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Thank you for participating,

A handwritten signature in black ink, appearing to read 'G. Hamilton'.

Gregory Hamilton  
President  
Aviation Week Network

Acknowledged, agreed, and submitted by

\_\_\_\_\_  
Nominee’s Signature

\_\_\_\_\_  
Date

Nominee’s Name (please print): \_\_\_\_\_

Title (please print): \_\_\_\_\_

Company (please print): \_\_\_\_\_

## NOMINATION FORM

Name of Program: F-15EX \_\_\_\_\_

Name of Program Leader: Kurt Schroeder \_\_\_\_\_

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Customer Approved

- Date: 9 July 2024 \_\_\_\_\_
- Customer Contact (name/title/organization/phone): Matthew Kelly/F-15EX Deputy Program Manager/937-701-5282 \_\_\_\_\_

Supplier Approved (if named in this nomination form)

- Date: \_\_\_\_\_
- Supplier Contact (name/title/organization/phone): \_\_\_\_\_

**PLEASE REFER TO PROGRAM EXCELLENCE DIRECTIONS  
AS YOU COMPLETE THIS FORM.**

## SECTION 1: EXECUTIVE SUMMARY

### Make the Case for Excellence

Value: 10 points

Use 12 pt. Times Roman typeface.

#### **What is the vision for this program/project? What unique characteristics and properties qualify this program for consideration?**

The Boeing Company has a long and proud aerospace history of being a global industrial champion. Boeing employs over 170,000 people globally, and its revenues exceed \$77B annually. The Boeing Defense business represents roughly one-third of the company's revenues. One of the most impressive platforms is the F-15.

The F-15 program starts in 1967 when the United States Air Force (USAF) selected the McDonnell Douglas (now Boeing) design. The aircraft's first flight was in July 1972 and it entered service in 1976, with the production line still producing the fighter 52 years later. The F-15 is a twin-engine, all-weather fighter that is the backbone for the U.S. Air Force's air superiority and homeland defense missions. Its proven design is undefeated in air-to-air combat, with over 100 aerial combat victories and zero losses. Twenty-nine thousand five hundred pounds of thrust per engine enables the F-15 to exceed speeds of Mach 2.5. The F-15C continues to provide air superiority with an undefeated and unmatched aerial combat record. The F-15E retains this air superiority capability and adds systems, such as advanced imaging and targeting pods to meet the requirement for all-weather, deep penetration and night/under-the-weather, air-to-surface attack. Configured with conformal fuel tanks (CFTs), the F-15E can deploy worldwide with minimal tanker support and arrives combat-ready. F-15s operate 24/7 worldwide in peacekeeping and combat operations with over 1,000 F-15 aircraft in operational service for the USAF and other international allies, for whom the F-15 is the backbone of these respective nation's air forces. The combined investment in the platform has paid dividends with the F-15 having the highest availability of any USAF fighter with a lower cost of operations than F-22 or F-35. The modernization investment in the F-15 enabled an Advanced F-15 with cutting edge avionics, Large Area Display (LAD), Eagle Passive/Active Warning Survivability System (EPAWSS), and Advance Display Core Processor (ADCP) II maintaining unparalleled performance and opened the door for the F-15EX.

The F-15EX Eagle II, now available to the USAF, is a low-risk, highly mature, simultaneously multi-role weapons system that leverages prior significant investment by international partners. The platform, by design, offers substantial operations and maintenance savings and the flexibility to rapidly integrate new advanced weapons that cannot fit in internal weapons bays of other aircraft. The USAF selected the F-15EX in December 2019 and was awarded an Indefinite Delivery/Indefinite Quantity (IDIQ) contract in July 2020.

Boeing delivered the first two test aircraft to the 96<sup>th</sup> Test Wing, Eglin Air Force Base (AFB), in 2021, just nine months after the contract award, by leveraging the existing production line for the F-15 Qatari Advanced Aircraft. By the end of 2023 the Boeing Company completed delivery of the F-15EX Eagle II test fleet with EX3-6 aircraft fielded to Eglin AFB, completed rigorous testing, including Initial Operational Test & Evaluation (IOT&E) and Live Fire Test & Evaluation (LFT&E), culminating in a comprehensive assessment by the Director of Operational Test & Evaluation (DOT&E). The findings affirmed the exceptional operational effectiveness of the F-15EX across its air superiority roles and air-to-ground proficiency. Moreover, the DOT&E determined the F-15EX to be operationally effective, suitable, and survivable against threats likely to be encountered in diverse mission environments.

