Transition and Retirement Agreement dated as of September 9, 2022, as revised, by and between Northrop Grumman Systems Corporation and Mary D. Petryszyn

- *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, 2022, formatted as inline 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 25th day of January 2023.

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 25th day of January 2023, by the following persons and in the capacities indicated.

<u>Signature</u>	<u>Title</u>
Kathy J. Warden*	Chair, 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 (Principal Accounting Officer)
David P. Abney*	Director
Marianne C. Brown*	Director
Donald E. Felsing*	Director
Ann M. Fudge*	Director
Madeleine A. Kleiner*	Director
Karl J. Krapek*	Director
Arvind Krishna*	Director
Graham N. Robinson*	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

Use Of Non-GAAP Financial Measures

This Annual Report contains non-GAAP (accounting principles generally accepted in the United States of America) financial measures, as defined by Securities and Exchange Commission (SEC) Regulation G. While we believe investors and other users of our financial statements may find these non-GAAP financial measures useful in evaluating our financial performance and operational trends, they should be considered as supplemental in nature and therefore, should not be considered in isolation or as a substitute for financial information prepared in accordance with GAAP. Definitions and reconciliations for the non-GAAP financial measures contained in this Annual Report are provided below. Other companies may define these measures differently or may utilize different non-GAAP financial measures.

Organic Sales:

Total sales excluding sales attributable to the company's IT services divestiture. This measure may be useful to investors and other users of our financial statements as a supplemental measure in evaluating the company's underlying sales growth as well as in providing an understanding of our ongoing business and future sales trends by presenting the company's sales before the impact of divestiture activity.

\$M	2022	2021	2020
Total sales	\$36,602	\$35,667	\$36,799
IT services sales	–	(162)	(2,329)
Organic sales	\$36,602	\$35,505	\$34,470

Segment Operating Income and Segment Operating Margin Rate:

Segment operating income, as reconciled in the table below, and segment operating margin rate (segment operating income divided by sales) reflect the combined operating income of our four segments less the operating income associated with intersegment sales. Segment operating income includes pension expense allocated to our sectors under FAR and CAS and excludes FAS pension service expense and unallocated corporate items (certain corporate-level expenses, which are not considered allowable or allocable under applicable FAR and CAS requirements, 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.

\$M	2022	2021	2020
Sales	\$36,602	\$35,667	\$36,799
Operating income	\$3,601	\$5,651	\$4,065
<i>Operating margin rate</i>	<i>9.8%</i>	<i>15.8%</i>	<i>11.0%</i>
Reconciliation to segment operating income			
FAS/CAS operating adjustment	200	(130)	(418)
Unallocated corporate (income) expense	452	(1,304)	541
Segment operating income	\$4,253	\$4,217	\$4,188
<i>Segment operating margin rate</i>	<i>11.6%</i>	<i>11.8%</i>	<i>11.4%</i>

Transaction-Adjusted EPS:

Diluted earnings per share excluding the per share impacts related to the company's IT services divestiture, including the gain on sale of the business, associated federal and state income tax expenses, transaction costs, and the make-whole premium for early debt redemption, as well as mark-to-market (MTM) benefit (expense) and related tax impacts. This measure may be useful to investors and other users of our financial statements as a supplemental measure in evaluating the company's underlying financial performance per share by presenting the company's diluted earnings per share results before the non-operational impact of the IT services divestiture and pension and OPB actuarial gains and losses. Transaction-adjusted EPS is reconciled below.

	2022	2021	2020
Diluted earnings per share	\$31.47	\$43.54	\$19.03
MTM (benefit) expense per share	(7.92)	(14.64)	6.17
MTM-related deferred state tax expense (benefit) per share	0.42	0.77	(0.32)
Federal tax expense (benefit) of items above per share	1.57	2.92	(1.23)
MTM adjustment per share, net of tax	(5.93)	(10.95)	4.62
Gain on sale of business per share	—	(12.31)	—
State tax impact per share	—	0.99	—
Transaction costs per share	—	0.20	—
Make-whole premium per share	—	0.34	—
Federal tax impact of items above per share	—	3.82	—
Transaction adjustment per share, net of tax	—	(6.96)	—
Transaction-adjusted EPS	\$25.54	\$25.63	\$23.65

General Information

Northrop Grumman Corporation on the Internet

Information on Northrop Grumman and its sectors, including press releases, this Annual Report and other reports, can be found at www.northropgrumman.com

Annual Meeting of Shareholders

Wednesday, May 17, 2023 8 a.m. EDT

The 2023 Annual Meeting of Shareholders of Northrop Grumman Corporation will be held on Wednesday, May 17, 2023 at 8 a.m. Eastern.

Northrop Grumman Corporation Corporate Office

2980 Fairview Park Drive
Falls Church, Virginia 22042

Independent Auditors

Deloitte & Touche LLP

Stock Listing

Northrop Grumman Corporation common stock is listed on the New York Stock Exchange (trading symbol NOC).

Transfer Agent, Registrar and Dividend Paying Agent

Computershare

P.O. Box 43006
Providence, RI 02940-3006
(877) 498-8861

www.computershare.com/investor

Dividend Reinvestment Program

Registered owners of Northrop Grumman Corporation common stock are eligible to participate in the company's Automatic Dividend Reinvestment Plan. Under this plan, shares are purchased with reinvested cash dividends and voluntary cash payments of up to a specified amount per calendar year.

For information on the company's Dividend Reinvestment Service, contact our Transfer Agent and Registrar, Computershare.

Company Shareholder Services

Shareholders with questions regarding stock ownership should contact our Transfer Agent and Registrar, Computershare. Stock ownership inquiries may also be directed to Northrop Grumman's Shareholder Services via email at sharesrv@ngc.com.

Duplicate Mailings

Shareholders with more than one account or who share the same address with another shareholder may receive more than one Annual Report. To eliminate duplicate mailings or to consolidate accounts, contact Computershare. Separate dividend checks and proxy materials will continue to be sent for each account on our records.

Investor Relations

Securities analysts, institutional investors and portfolio managers should contact Northrop Grumman Investor Relations at investors@ngc.com.

Media Relations

Inquiries from the media should be directed to Northrop Grumman Corporate Communications at (703) 280-4456 or send an email to newsbureau@ngc.com.

Electronic Delivery of Future Shareholder Communications

If you would like to help conserve natural resources and reduce the costs incurred by Northrop Grumman Corporation in mailing proxy materials, you can consent to receiving all future proxy statements, proxy cards and Annual Reports electronically via e-mail or the Internet. To sign up for electronic delivery, registered shareholders may log onto www.computershare.com/investor.

Look for our other reports