The successful conclusion of IOT&E marked a pivotal step in the program and enabled the USAF to approve Full Rate Production decision for the program in June 2024, underscoring the overall success of the F-15EX development and low-rate initial production. Boeing provided crucial functional support to the USAF led

combined Developmental and Operational testing. This achievement represents a significant milestone in the F-15EX program, validating Boeing's strategic approach of leveraging extensive investment and capability advancements to deliver a modern fighter with unparalleled multi-role capacity, payload versatility, and range. The USAF now has the full complement of six F-15EX test aircraft at Eglin AFB participating in large scale exercises and deep-end testing and is on track to set new standards in reliability and cost-per-flying hour.

Following the completion of deliveries to the test fleet, the first combat aircraft started delivery to the Portland Air National Guard in the Summer of 2024 resulting in USAF passing its initial operational capability (IOC) milestone on July 10<sup>th</sup>.

The F-15EX program began as a rapid fielding program and maintained momentum through the IOT&E phase.

The first two test aircraft (20-0001 and 20-0002) were delivered after only a nine flights totaling 13.7 hours. Less than a month after initial delivery to Eglin, these two aircraft were then deployed to Northern Edge, a 20-day large force exercise in Alaska that allows the aircraft to operate in a realistic combat environment. This is a testament to the aircraft's readiness and the team's confidence in the platform.

After the Northern Edge deployment, the team prepared F-15EX 20-0002 in approximately two weeks for a 3.5-month deployment to Patuxent River Naval Air Station for High Altitude Electromagnetic Pulse (HEMP) and External RF Electromagnetic Environment (E3) testing. This testing was successfully completed with no significant anomalies noted.

Throughout the remainder of 2021, the F-15EX team continued to put the aircraft through the planned test regime including an additional deployment to support an Operational focused exercise, Black Flag, at Nellis AFB. F-15EX aircraft flew fourteen sorties for 25.2 hours to support Black Flag. In addition, the first gun live-fire test on 20-0001 was completed in November of 2021. All of this accounted for a total of 304 test points conducted in 2021.

The Eglin AFB team continued to complete significant milestones with the two test aircraft throughout 2022. In January, the program supported Combat Archer at Tyndall AFB and completed the first live missile fire for an F-15EX aircraft by launching an AIM-120 off Station 8B. The test center completed two additional live missile events, including the first Station 1B live missile fire for any U.S. Air Force F-15 aircraft, bringing expanded capability to the USAF fleet. Multi-engine acoustic Ground and Flight Testing, measured F-15EX engine noise at various settings and flight altitudes. KC-46 aerial refueling certification was also conducted and completed at Nellis AFB, granting access to the most advanced USAF tanker to the F-15EX. A total of 353 test points were completed by the Eglin Test Center in 2022.



Figure 1: AMRAAM Shot from STA 8B

In 2023, the F-15EX Test Program utilized an opportunity to test air-to-ground capabilities at Combat Hammer at Hill AFB. During this period, two F-15EX aircraft flew a combined four sorties and 6.4 hours in various configurations releasing nine air-to-ground smart munitions and long-range weapons. 20-0001 successfully dropped 1 AGM-158/JASSM and 2 GBU-38/JDAM without installing CFTs. Additionally, 20-0002 dropped 2 GBU-39/SDBI with CFTs further expanding the Air-to-Ground capability for the F-15EX fleet. F-15EX

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successfully transitioned to agile software releases as part of the \$181.3M Continuous Development and Integration (CD&I) program allowing rapid new capability fielding.

F-15EX continued participation in extensive large fleet exercises in 2023, including Northern Edge and Black Flag demonstrating the ability to integrate with F-35, F-22, F-15E, F-15C, F-16, and T-38 aircraft. These demonstrations help guide the Full Rate Production Decision for F-15EX. At the end of 2023, the two F-15EX test aircraft flew a total of 916 sorties for 1473.1 hours and completed an additional 143 test points. The team finished 2023 by ensuring the next four F-15EX test aircraft completed all required system verifications and ground tests before delivery. Testing included a Structural Mode Interaction (SMI) test, Ground Vibration Test (GVT), Electromagnetic Capability (EMC), and instrumentation verification. The remaining four test aircraft were delivered in the Winter of 2023 completing the fleet of 6 test aircraft to support testing of additional combat capability.

Boeing is selected for the Program Management Excellence category in recognition of the program management challenges faced and overcome while simultaneously managing the IOT&E, and production while enabling a long-term sustainment package upfront. Boeing mitigated risks and challenges associated with concurrent design and production that could have resulted in rework and increased costs as the program's requirements changed as it progressed.

## DIRECTIONS

- **Do not exceed 10 pages in responding to the following four descriptions.**
  - Allocate these 10 pages as you deem appropriate, but it is important that you respond to all four sections.
- **DO NOT REMOVE THE GUIDANCE PROVIDED FOR EACH SECTION.**
- Use 12 pt. Times Roman typeface throughout.
- Include graphics and photos if appropriate; do not change margins.

## SECTION 2: VALUE CREATION

Value: 15 points

Please respond to the following prompt:

- **Clearly define the value of this program/project for the corporation; quantify appropriately**

F-15 has been in continuous production for 52 years with F-15EX production continuing into 2029. The reenergized F-15EX due to USAF's interest for a low-risk, highly mature, simultaneously multi-role weapons system has driven demand for F-15s internationally. The program has lead requests for Israel, Poland, Saudi Arabia, and Indonesia for new production aircraft as well as upgrade programs for Japan, Korea, Singapore to achieve F-15EX similar capabilities helping extend production and support well past the 2030s.

- **Clearly define the value of this program/project to your customer**

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Since the USAF first selected the F-15 in 1969, McDonnell Douglas and, later, The Boeing Company has maintained a sense of urgency around operational fielding.

Transitioning to new advanced fighter aircraft normally would significantly disrupt the fielding, logistics, and sustainment infrastructure. Replacing the existing F-15C fleet with F-15EX dramatically reduces disruption and accelerates fielding by taking advantage of existing aircraft's familiarity with the existing aircraft and allowing the USAF to focus on the new and improved systems. Starting in 2023 the program implemented a fielding strategy for F-15C, F-15E, and F-15EX to share a common Operational Flight Program (OFP) allowing significant cost savings for developing of the OFP allowing aircrew to transition between airframes with only differences training instead of a formal training course. The current syllabus for transitioning aircrew between airframes consists of academics, four simulator training sessions, and three aerial flights. The significant changes to the airplane include the digital flight control system and the advanced cockpit station (ACS). The flight control system provides similar handling qualities to the F-15C and F-15E, while protecting the airplane from overloads and increasing handling qualities with the additional 1/9 weapons stations. The advanced cockpit station provides the aircrew with a 10x19" display that is fully customizable depending on the mission sets being tasked to increase the situational awareness overall while reducing aircrew workload. Lastly, The F-15EX leverages commonality across support equipment and spares with the legacy F-15 platform providing additional savings.

Replacing the legacy F-15 Fleet with F-15EX is an innovative approach that results in a lower operations and maintenance costs, flexibility to rapidly integrate advanced mission systems and weapons, reduced training time spent transitioning to a new aircraft type, and ultimately combat ready forces becoming available sooner than a transition to a brand-new aircraft platform.

- **Clearly define the value of this program/project to members of your team; quantify if possible**

The F-15EX has allowed advancements from both USAF and international F-15 customers to be combined into a single platform. This approach has leveraged knowledgeable team members who have worked F-15C, F-15E, and international programs to transition to F-15EX. The program has transitioned to a digital future attracting new members with apps-based solutions. Boeing's labs and software teams become more important to the capabilities of the jet. EPAWSS is one system that can be swiftly updated to respond to the battlespace — such as when a new threat has been found, or a new jamming technique may be needed.

- **Clearly define the contribution of this program/project to the greater good (society, security, etc.)**

Seven nations operate the F-15 platform today with a presence of over 1,000 aircraft in the field. As a USAF platform, the F-15 is responsible for fulfilling the homeland defense mission at several Continental United States (CONUS) basing locations and rotational and permanent forces Outside the Continental United States (OCONUS) around the globe. The F-15 holds an undefeated Air-to-Air success rate of 104:0.

**International Cooperation:** The F-15EX is a global platform with a supply chain involving over 20 international suppliers accounting for approximately 25% of the material cost.

**Economic Development:** The F-15EX is assembled in St. Louis, Missouri, with a widely represented supply base totaling over 570 suppliers and created over 2,000 jobs at the St. Louis site.

**Enable the Future:** While the F-15 is viewed by many as a legacy platform, it not only has an advanced avionics and sensor suite, but serves as a test bed for risk reducing future advanced capabilities for the F-15 and

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other platforms. Boeing invested in the platform by proactively adding 10G Fiber throughout the aircraft to support additional processing and computing power.

**Inspire the Next Generation:** Building aircraft for the USAF inspires a sense of patriotism. It is an honor to know that Boeing’s daily work contributes to protecting and defending the United States homeland and U.S. allies worldwide by providing a modern fighter jet with advanced capabilities that allow warfighters significant advantages during combat operations.

### SECTION 3: ORGANIZATIONAL BEST PRACTICES AND TEAM LEADERSHIP

Value: 35 points

Use 12 pt. Times Roman typeface

Please respond to the following prompts:

- **15 points:** Describe the innovative tools and systems used by your team, how they contributed to performance and why

**Full-Sized Determinant Assembly (FSDA):** FSDA was incorporated into the build for the Nose Barrel, Forward Fuselage, and Wings to improve quality, assembly time, reduction of drilling operation and the number of tools required for the build. In addition to up front efficiencies, FSDA also leads to benefits during maintenance and rework.

**Design for Manufacturing and Assembly (DFMA):** Since the F-15EX builds off the original design of the F-15, there are limitations to how much of the design should be transitioned from the 2D drawings to the 3D model-based definition. For parts where the business case does not deem FSDA viable, additional changes were made to update the part drawings to model based definition.

- **10 points:** Define the **unique** practices and process you used to develop, lead and manage people?

The first two F-15EX test aircraft were delivered to Eglin AFB in 2021, with development and production continuing in parallel throughout the program. At this time, there were significant changes to the workforce resulting from the COVID-19 pandemic which forced Boeing to reevaluate its people strategy. Today, Boeing’s People Strategy is defined by three key pillars: Develop Our Workforce, Strengthen Our Culture, and Champion Diversity, Equity, and Inclusion.

#### **Develop Our Workforce:**

- Track staffing alignment to business needs and financial commitments
- Support employee development plans that drive focused training and ensure proper onboarding resources are in place
- Leader engagement at recruiting events and drive a social media presence
- Functional leaders identify critical roles and document knowledge management plans

#### **Strengthen Our Culture:**

- Exhibit behaviors that foster inclusion and belonging that are consistently applied, visible and applicable to all, and demonstrated not just spoken.
- Program specific onboarding creates a welcoming experience for new employees (welcome package, communications, recognition).

#### **Champion Diversity, Equity & Inclusion:**

- Create an environment where diverse candidates understand they are valued and have confidence in seeking out new roles within the organization

- Proactively engage in recruiting and recognizing diverse talent
- Actively develop diverse teammates and pull through the talent pipeline
- Program leader led Learning Circles with key top talent to accelerate development

➤ **10 points: How did you leverage skills and technologies of your suppliers?**

With the transition to a three-dimensional (3D) Model Based Definition (MBD), Boeing has demonstrated improvements in cycle time and reductions in non-conformances. Secondary benefits are seen in the reduced in time it takes to design new modifications to the aircraft for upgrades, better visualization of the aircraft, and improved learning curves for new employees in shop assembly areas and the engineering offices.

Historically, the F-15 engineering design was controlled by hand drawings. Many suppliers, especially newer and smaller industry partners, need the infrastructure to support this type of engineering. The transition to 3D MBD enables a broader supply base and allows small businesses to compete.

Another advantage is the reduced reliance on master set tooling. Master tools govern the interface of major aircraft sections down to the interfaces of an antenna onto the aircraft mold line. By performing a digital scan of the existing master tool, interface features can be incorporated directly into the detail part fabrication eliminating the need to add those features at a higher assembly. This results in savings by removing the need to cycle check assembly tools back to the master tools.

3D MBD data is also used to sustain of the F-15EX aircraft once they are fielded. It has been used from incorporation into the technical orders to inclusion in the creation of new Support Equipment to verify and test the aircraft. 3D MBD used to design and fabricate of the new antenna couplers required to test Satellite Communication System (SATCOM) and Global Positioning Satellite (GPS) systems.

#### SECTION 4: DEALING WITH PROGRAM COMPLEXITY

(VOLATILITY, UNCERTAINTY, COMPLEXITY, AMBIGUITY, or VUCA)

Value: 25 points

Use 12 pt. Times Roman typeface

Please respond to the following prompts:

**10 points: Describe UNIQUE areas of VUCA faced by your program and why. (Please avoid the issues surrounding Covid-19 pandemic, which was faced by all programs.)**

Boeing faced several unique challenges during the execution of the F-15EX program. These included:

**Volatility (VUCA):** The F-15EX team encountered volatility in many ways. World events drove changes in customer operations, and mission requirements with USAF strategic basing decisions changing CONUS and OCONUS fielding strategies. Additionally, supplier execution recovering from the COVID workforce disruption drove significant quality and delivery schedule changes into the production line. Finally, with constantly changing total USAF end quantities funded in each budget cycle due to the current fiscally constrained environment, the program must continually adjust long term non-recurring engineering and diminishing manufacturing source plans.

**Uncertainty (VUCA):** Uncertainty can be a daily obstacle in development and test environments. When new software and hardware, a changing supply base, and new strategic basing decisions, the team often found itself in a unique situation with hard-to-identify problems.



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**Complexity (VUCA):** An aircraft development program is complex by definition. As noted above, the first two F-15EX flight test aircraft evolved from the F-15QA aircraft, which made in managing two configurations more complicated for the production facility. Boeing had the objective to increase production capacity to meet USAF needs.

Through Rate Change Readiness (RCR), Boeing assessed all aspects of the F-15 production line to increase throughput from one aircraft a month to two aircraft a month. Assessments included Direct Labor, Support Labor, Layout/Floor Space, Equipment/Tooling, Planning System, and Supply Chain with action plans to stabilize rate.

**Ambiguity (VUCA):**

The design for F-15EX was not fully developed for the first production lot which created ambiguity and assumptions in the configuration.

- **15 points: Explain how your team responded to these challenges. What changes did you make, what were the results?**

**Responding to Volatility (VUCA):** The program adopted tight customer cross talk and open dialogue required to make updates and revector the support equipment, logistics activities, and spares on contract to meet the changing strategic based decisions. The program also adopted unique acquisition strategies including collective negotiations with USAF and Foreign Military Sales (FMS) customers, to leverage commonality of recurring and support costs across multiple stakeholders to drive efficiencies in process times and lower manpower requirements. Finally, to address supplier execution and budget cycle quantity changes, the program completed significant mitigation activities with the customer and sub-tier supplier visits to deliver all components required to sell off a fighter aircraft.

**Dealing with Uncertainty (VUCA):** Boeing set up recurring daily meetings to address obstacles and to remain agile as the program and problems evolved.

With the USAF customer, Boeing adopted Joint Business Review meetings, Joint Program Risk Assessments, and weekly Program Management and Contracting Officer tag-ups to make decisions and maintain agility.

**Mastering Complexity (VUCA):** Program planning in the production system drives managing multiple configurations. Boeing detailed the two configurations into the Manufacturing Execution System (MES) and Integrated Champion Environment (ICE) allowing them to assess operations data to gauge performance while maintaining quality and safety for the detailed build of both configurations.

**Applying Clarity to Ambiguity (VUCA):**

A high level of teamwork and coordination with customers enabled consistency by supplying information to Special Program Office (SPO) to help them make design decisions that accounted for support and fielding considerations.

## **SECTION 5: METRICS**

Value: 15 points

Use 12 pt. Times Roman typeface

Please respond to the following prompts, where predictive metrics indicate items that provide a view of how yestrday's actions and today's actions will affect the future timeline, cost or other requirement.

Provide charts/graphs that illustrate performance to these metrics:

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➤ **What are your predictive metrics?**

Boeing leverages multiple tools to provide predictive metrics. For Production Health, Boeing utilizes Production Status Reports, F-15 Bird Farm, Production Process Waterfalls and Production Scorecards to forecast production process flow of aircraft through the production line. For Production Capacity, Boeing utilizes the Rate Change Readiness (RCR) Review which evaluates the production system readiness for an authorized rate change commitment that increases or decrease the shipset rate for an existing production program. The RCR reviews and provides feedback on Rate Readiness Assessments and Gap Closure Planning for Direct Labor, Support Labor, Layout/Floor Space, Equipment/Tooling, Planning System, and Supply Chain. The Process provides documented feedback and actions needed to improve the quality and validity of the gap closure plans before submittal for Rate Change Approval. For Production Health, Boeing utilizes Production Status Reports, F-15 Bird Farm, Production Process Waterfalls and Production Scorecards to forecast production process flow of aircraft through the production line. For Production Capacity, Boeing utilizes the Rate Change Readiness (RCR) Review which evaluates the production system readiness for an authorized rate change commitment that increases or decreases the shipset rate for an existing production program. The RCR reviews and provide feedback on Rate Readiness Assessments and Gap Closure Planning for Direct Labor, Support Labor, Layout/Floor Space, Equipment/Tooling, Planning System, and Supply Chain. The process provides documented feedback and actions needed to improve the quality and validity of the gap closure plans before submittal for Rate Change Approval.

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Focusing on Finance and Schedule the use of Earned Value Management (EVM), and Scheduled Risk Analysis (SRA) allow predictive measurements. These tools provide indexes and analysis to see trends in improvements or declines in the financials and schedule.

**Financial Metrics:** Boeing utilizes metrics to align work scope, tasks, and resources within financial commitments that define the cost baseline and affordability targets and strategies throughout the program life cycle. These include Estimate at Completion (EAC), Budget at Completion (BAC), Cost Variance, Integrated Program Management Data and Analysis Report (IPMDAR).

**Schedule Metrics:** Boeing utilizes metrics to define and optimize program execution strategies, including organization, plans, program processes, workflows, schedules, resources, and execution controls to fulfill business and contract requirements which include Total Schedule Variance (TSV), Critical Path, Driving Paths, Schedule Risk Assessments (SRA), and Late Items.

**People Metrics:** Boeing utilizes metrics to measure the organization's health regarding progress toward the staffing plan, recruiting and talent retention, attrition and risks. These metrics are pulled quarterly and shared

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with senior leadership for awareness and insight into areas where more effort is needed from a people perspective.

**Production Capacity Metrics:** Boeing utilizes metrics to measure Direct Labor (DL), Support Labor (SL), Layout/Floor Space, Equipment/Tooling, Planning System, and Supply Chain to achieve the current rate and generate gap closure plans for rate increase approval.

➤ **How did you perform against these metrics?**

**Financial Metrics:** Financial metrics has helped keep the F-15EX program affordable for the USAF opening options for up to 98 aircraft to be procured. These metrics has kept the current Lot 1 production on budget for the USAF as well as allowing communication when aspects are exceeding expected costs.

**Schedule Metrics:** Schedule metrics has allowed the program to communicate schedule impacts which ultimately influence fielding of the warfighter. These metrics allowed a successful fielding of EX7 and EX8 to Portland Air National Guard in the Summer of 2024.

**People Metrics:** Measurements of organizational health has helped trigger staffing increases to meet production rates for F-15EX. The increase has driven an increase of staff to 780 personnel by the end of 2024.

**Production Capacity Metrics:** Production Capacity Metrics has helped project the health of the F-15EX production line. These metics have highlighted concerns with suppliers creating future bottlenecks in the production flow and allowing leadership to help mitigate before production line was impacted.

➤ **How do your predictive metrics drive action toward program excellence? Please provide examples.**

Boeing's predictive metrics has lead USAF to approve Full Rate Production decision for the program in June 2024, the continuation of F-15EX production with Lot 5 and Lot 6 delivery Orders with up to 98 aircraft and ultimately the successful fielding of F-15EX at Portland Air National Guard.